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JOINT NEPA/SEPA

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

WASHINGTON WINDPLANT #1

PROPOSED BY: KENETECH WINDPOWER, INC.

LEAD AGENCIES:

KLICKITAT COUNTY, WASHINGTON

BONNEVILLE POWER ADMINISTRATION

FEBRUARY 1995

DOE/EIS-0205

Cover Memo

This Draft Environmental Impact Statement (DEIS) addresses the Washington Windplant #1 proposal for construction and operation of a 115-megawatt (MW) windpower project in the Columbia Hills area southeast of Goldendale in Klickitat County, Washington. The Project would be constructed on private land under easement to KENETECH Windpower, Inc. (the Applicant). An Environmental Impact Statement is required under both NEPA and SEPA guidelines and is issued under Section 102 (2) (C) of the National Environmental Policy Act (NEPA) at 42 U.S.C. 4321 et seq and under the Washington State Environmental Policy Act (SEPA) as provided by RCW 43.21C.030 (2) (c). Bonneville Power Administration is the NEPA lead agency and Klickitat County is the SEPA lead agency for this DEIS.

The project site is approximately 5,110 hectares (12,630 acres) in size. The project would include approximately 345 type 33M-VS wind turbines. Alternatives to the Proposed Action evaluated in this EIS include:

- An Alternative Powerline Route to reduce impacts to native plant communities and priority habitats.
- A Restricted Areas Alternative to avoid areas where there is potential for significant adverse environmental impacts.
- A Subarea Development Alternative, which would limit the initial phase of development to either the western portion of the site or the east-central portion of the site.
- No Action Alternative under which the Project would not be constructed and existing grazing and agricultural activities on the site would continue.

Interested citizens, agencies, and tribes are invited to review this DEIS and provide written comments on or before April 10, 1995. Written comments should be addressed to: Kathy Fisher, ECN3 Bonneville Power Administration, 905 NE 11th Avenue, Portland, Oregon 97232, (503) 230-4375 or Curt Dreyer, Klickitat County Planning Director, 228 West Main, Room 150, Goldendale, Washington 98620, (509) 773-5703. A Public Hearing to accept oral comments is scheduled on April 5, 1995, at 7:00 in the evening at the Klickitat County Public Utility District No. 1 hearing room in Goldendale, Washington (1313 South Columbus).

All comments received will be responded to in a Final EIS. The Final EIS will be used prior to the decision making process to determine if the Proposed Action or any of the alternatives should be given the permits and approvals needed for construction and operation of the Project.

Fact Sheet

Joint NEPA/SEPA Document

This Environmental Impact Statement (EIS) is a joint document issued under Section 102 (2) (C) of the National Environmental Policy Act (NEPA) at 42 U.S.C. 4321 et seq and under the Washington State Environmental Policy (SEPA) as provided by RCW 43.21C.030 (2) (c).

Nature and Location of the Proposal and Alternatives

KENETECH Windpower, Inc. proposes to construct and operate the 115-megawatt (MW) Washington Windplant #1 in a portion of the Columbia Hills area of Klickitat County, Washington. The Project would be constructed on private land under easement to KENETECH Windpower, Inc. The Project site is approximately 5,110 hectares (12,630 acres) in size. The Project would include approximately 345 type 33M-VS wind turbines.

Alternatives to the Proposed Action evaluated in this EIS include:

- An Alternative Powerline Route
- A Restricted Areas Alternative
- A Subarea Development Alternative
- No-Action Alternative

The Alternative Powerline Route involves modifying the route for the Project's 34.5-kilovolt (kV) powerline to reduce impacts to native plant communities and priority habitats. The Restricted Areas Alternative involves Conditional Use Permit conditions that specify areas of the site where development should not occur based on the potential for probable significant adverse environmental impacts that could not be mitigated through other means. The Subarea Development Alternative involves limiting the initial phase of development to one of two areas: the western portion of the site (Option 1) or the east-central portion of the site (Option 2). Under the No Action Alternative, the Project would not be constructed and existing agricultural, grazing, and utility use on the site would continue.

Proponent

The proponent is KENETECH Windpower, Inc.

Proposed Date for Implementation

Assuming all permits and approvals are obtained, the proposed Washington Windplant #1 would begin operation in 1996. Construction is scheduled to begin July, 1995.

Lead Agencies

Klickitat County is the Washington SEPA lead agency for the EIS. Bonneville Power Administration is the lead agency under NEPA.

Responsible Officials and Contacts

Curt Dreyer, Klickitat County Planning Director, 228 West Main, Room 150, Goldendale, Washington 98620, (509) 773-5703.

Kathy Fisher, ECN3 Bonneville Power Administration, 905 NE 11th Avenue, Portland, Oregon 97232, (503) 230-4375.

Required Permits and Licenses

Conditional Use Permit	Klickitat County
Building Permit(s)	Klickitat County
National Pollutant Discharge Elimination System (NPDES) General Permit	Washington Department of Ecology
Section 404 Nationwide Permits for crossing intermittent streams	U.S. Army Corps of Engineers
Section 401 Water Quality Certification	Washington Department of Ecology
Electrical Permit(s)	Washington Department of Labor and Industries
Transmission Services Agreement	Bonneville Power Administration

Authors and Principal Contributors

R. W. Beck	Project Management Earth Water Botany Aesthetics	Land Use Transportation Public Services and Utilities Health and Safety Cumulative Impacts
Jones & Stokes Associates, Inc.	Avian Resources Wildlife Noise Air Quality Aesthetics	
Historical Research Associates, Inc.	Cultural Resources	

Date of Issuance of Draft EIS

February 24, 1995

Time and Place of Joint SEPA/NEPA Public Hearing on Draft EIS

April 5, 1995
7:00 p.m.
Klickitat County Public Utility District No. 1
Hearing Room
1313 South Columbus
Goldendale, Washington

Date Comments are Due on Draft EIS

April 10, 1995, (Received by Klickitat County Planning Department or the Bonneville Power Administration)

Nature and Date of Final Actions

Final actions will include decisions by various agencies on permit applications, including a Conditional Use Permit which may be issued by Klickitat County. A public hearing on the Conditional Use Permit is expected in May 1995, but is subject to change. Other permit decisions are expected in the second quarter of 1995. Final action by the Bonneville Power Administration would be a Record of Decision (ROD) for a transmission services agreement with utilities purchasing the Project's electrical output.

Location of Background Environmental Data

Background material for this EIS, including supporting technical reports, is available during the applicable comment period at the Klickitat County Planning Department, 228 West Main, Room 150, Goldendale, Washington, 98620, and at the Bonneville Power Administration, 905 NE 11th Avenue, Public Information Office, Portland, Oregon, 97232. Supporting technical reports to this EIS include the following appendices:

- Washington Windplant No. 1 Botanical Resources Field Survey, R. W. Beck (December 1994)
- Avian Use of Proposed KENETECH and CARES Wind Farm Sites in Klickitat County, Washington, Jones and Stokes Associates, Inc. (January 1995)
- Draft Cultural Resources Assessment of the KENETECH Windpower Washington Windplant No. 1 Project, Klickitat County, Historical Research Associates, Inc. (January 1995)

These appendices have been distributed to county libraries and to resource agencies with expertise or jurisdiction over biological or cultural resources (see Part 6, Distribution List).

Cost to the Public for a Copy of This Draft EIS

\$30.00	per copy of the DEIS
\$ 4.00	per copy of Botanical Resources Field Survey
\$10.00	per copy of the draft Cultural Resources Assessment
\$24.00	per copy of the Avian Use Report

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SUMMARY

Summary

S.1 Overview

S.1.1 Proposal

KENETECH Windpower, Inc. (the Applicant), has applied for a Conditional Use Permit from Klickitat County to develop Washington Windplant #1 (the Project) in the Columbia Hills area of Klickitat County, southeast of Goldendale (see Figure S-1). The proposed Project would provide 115 megawatts (MW) of wind-powered electrical generation capacity. Electrical power from the proposed Project would be transmitted by the Bonneville Power Administration (BPA) over its transmission system to utilities purchasing the Project's output. A Transmission Services Agreement or Agreements between BPA and the purchasing utilities would therefore be required for this Project. PacifiCorp, Puget, and PGE have submitted to BPA a "good faith request," pursuant to the implementing regulations of the Energy Policy Act of 1992, to wheel 50 MW (Phase 1 of the Project) of power generated by the Project over the BPA transmission system.

S.1.2 Existing Setting

The Washington Windplant #1 site is located in the Columbia Hills area of Klickitat County, 9.6 km (6 miles) southeast of Goldendale and to the east of U.S. Highway 97 (US-97). Specifically, the site is located south of Hoctor Road and north of State Route 14 (SR-14). The 5,110-hectare (12,630-acre) Project site extends for approximately 23 km (14 miles) along the crest of the Columbia Hills. The Columbia River serves as a major barge transportation route and recreational resource. In addition, the river has been highly developed with dams and associated hydroelectric generating facilities. One such facility — John Day Dam — is located below the Project site. A large industrial facility — Columbia Aluminum — is located adjacent to John Day Dam. KENETECH Windpower, Inc. has collected wind data in the Columbia Hills and has determined that the area has an adequate wind resource to support a commercial-scale wind power project.

Project lands are all privately owned and have been used for grazing and, to a lesser extent, for cultivated crops for more than a century. Prior to european settlement and private ownership of the land, the Columbia Hills were used by Native American tribes and bands which ceded the lands to the U.S. government pursuant to the Treaty of June 9, 1855. This treaty created the Yakima Indian Reservation, approximately 28 km (17 miles) to the north. Traditional cultural use of Project lands by Native Americans is discussed in Section 2.6.

The Applicant has entered into wind power easement agreements with Project landowners. Project lands are currently zoned Extensive Agriculture and Open Space, and are primarily cultivated or used for grazing. The proposed Project would reduce the amount of land on the site available for agricultural use by about 1.5 percent. Roads would displace about 1.6 hectares (4 acres) of cultivated land. The overhead powerline would traverse approximately 3.2 hectares (8 acres) of cultivated land, but most of this area could remain in agricultural use following

Project development. The compatibility of the Project with agricultural uses is discussed in Section 2.8.

The Project would add an additional utility facility to the site. A number of existing public utility corridors currently occupy portions of the Project site. Two BPA high-voltage transmission lines are partially located on Project lands: the 230-kV Midway-Big Eddy line crosses the northwestern corner of the site; and the 500-kV Hanford-John Day line passes through the far eastern portion of the site. A 115-kV Klickitat County Public Utility District (PUD) transmission line crosses the western portion of the site enroute from John Day Dam to Goldendale. A natural gas pipeline runs east-west just south of Hoctor Road and passes through the northern portion of the Project site. Several public and private communication facilities are also located on or near the Project site on Juniper and Luna points. The Project's potential impacts on public utilities and services are discussed in Section 2.12.

S.1.3 Applicant's Objectives

The Applicant's primary objectives for the Project are: to construct and operate an electrical generation project using advanced utility-grade wind turbine technology specifically designed by KENETECH Windpower, Inc.; to initially deliver 50 MW (Phase 1) of installed wind-powered generating capacity over BPA's transmission system to three investor-owned electrical utilities (Pacificorp, Puget Sound Power & Light Company, and Portland General Electric) that have entered into an agreement to purchase this capacity; to have the permitted capability to construct and operate an additional 65 MW of wind-powered electrical generating capacity on the Project site; to develop and operate the Project in a manner that is compatible with ongoing agricultural and grazing use of Project lands; and to meet the public demand for additional energy resources.

S.1.4 BPA Purpose and Need

Public Law 93-454, the Transmission System Act, requires that BPA make excess transmission capacity available to utilities requesting transmission service. The Energy Policy Act of 1992 also requires utilities, including BPA, to make arrangements to provide transmission wheeling subject to certain constraints. PacifiCorp, Puget, and PGE have submitted to BPA a "good faith request," pursuant to the implementing regulations of the Energy Policy Act of 1992, to wheel 50 MW of power generated by the Project over the BPA transmission system. BPA needs to respond to this request. The BPA purposes that will be considered in evaluating the utilities' request include:

- Restoring and enhancing environmental quality and avoiding or minimizing possible adverse environmental effects.
- Assuring consistency with BPA's statutory responsibilities, including the Pacific Northwest Electric Power Planning and Conservation Act (Regional Power Act), the Transmission System Act, and the Energy Policy Act of 1992.
- Protecting BPA's ability to serve its existing contractual obligations and to remain able to meet the needs of its customers.

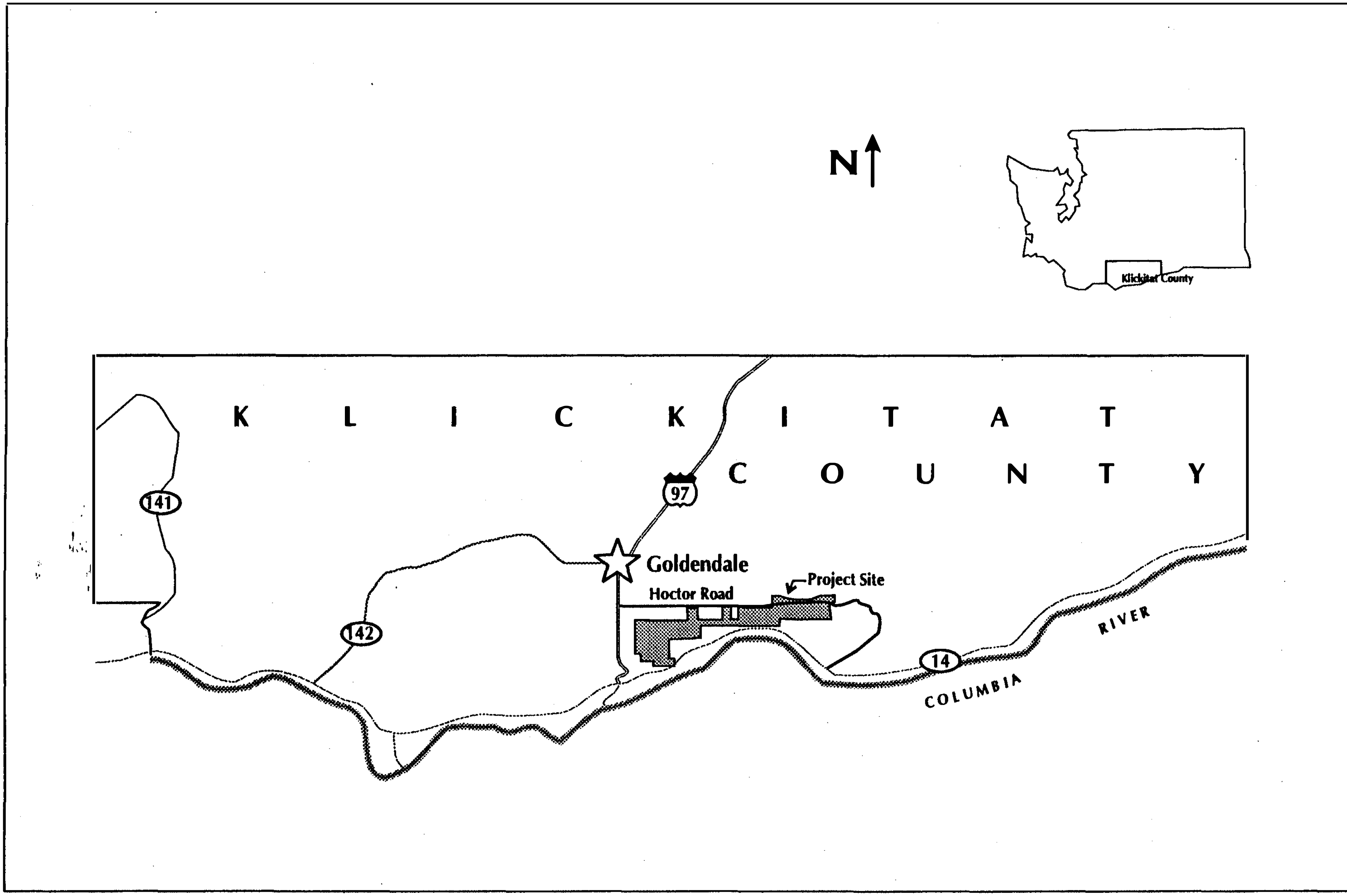


Figure S-1 – Location Map

- Providing electrical system reliability that meets BPA's reliability criteria.
- Preserving transmission capability for future BPA resources.

S.2 Relationship to Future or Phased Environmental Review

The Applicant has applied for a Conditional Use Permit that would apply to the entire 115-MW Project, and this EIS addresses the environmental impacts of the full Project development. Therefore, phased environmental review is not anticipated.

S.3 Proposed Action and Alternatives

S.3.1 Proposed Action

Figure S-2 shows overall Project development as proposed on the site. As proposed, development of Washington Windplant #1 would ultimately entail installation of approximately 345 wind turbines arranged in up to 39 distinct rows (turbine strings). Development within each turbine string would include turbine tower structures and foundation pads, controls, small transformers, underground collection and communication lines, and an access road.

Turbines would be designed and manufactured by the Applicant. Each turbine consists of three main components: 1) the rotor/generator assembly, which converts wind power to electrical energy; 2) a modified tubular tower; and 3) a foundation supporting the entire turbine structure.

The KENETECH 33M-VS turbine (see Figure S-3) is designed to convert wind power to electrical energy using a 33- to 39-meter-diameter (108 to 128 feet), 3-blade rotor, which resembles an airplane propeller. The rotor blades are made of laminated fiberglass, and each blade is connected to a central hub. These turbines use a horizontal axis, upwind, variable speed design, where the axis of the blades' rotation is parallel to the wind stream and the rotor assembly is located upwind of the turbine tower. Modified tubular steel turbine towers are proposed. Towers would range from 24 to 36.6 meters (80 to 120 feet) high, depending on localized site conditions. Each tower would incorporate an enclosed climbing ladder to provide access to the turbine unit.

The speed of the rotor's rotation ranges from 14 to 54 rpm. Through a series of gears and shafts (the transmission), the rotation of the rotor shaft induces an electrical current in the generator to produce electricity. Power from each wind turbine would be fed through underground 600-Volt power cables to small transformers that would "step up" the electrical voltage to 34.5 kV. Each transformer would serve two to three turbines. Communication lines and conduits containing electrical power cables would be buried approximately 0.6 meters (2 feet) below the ground surface along each turbine string.

Power from the underground power collection lines would be fed directly to the overhead Project powerline, which generally would run east-west across the site as shown on Figure S-2.

The 34.5-kV Project powerline would be supported by single wood poles. The powerline would connect to a new substation located on-site, where power voltage would be increased to 230 kV prior to interconnection with the BPA Midway-Big Eddy transmission line. Security fencing would be constructed around the substation. All electrical equipment would be designed and installed in compliance with national electrical safety codes and standards, including NEMA (National Electrical Manufacturers Association), ANSI (American National Standards Institute), and IEEE (Institute of Electrical and Electronics Engineers), and with the requirements of WAC 296-44.

Project site development would also entail upgrading existing roads and constructing new roads to provide access to the turbine strings. Generally, primary access roads would follow ridgelines across the site. Where feasible, existing roads would be upgraded to serve as primary access roads. Roads would be constructed on grades up to about 10 percent. Where required by site conditions, such as steep slopes, switchbacks would be used. Temporary staging areas totaling about 4 hectares (10 acres) for construction equipment and materials would also be required.

The total amount of land that would be disturbed during construction is about 155 hectares (382 acres). After restoration of temporarily disturbed areas, Project features would permanently occupy about 79 hectares (193 acres). Less than 2 hectares (less than 3 acres) would be impervious surface (see Table S-1).

TABLE S-1
SUMMARY OF PROJECT FEATURES

Features	Area Temporarily Disturbed		Area Permanently Occupied	
	Hectares	Acres	Hectares	Acres
Turbine String and New Secondary Access Road[1]	98	243	33	82
Powerline	17	42	14	34
New Primary Access Road[2]	27	66	24	58
Substation	<1	1	<1	1
Upgraded Access Road	8	20	7	18
Construction Staging Area	4	10	0	0
TOTAL (rounded to closest hectare/acre)	155	382	79	193

1 Assumes 30-meter (100-foot) disturbance corridor along turbine strings except where steep terrain dictates the use of road switchbacks. Secondary roads along turbine strings are about 4 meters (12 feet) wide plus associated drainage ditches.

2 Assumes area required for an approximately 5-meter (16-foot) primary road and associated drainage ditches.

Construction of Phase 1 of the Washington Windplant #1 and each additional phase is estimated to require eight (8) to eleven (11) months. Construction would require the movement of heavy equipment and vehicles to and from the Project site and on-site staging of construction equipment and materials. Construction vehicles and equipment include bulldozers, graders, backhoes, water trucks, truck-mounted drill rigs, cranes, concrete mixers, gravel trucks, and equipment delivery vehicles. Most daily construction traffic would be associated with gravel

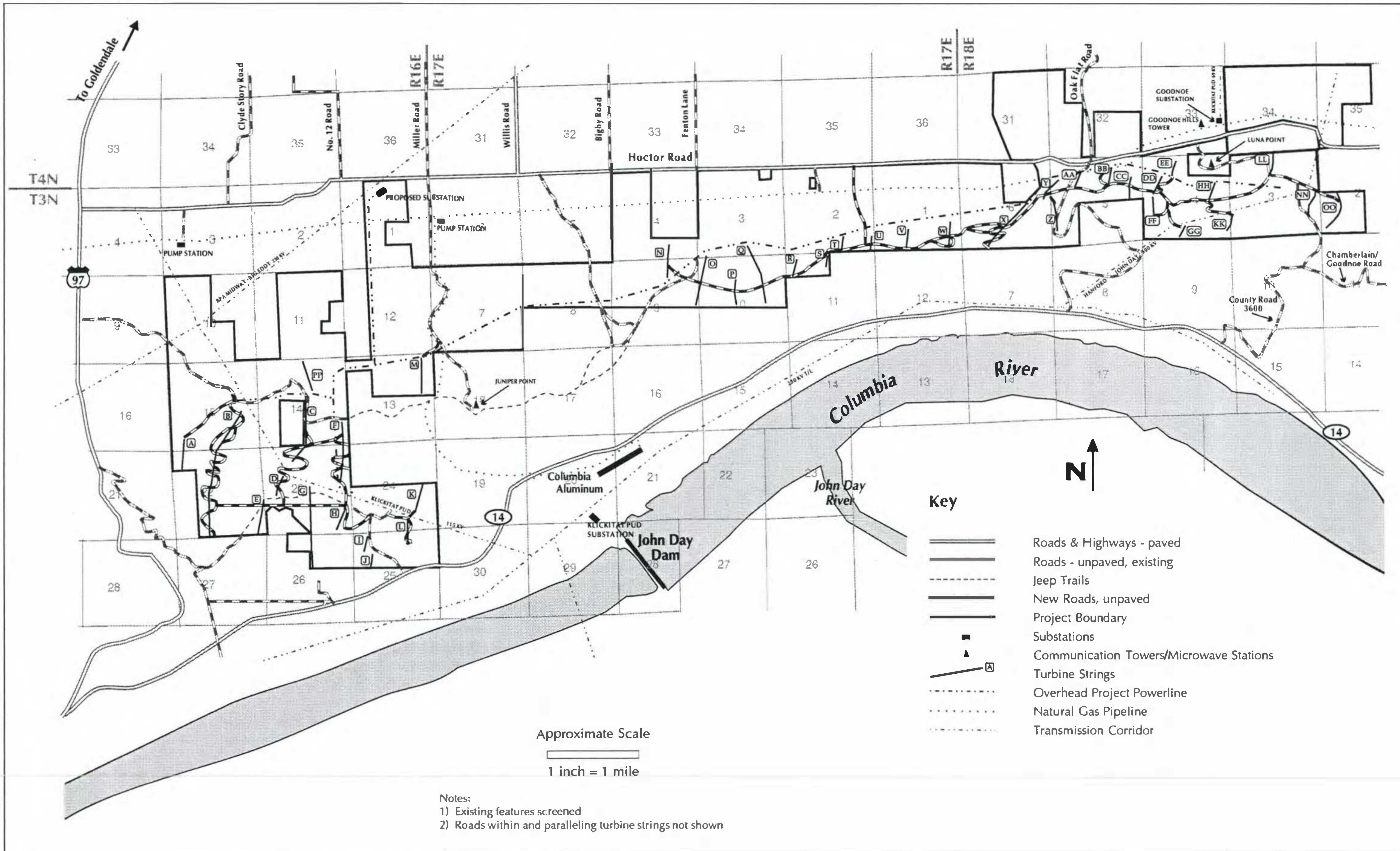


Figure S-2 — Proposed Site Development

trucks bringing aggregate from off-site to the site for road construction. The Applicant has not yet identified an off-site aggregate source.

The Project would provide power throughout the year, but power generation would vary according to seasonal and diurnal wind conditions. Peak power production would occur from April through September. During the peak season, peak daily power production would occur from late afternoon through early evening. Much of the Project would operate automatically through an electronic communications and control system. During operations, the Project would employ approximately nine full-time workers (Business Development Concepts, 1994). These employees would work at the off-site operations and maintenance facility; however, maintenance employees would tour and inspect the Project site daily.

Mitigation measures proposed by the Applicant and that will be included as part of the proposed Project include:

- Eliminating the potential for bird collisions with guy wires by installing turbines, meteorological and microwave towers that do not require guy wires for support.
- Reducing the potential for turbine towers to attract birds by using a modified tubular tower rather than a lattice tower structure. (Research indicates that lattice towers may be used by birds for perching.)
- Reducing the potential for bird collision and electrocution by locating powerlines underground where they run along turbine strings.
- Reducing the potential for bird electrocution by designing the 34.5-kV powerline with raptor protection measures. Raptor protection measures will be designed in accordance with *Suggested Practices for Raptor Protection on Powerlines* (Miller, 1975).
- Providing turbines with overspeed protection to prevent damage to generator and tower structure.
- Designing the turbine towers and foundation to survive windspeeds of 161 km per hour at 9 meters (100 mph at 30 feet) above the ground surface.
- Providing a climbing ladder on the inside of the tower to provide safe access during icy weather conditions and designing the ladders to meet all applicable health and safety standards.
- Housing gears and moving parts within the nacelle (see Figure S-3) to contain sparks and prevent fires.
- Providing locks and high voltage warning labels on all control cabinets and transformer cabinets to reduce the risk of electrocution.
- Fencing and locking the Project substation and providing warning signs about the presence of high voltage equipment.
- Providing radio-controlled locked gates onto the Project site and signs warning of high voltage equipment and buried cable.

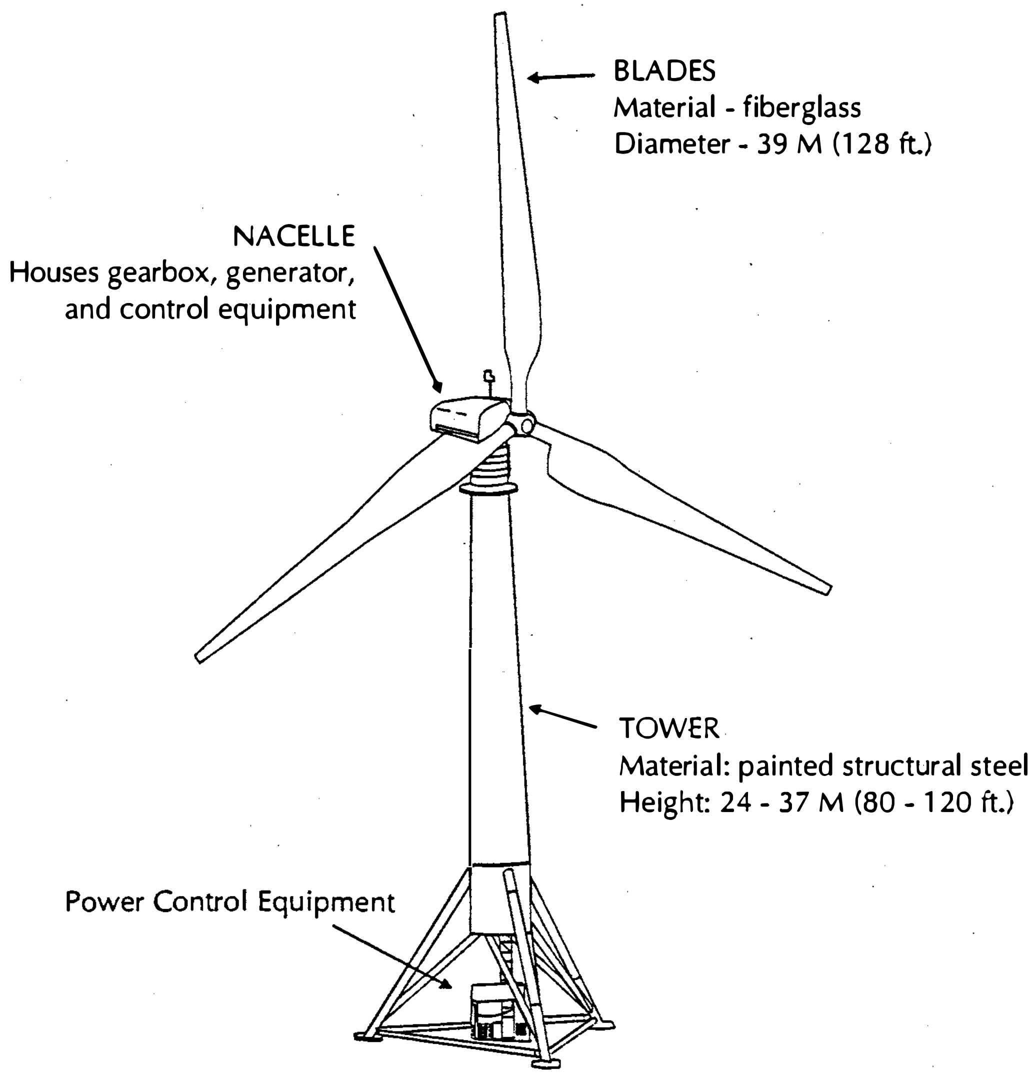


Figure S-3
Proposed Turbine

Source: KENETECH Windpower

- Locating the overhead powerline at least 61 meters (200 feet) from the turbines so that cranes working on the turbines will be at a safe distance from the powerlines.
- Using and upgrading existing roads wherever feasible rather than building new roads.
- Constructing roads with ditches and culverts sized to accommodate the 100-year storm.
- Locating roads along ridgelines to reduce the amount of cut and fill (grading) required.
- Revegetating any disturbed areas that are not permanently occupied by Project features.
- Providing a minimum 15-cm (6-inch) gravel surface on Project roads to reduce wind erosion.
- Using non-reflective paints to reduce glare.
- Locating turbines in strings to improve aesthetics by providing a more uniform-looking development.
- Installing power collection and communication lines underground along turbine strings.

S.3.2 Alternative Overhead Powerline Route

An alternative route for the Project powerline is shown on Figure S-4. This alternative route would reduce impacts to native plant communities and Priority Habitats primarily by avoiding a large block of shrub-steppe and Oregon white oak habitats located in the western portion of the site. From Section 9, Range 3N Township 17E east, the alternative route would follow the same alignment as the proposed route.

S.3.3 Restricted Areas Alternative

The Restricted Areas Alternative would involve Conditional Use Permit conditions that place restrictions on development in specific areas of the site or on specific turbine strings. Conditions would specify where development would not be allowed to occur based on the potential for probable significant adverse environmental impacts that could not be mitigated through other means.

S.3.4 Subarea Development Alternative

The Subarea Development alternative compares two options for development of Phase 1 of the Proposed Project:

Option 1 – Phase 1 development limited to the western portion of the site.

Option 2 – Phase 1 development limited to the east-central portion of the site.

These two subareas are shown on Figure S-5.

The objective of this alternative would be to limit the area disturbed during Phase 1 development. This would reduce impacts during the period of time prior to the development of subsequent Project phases. In the event that subsequent phases are ultimately not developed, the long-term impacts of the Project would then be limited to a more confined area of the site.

S.3.5 No Action

The No Action Alternative consists of KENETECH Windpower, Inc., not building and operating a 115-MW, wind-powered electric generating plant in the Columbia Hills east of US-97, near Goldendale, Washington.

S.3.6 Alternatives Considered But Eliminated From Detailed Study

The lead agencies reviewed information on a wind power site that was previously considered by the Applicant but abandoned. The site was located in the vicinity of Rattlesnake Mountain on the Hanford Nuclear Reservation and included a portion of the National Environmental Research Park at Hanford and Arid Lands Ecology Reserve. Development of the Rattlesnake Mountain site would have conflicted with federal policies for the Research Park and Ecological Reserve at Hanford. For this reason and because of the potential environmental impacts identified during preliminary work on the site, the Applicant determined that the Rattlesnake Mountain site was not available for development of the Project and the lead agencies determined that it was not a reasonable or feasible alternative to the Proposed Action.

S.4 Major Conclusions, Areas of Controversy and Uncertainty, and Issues to be Resolved

Washington SEPA rules require that EIS summaries identify major conclusions, significant areas of controversy and uncertainty, and issues to be resolved, including the environmental choices to be made among alternative courses of action and the effectiveness of mitigation measures. Table S-2 summarizes impacts, mitigation measures, and significant unavoidable adverse impacts that are expected for the proposed Project and alternatives. Based on the environmental review conducted for this EIS and without considering additional mitigation measures identified in the EIS, the following potentially significant adverse impacts were identified for the proposed Project:

- Erosion and sedimentation during Project construction.
- Disturbance of certain high-quality native plant communities occurring in shrub-steppe habitat.
- Impacts to western gray squirrel habitat and potential disturbance during nesting.
- Incidental collision of birds, including impacts to special-status species with wind turbines.

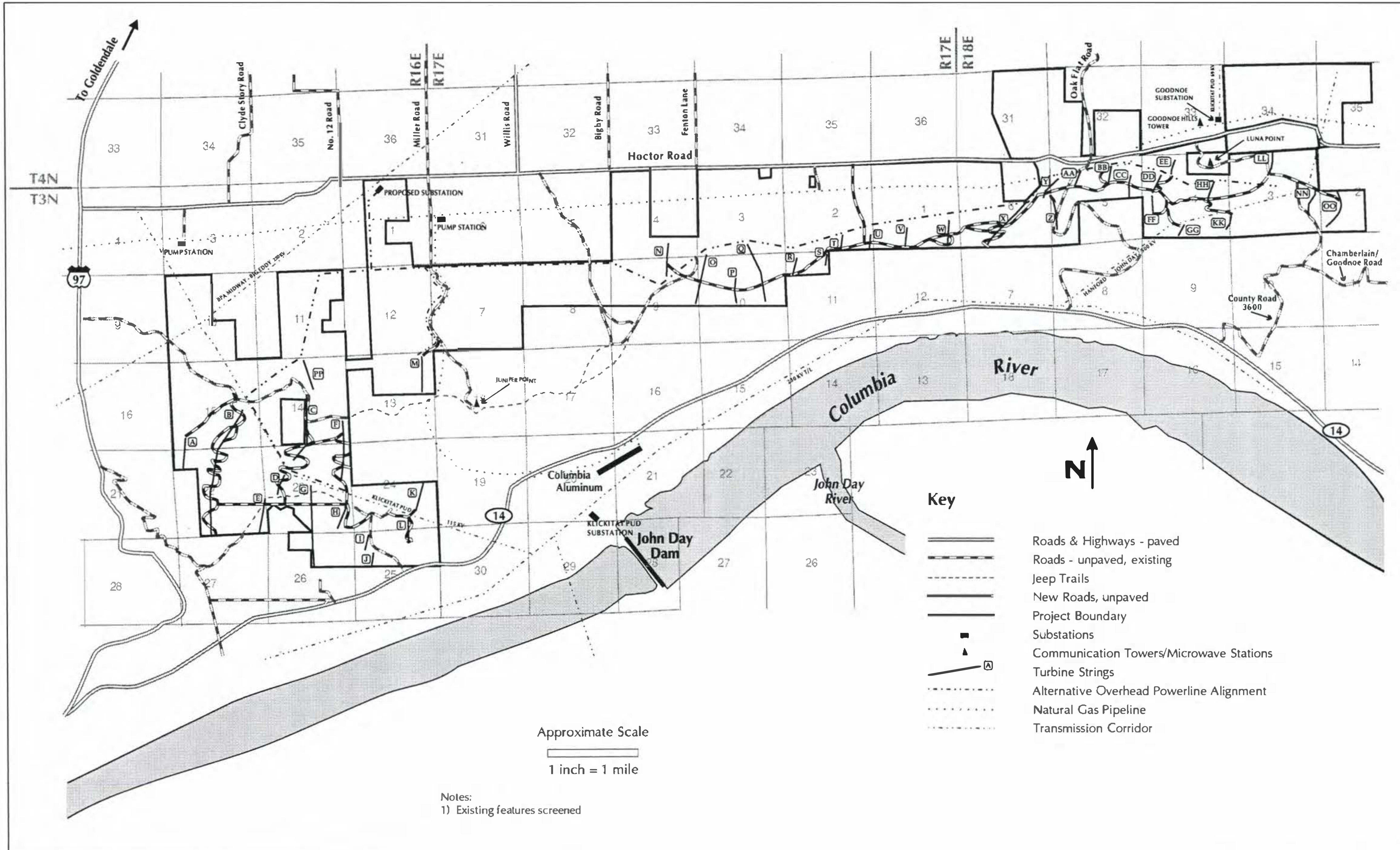


Figure S-4 — Alternative Powerline Route

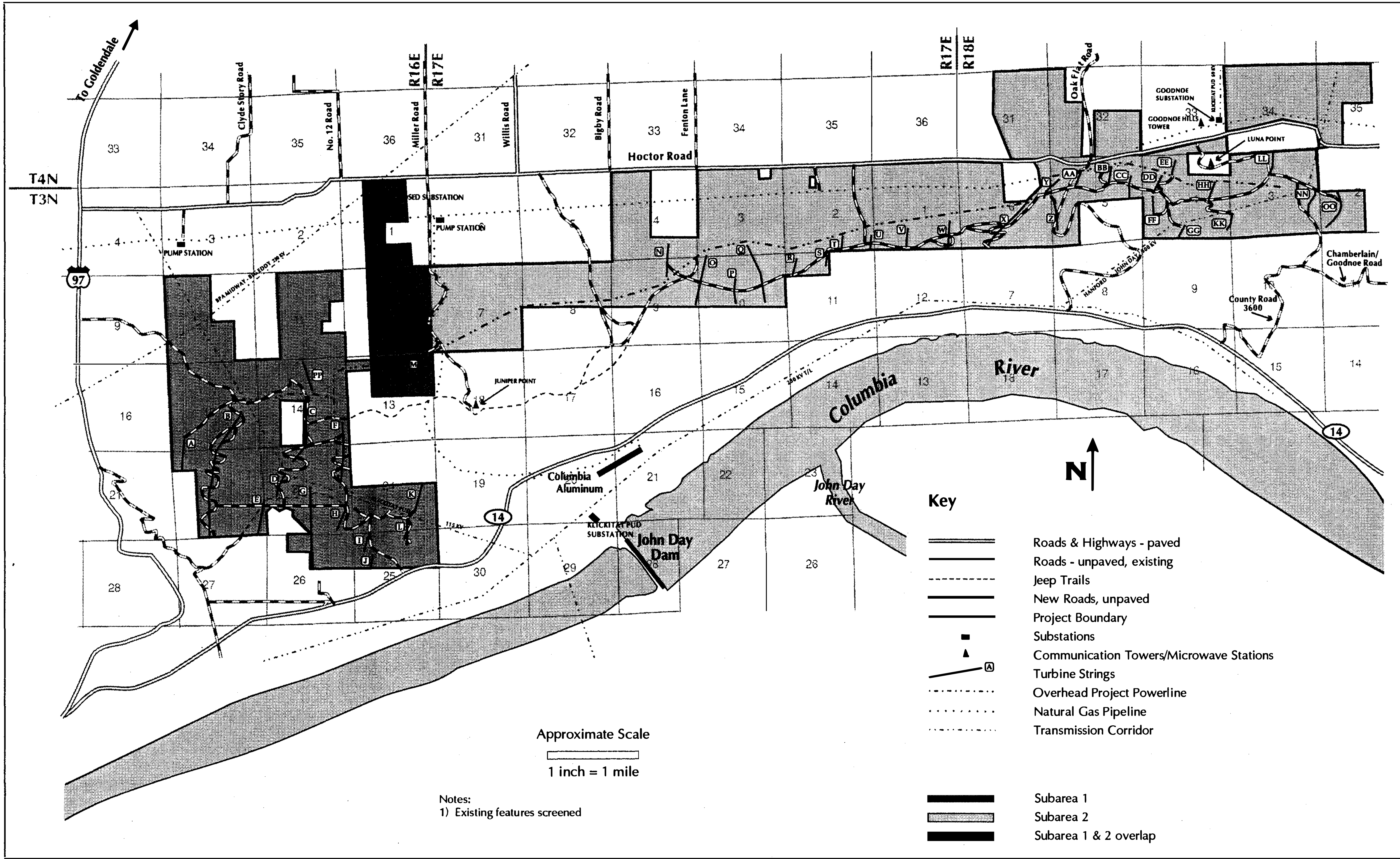


Figure S-5 — Subarea Development Alternative

- Disturbance of cultural sites that are potentially eligible for listing in the National Register of Historic Places.
- Potential aesthetic impacts to views along Hoctor Road and to certain views near Maryhill and at other locations near the Columbia River.
- Potential exceedence of the nighttime noise standard (50 dBA[1]) at some residential locations.
- Potential schedule conflicts with repairs planned for Hoctor Road in the summer of 1995.
- Potential for obstruction of line-of-sight microwave signal transmission at certain turbine string locations.

These impacts can largely be avoided, minimized, and/or otherwise mitigated. Erosion and sedimentation impacts can be minimized by employing Best Management Practices for stabilizing soils, controlling runoff, and removing sediments prior to discharging runoff to intermittent streams and drainages. Disturbance to shrub-steppe habitat can be reduced by changing the routing of Project powerlines and roads; by flagging the limits of construction; and by intensive efforts at reseeding, restoration, and ongoing weed control. Potential impacts to the western gray squirrel can be minimized by retaining oak vegetation and restricting construction activity near nest sites. Potential impacts to birds can be reduced by employing tubular towers and by minimizing construction disturbance near nesting and roosting sites. Potentially eligible cultural sites can be largely avoided by flagging the sites and restricting construction activities from the flagged areas. Noise impacts can be reduced by modifying the number of turbines in individual strings. Schedule conflicts with planned repairs to Hoctor Road can be minimized by coordinating construction activities with County Department of Public Services and timing construction in areas that do not have to be accessed from Hoctor Road to coincide with the time-critical construction activities that are occurring on that road. Potential conflicts with line-of-sight microwave transmissions can be avoided by placement of individual turbines to avoid signal paths.

Even with the above mitigation measures, there would continue to be some potential for significant adverse impacts to occur to a few environmental resources on a few areas of the site. These and other areas of uncertainty identified in this environmental review include:

1) **Impacts to High-Quality Douglas' Buckwheat-Sandberg's Bluegrass Plant Communities.** High-quality examples of this native plant community exist in shrub-steppe habitat located in the western and central habitat complexes on the Project site. This community exists across a narrow, natural range in Washington on the Project site. This commonly exists in shallow, rocky soils occurring along portions of the crest of the Columbia Hills. These soils exhibit a crust of lichens and mosses. Because of the low productivity and water-retention capabilities of these soils, the crust plays a critical role in the ecology of this community. The soil crust can be easily disturbed by construction activity. Successful efforts to restore this community have not been documented.

[1] dBA = A-weighted decibels.

Therefore, increased erosion and the potential for establishment of invasive weeds could result if restoration efforts proved unsuccessful.

2) **Impacts to Potentially Eligible Cultural Resources Sites Located on Turbine Strings J and EE.** While most cultural sites identified for this environmental review appear to be avoidable, sites along turbine strings J and EE occupy virtually the entire turbine string. Further testing would be required to determine if these sites are, in fact, eligible and, if they are, to design a mitigation plan for scientific data recovery. With appropriate data recovery, impacts would not be considered significant.

3) **Avian Impacts.** Year-long Project avian studies suggest the Project site is used by resident raptor populations and by migrating raptors and passerines such as the western bluebird. However, the Project site does not appear to be in a major migratory flyway. The Applicant has incorporated several mitigation measures into its Proposed Action, including: raptor protection of powerlines and power poles; use of tubular rather than lattice towers; and eliminating the use of guy wires. Nonetheless, some incidental raptor mortality would be unavoidable. Peregrine falcons, a federally listed endangered species, use the site infrequently, and their foraging preferences may not make them particularly susceptible to collision with wind turbines. Nonetheless, one pair was observed frequenting an area approximately 8 km (5 miles) to the east of the Project site. Although unlikely, if a peregrine falcon collision did occur, it would reduce the population of the peregrines in the Columbia Gorge Management Unit, but would not significantly affect the viability of the species in that management unit since the population is estimated at up to seven breeding pairs, which likely exceeds the management goal for the area. Bald eagles, a federal threatened species, winter in the vicinity of the site and some mortality due to collision would be possible. Klickitat County provides only minor bald eagle wintering habitat relative to eastern Washington as a whole. Therefore, regional population levels are unlikely to be significantly affected by the proposed Project, although the local population could be reduced.

4) **Aesthetics.** The Project would be visible to viewers along Hoctor Road, portions of US-97, near Maryhill, and from locations along I-84 and SR-14. Although mitigation can reduce aesthetic impacts research suggests that some viewers would find the Project visually displeasing while others would regard the Project favorably.

5) **Traditional Cultural Properties.** Consultation with the Yakama Indian Nation regarding the potential for traditional cultural properties that could be eligible for listing in the National Register of Historic Places is ongoing. Review of oral history interviews conducted to date with certain Yakama elders indicates that Juniper Point, located south of the Project site, might be eligible for listing. Ongoing consultation with the Yakama Nation could reveal additional traditional cultural properties in the vicinity.

Alternatives considered in this EIS would reduce Project impacts and address these uncertainties to varying degrees:

- **The Alternative Powerline Route** would reduce impacts to Oregon white oak and shrub-steppe habitats by routing around the extensive habitat complex in the western area of the site. This would reduce disturbance to high-quality Douglas' buckwheat-Sandberg's bluegrass communities.

- **The Restricted Areas Alternative** would prohibit Project development in areas of high-quality Douglas' buckwheat-Sandberg's bluegrass communities and along turbine strings J and EE, which contain unavoidable cultural resources. This would eliminate the potential for significant adverse impacts to those resources.

- **The Subarea Development Alternative** would restrict Phase 1 of the Project to either the western or east-central area of the site. Either option would: (1) reduce the overall area of disturbed soil and thereby the potential for erosion and sedimentation; (2) reduce the amount of priority oak and shrub-steppe habitat and high-quality native plant communities disturbed; (3) allow for monitoring and testing of efforts to restore Douglas' buckwheat-Sandberg's bluegrass plant communities; (4) reduce construction traffic impacts; and (5) reduce nighttime noise impacts at certain locations until development of subsequent phases of the Project.

- **No Action.** The No-Action Alternative would avoid impacts associated with the development of Washington Windplant #1. However, impacts caused by ongoing farming and grazing practices would continue. In addition, No Action could result in increased use of fossil fuels for energy production resulting in increased localized impacts to air quality as well as wider-scale cumulative impacts, including ozone depletion, acid rain, and the greenhouse effect (global warming).

S.5 Timing of Possible Approval

Washington State SEPA rules require that an EIS address the benefits and disadvantages of implementing a proposal at some future time [WAC 197-11-440(5)]. In addition, NEPA regulations require discussions of the short-term uses of man's environment and the maintenance of long-term productivity and any irreversible or irretrievable commitments of resources that would result from implementation of a proposal (40 C.F.R. §1502.19).

The Project would negligibly reduce the amount of land available for cultivation and grazing, and would provide a source of additional income for site landowners. The Project would utilize wind, a renewable resource, for power generation and would not result in the irreversible or irretrievable commitment of resources since areas of the site occupied by Project features could be returned to agricultural use following decommissioning of the Project.

Deferring approval would provide time for additional studies of avian use, but could result in cancellation of the Project due to the Applicant's contractual obligations to deliver power. This would eliminate an opportunity to demonstrate a commercial-scale windpower project in Washington and could ultimately lead to development of additional fossil fuel generating resources as discussed in Section 1.4 (No Action) with comparatively greater environmental impacts on a per-MW basis. In addition, cancellation of the Project would eliminate a source of income to the agricultural property owners with whom the Applicant has entered into easement agreements.

TABLE S-2
SUMMARY OF IMPACTS AND MITIGATION

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Earth	AE: Project site extends along 14 miles of The Columbia Hills on the north side of the Columbia River in south-central Washington. Site topography is distinguished by the Columbia Hills Ridge crest which rises approx. 700 to 800 meters (2,300 to 2,700 feet) above the Columbia River. Site elevations range from 305 to 880 meters (1,000 to 2,890 feet) above sea level. Slopes on the site range from 0 to 90 percent. Site geology reflects folding of the Columbia River basalts, a hard rock formed from lava that flows from large fissures in the earth's crust. No faults have been identified on the Project site. I: Clearing and grading would disturb approx. 155 hectares (382 acres) resulting in the potential for erosion and sedimentation. Up to 99,000 cubic meters (130,000 cubic yards) of gravel would be required for roadways. Construction on steep slopes would be required. M: Limit clearing and grading activities to dry months (typically May-Oct). Prepare and implementing an Erosion and Sediment Control Plan (required under NPDES General Permit) which specifies stabilization and structural Best Management Practices (BMPs). Design roads and structural foundations in consultation with a professional geotechnical engineer. Design structures to meet the Uniform Building Code, seismic zone 2B. Use rock or other appropriate channel protection in steeper drainages. Monitoring erosion on a regular basis. SUAI: None expected.	AE: Same as Proposed Action. I: Minor increase in the amount of disturbed soils (approx. 2 hectares, 4 acres) relative to the Proposed Action. M: Same as Proposed Action. SUAI: None expected.	No restrictions identified. If detailed geotechnical investigations for final Project design reveal unstable areas that could not be adequately stabilized during construction or Project operation, those areas would be restricted from development.	AE: Option 1 would restrict Phase 1 development to the western area of the Project site. Option 2 would restrict Phase 1 development to the east-central portion of the Project site. I: Option 1 would disturb about 65 hectares (165 acres) of on-site soils and would avoid disturbing the east-central portion of the site prior to the development of subsequent phases. Option 2 would disturb about 81 hectares (181 acres) and would eliminate the disturbance of the western portion of the site during phase 1. Under both options the amount of gravel required for Phase 1 construction would be reduced to approx. 54,000 cubic meters (70,000 cubic yards). M: Same as the Proposed Action, but required over a smaller area. SUAI: None expected.	AE: Same as in Proposed Action. I: None. M: None. SUAI: None.
Water	AE: The Project site is located in the semi-arid region of east-central Klickitat County where most precipitation occurs from late fall through early spring. Average annual rainfall ranges from 25-40 cm (10 - 15 inches) per year. The 100 year, 24 hour storm events results in approx. 8.9 cm (3.5 inches) of rain over 24 hours. Runoff from areas of the site to the north of the Columbia Hills crest flows into two drainage basins, Swale Creek to the west and Rock Creek to the east. Runoff from areas of the site to the south of the Columbia Hills crest flows directly to the Columbia River via numerous north-south drainages. All streams on site are intermittent. I: Erosion during Project construction could result in sediment discharges to intermittent streams. During construction some surface water contamination could result from fuel or oil spills from construction equipment. No significant impacts to groundwater are anticipated. M: Limit clearing and grading activities to the late spring through early fall (May-Oct.) to avoid grading during rains and snowmelt. Prepare and implement a detailed Erosion and Sediment Control Plan as identified under 'Earth'. Installation of culverts to reduce interference of stream flow caused by road fill. Account for the effects of snowmelt in sizing drainage ditches. Monitor the site for erosion on a regular basis and take corrective action as necessary. Provide oil adsorbing pads under turbines during maintenance. SUAI: None expected.	AE: Same as the Proposed Action. I: Minor increase in the amount of disturbed soils (approx. 2 hectares, 4 acres) relative to the Proposed Action. Increases erosion and stream sedimentation potential slightly. M: Same as the Proposed Action. SUAI: None expected.	No restrictions identified.	AE: Option 1 would restrict Phase 1 development to the western area of the Project site. Option 2 would restrict Phase 1 development to the east-central portion of the Project site. I: Option 1 would disturb about 65 hectares (165 acres) of on-site soils and would avoid disturbing the east-central portion of the site prior to the development of subsequent phases. Option 2 would disturb about 81 hectares (181 acres) and would eliminate the disturbance of the western portion of the site during phase 1. M: Same as the Proposed Action, but required over a more restricted area. SUAI: None expected.	AE: Same as the Proposed Action. I: None. M: None. SUAI: None.

Key: AE: Affected Environment I: Impacts M: Mitigation Measures SUAI: Significant Unavoidable Adverse Impacts

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Plants	AE: No special status plants were found on site. The majority of the site is range (60%) and cultivated (20%) lands. Priority habitats include Oregon white oak, shrub-steppe, and juniper. Shrub-steppe habitat contains examples of several native grassland communities; Douglas' buckwheat/ Sandberg's bluegrass and others (see Table 2.3.3 in Section 2.3). Three major habitat complexes exist on the site. The two most important habitat complexes are located in the western and eastern areas of the site. The western habitat complex covers approx. 360 hectares (900 acres) of the project site, the eastern covers about 125 hectares (310 acres) on site, and the central habitat complex extends over 73 hectares (180 acres). Wetlands located on-site consist of excavated stock ponds heavily used by livestock and would not be considered jurisdictional wetlands and are not located in areas of Project disturbance. I: Approx. 148 hectares (365 acres) of vegetation would be removed or disturbed during project construction. Approx. 76% of the disturbance would occur within cultivated or degraded rangeland. The remaining disturbance would affect about 10 hectares (24 acres) of oak and 22 hectares (54 acres) of shrub-steppe habitat, including high quality Douglas' buckwheat/Sandberg's bluegrass communities. Indirect impacts could result from increased soil erosion, compaction fracturing plant communities/habitat complexes, and establishment of invasive weeds. M: Limit construction disturbance to the maximum extent possible. Conduct ongoing monitoring during construction. Restrict vehicle access to native grassland areas during wet periods. Route the powerline in the western habitat area parallel to the existing road to the maximum extent possible. Develop a reseeding/restoration/ and weed management plan that is reviewed by the Washington Noxious Weed Control Board. SUAI: No evidence exists of successful restoration of the Douglas' buckwheat/Sandberg's bluegrass shrub-steppe community resulting in uncertainty regarding the effectiveness of mitigation in those areas.	AE: Same as the Proposed Action. I: The alternative powerline route would disturb about 2 hectares (4 acres) more vegetation than the Proposed Action. However, it would reduce the amount of oak habitat affected by about 13 percent (about 1.2 hectares, 3 acres) and the amount of shrub-steppe by about 10 percent (approx. 2 hectares, 5 acres). It would also reduce the extent to which Project features break up the western habitat complex. M: Same as the Proposed Action except for mitigation related to routing the proposed powerline through the western habitat complex. SUAI: Same as the Proposed Action.	AE: Would restrict high-quality Douglas' buckwheat-Sandberg's bluegrass communities from Project development. I: Would avoid impacts to high-quality Douglas' buckwheat/Sandberg's bluegrass communities. M: Same as the Proposed Action. SUAI: None expected.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Both options would reduce impacts to shrub-steppe, oak, and juniper habitats. Option 2 disturbs more oak, juniper, and shrub-steppe habitat than Option 1, but would avoid impacts during Phase 1 development to the western habitat complex, which is the largest contiguous priority habitat complex on site. M: Same as the Proposed Action except under Option 2 impacts to the western habitat complex would be avoided and therefore, mitigation for those impacts would not be necessary. SUAI: Same as the Proposed Action.	AE: Same as the Proposed Action. I: On-going grazing and cultivation could result in continued displacement of native grassland communities and priority habitats on the Project site. M: None. SUAI: None.
Wildlife (Non-Avian)	AE: No non-avian federally threatened or endangered species were found on the Project site. The site contains habitat suitable for 9 Washington State listed species, including 1 state-threatened species (western gray squirrel) and 1 state-candidate (juniper hairstreak). Most of the State listed species are common elsewhere in the United States, but are peripheral on their ranges in Klickitat County. Other wildlife found on the site include both common mammals and reptiles. Candidate federal species including the western sage lizard and some bat species may also use portions of the site and nearby areas. I: Potential loss of 10 hectares (24 acres) of oak and oak/pine would reduce populations of western gray squirrel. Direct habitat loss to juniper woodlands could result in reduced populations of juniper hairstreak. Impacts to sage lizard and candidate bat species habitat are expected to be minimal due to preferences for roosting although bat collisions with turbines would be possible during foraging. M: Mitigation discussed for plant communities and habitats would also help partially offset impacts to wildlife. Other mitigation includes: retain all vegetation and restrict entry within a 23 meter (75-foot) radius of any western gray squirrel nests. Retain at least 50 percent canopy cover in oak woodlands within a 120 meters (400 foot) radius of known western gray squirrel nest trees. To the extent possible, retain conifers (pine) for 25 percent of the remaining canopy. Avoid construction activity within 90 meters (300 feet) of any western gray squirrel nest between May and Sept. SUAI: Minor reduction in western gray squirrel and juniper hairstreak habitat.	AE: Same as the Proposed Action. I: Would reduce impacts to the amount of oak and oak/pine habitat disturbed by approx. 1.2 hectares (3 acres). This would reduce construction disturbance to the western gray squirrel nests associated with oak habitat. M: Same as the Proposed Action. SUAI: None expected.	No restrictions identified.	AE: Option 1 would restrict Phase 1 development to the western portion of the site Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Option 1 would avoid disturbing juniper habitat in the east-central portions of the site, which supports the Juniper hairstreak, during Phase 1 construction. Option 2 would reduce impacts to the large western habitat complex and therefore, reduce impacts on western gray squirrel nests in that habitat complex. M: Same as the Proposed Action, except over a more restricted area. SUAI: None expected.	AE: Same as the Proposed Action. I: None. M: None. SUAI: None.

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Birds	AE: Twenty-two special-status species could potentially be present in the Project vicinity. Of these 15 were observed in the study area. One species, the peregrine falcon, is listed as both state and federally endangered. In the Columbia River gorge management unit there are up to seven nesting pairs of peregrine falcon nests not including the pair frequently found at Rock Creek. Another species observed on site, the bald eagle, is listed as threatened both state and federally. In addition to the special-status species observed on site several other non-listed species were observed in the study area. Waterfowl concentrations along the Columbia River immediately south of the study area were observed. I: Potential impacts to raptors and other birds using the study area include collision with wind turbines, loss of habitat, disturbance to foraging and breeding behavior, collision with overhead powerlines, and electrocution. Construction activities at some turbine strings could disrupt bald eagle nests if they occur in winter. Construction activities at other turbine strings could disrupt red-tailed hawk and Swainson's hawk nesting activities. Operation of the Project could cause some birds to alter their flight paths which could in turn reduce their foraging efficiency. Although use of the site by peregrine falcons is infrequent (2 sightings), peregrine falcon populations within the Columbia River gorge could be measurably reduced from collisions with wind turbines. Bald eagle mortality could result from collision with wind turbines especially in the eastern part of the site. Mortalities from collision with wind turbines could be in the range of six to 20 birds annually but would not significantly affect the regional population of most other bird species observed in the study area. M: Establish an ongoing monitoring program that would assess the extent of avian use and mortality at the project site. If studies reveal disproportionately high levels of mortality to species that are vulnerable to regional-level impacts, relocating or modifying wind turbines could be implemented. Other potential mitigation to be discussed with coordinating committee. SUAI: Incidental mortality as a result of collisions with wind turbines would be unavoidable.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action. SUAI: Same as the Proposed Action.	No restrictions identified.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Option 1 would avoid development of turbine strings along the flight path between the Columbia River and a night roost area used by wintering bald eagles and reduce impacts to peregrine falcons that were observed in the eastern portion of the site. Both options would provide the opportunity to monitor partial development of the site and actual avian impacts prior to full Project development. M: Same as the Proposed Action. SUAI: Same as the Proposed Action.	AE: Same as the Proposed Action. I: None. M: None. SUAI: None.

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Cultural Resources	AE: Human occupation of the Mid-Columbia region dates back 10,500 years. The Columbia Hills cultural resources include sites from pre-historic Indian tribes to the early settlers of the 19th century. Field surveys identified 60 cultural resource properties on the site. Fourteen of the properties are sites and the other 46 are isolates. Eleven of the sites are potentially eligible for listing on the National Register of Historical Places (NRHP). Various ethnobotanical plant resources were also found on the site. No traditional cultural properties have been identified to date through consultation with the Yakama Indian Nation, but consultation is on-going. I: Project construction could adversely affect 11 sites and 5 isolates due to soil disturbance and unauthorized artifact collection. Although ethnobotanical resources are located on the site, current private property owners do not allow access to Native Americans for gathering. M: Precisely locate and flag potentially eligible sites and design Project features to avoid the identified properties during construction. Conduct further testing of the two sites that appear to be unavoidable. Design and implement scientific data recovery where further testing confirms eligibility and resources which cannot be avoided. Conduct additional surveys along final powerline corridor and access roads, and monitor construction activities. If unidentified cultural resource properties are encountered during construction, cease construction in the immediate vicinity pending further investigation. SUAI: None expected, pending further consultation with the Yakama Indian Nation.	AE: Same as the Proposed Action. I: Additional sites could be identified along alternative powerline corridor. M: Any sites identified along the alternative powerline corridor could be avoided with minor adjustments to the corridor or placement of power poles. SUAI: Same as the Proposed Action.	AE: Same as the Proposed Action. I: Would reduce impacts to cultural properties and isolates by restricting development on turbine strings J and EE should further testing prove those sites eligible for the NRHP. M: Same as the Proposed Action, except that further testing for turbine strings J and EE would not be needed. SUAI: Same as the Proposed Action.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Option 1 would initially avoid impacts to sites and isolates located along turbine strings O, U, Y, Z, AA, BB, CC, EE, GG, and OO during Phase 1. Option 2 would avoid impacts to potentially eligible sites and isolates located along turbine strings A,B,E,J, and L in the western portion of the site during Phase 1. M: Same as the Proposed Action. SUAI: Same as the Proposed Action.	AE: Same as the Proposed Action. I: Cultural properties located on site could potentially be disrupted by ongoing agricultural and grazing practices. M: None. SUAI: None.
Aesthetics	AE: Project site consists of rolling hills and bluffs above the Columbia River and lies outside of the Columbia River Gorge National Scenic Area. Similar landscapes occur in east-central Washington and Oregon. The site is visible from I-84 within the scenic area and from portions of US-97, I-84, and SR-14 outside of the scenic area. The site is also visible from Hoctor Road, the Maryhill area, John Day Dam, and from towns on the Oregon side of the Columbia River. I: Turbines and roads would be most visible from Hoctor Road, the Maryhill area, and small towns along the Oregon side of the Columbia River. From within the scenic area, turbine strings would be visible as a series of white lines along the hillside, but may be indistinguishable as turbines. Research suggests inoperative turbines give visual impression of unreliability and are viewed negatively. The Project would not block significant views or alter a unique landscape. Indirect impacts could include attracting sightseers along US-97 and Hoctor Road. M: Prohibiting on site storage. Decommissioning plan. A sign directing traffic to safe viewing areas at established recreational sites. SUAI: With mitigation turbines would continue to be visible. Some would view project favorably while others would view it as in adverse impact.	AE: Same as Proposed Action. I: Same as Proposed Action. M: Same as Proposed Action. SUAI: Same as Proposed Action.	None identified.	AE: During Phase I, Option 1 would be limited to western area of site. Option 2 would be limited to the eastern area of the site. I: Option 1 would be similar to the Proposed Action. Option 2 would eliminate views of the western part of the site. M: Same as Proposed Action. SUAI: Same as Proposed Action. Option 1 would be visible to more viewers.	AE: Same as Proposed Action I: Ongoing visual impacts from agriculture and utility uses would continue.

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Land Use	AE: The Project site is located southeast of Goldendale, which has an estimated population of 3,730 in 1993. Population density is 8.7 persons per square mile. Project site lands are all privately owned and are currently used for range, and to a lesser degree, dryland agriculture, primarily wheat cultivation. Approx. 60 percent of the site is rangeland and approx. another 20 percent is cultivated land. There are a number of recreation areas frequented in the summer months south of the site. I: Project would be compatible with ongoing agricultural and adjacent land uses provided mitigation measures for impacts to other elements of the environment are implemented. Royalty and lease payments would provide a source of financial support to agricultural landowners. Construction jobs and a few (9) permanent jobs would be created. M: Screening and fencing around Project substation. SUAI: None.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action. SUAI: None.	No restrictions identified.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Option 1 would initially avoid impacts to existing land uses in the east-central portion of the site. Option 2 would initially avoid impacts to existing land uses in the western portion of the site. M: Same as the Proposed Action. SUAI: None.	AE: Same as the Proposed Action. I: Existing agricultural, grazing, and utility land uses of the site would continue. M: None. SUAI: None.
Noise	AE: There are few noise sources in the vicinity of the Project site. The primary noise sources are traffic west of the site on US 97, south of the site on Interstate 84 and State Route 14. Other noise sources include trains, off-road vehicles, farm equipment and vehicles north of the site on Hoctor Road. Background noise levels at locations distant from roadways are likely to be between 40 and 50 dBA under calm wind conditions. Wind is the dominant noise source on site and masks other noises. I: Noise from construction would generate noise levels between 80-90 dB at a distance of 15 meters (50 feet), but is exempt from regulation. No receivers would experience noise levels above day-evening noise standard (60 dBA). Some locations could experience noise levels above the night-time noise standard (50 dBA). However, because the precise number of turbines in each turbine string has not yet been determined by the Applicant the noise modeling assumed the maximum number of turbines that could be developed in each string. This results in a total 481 turbines and overestimates the actual noise impacts resulting from Project development. M: Prior to issuing building permits for each phase, the Applicant should provide documentation verifying nighttime noise standards would not be exceeded at residential receivers. If this cannot be accomplished, mitigation, including obtaining noise easements from affected property owners, could be implemented. SUAI: None expected.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action. SUAI: None.	No restrictions identified.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Neither option would exceed the daytime and evening noise standard (60 dBA) during Phase 1 of the Project. Under Option 1, two receivers could exceed the nighttime standard (50 dBA). Under Option 2, five receivers could exceed the nighttime standard. This alternative eliminates some flexibility to reduce nighttime noise levels through less density of turbines on identified turbine strings. M: Same as the Proposed Action. SUAI: None.	AE: Same as the Proposed Action. I: None. M: None. SUAI: None.
Air Quality	AE: Primary stationary sources of particulate emissions in Klickitat County are scattered industrial facilities, wind-blown dust from non-irrigated agricultural areas, dust from agricultural activities, vehicle traffic, construction, and wood stove smoke. Areas on site have been mapped as critical erosion areas capable of sustaining net soil losses of 1.8 to 9 metric tons (2 to 10 tons) per year from wind and water erosion. I: Fugitive dust during construction would be the main source of air emissions associated with the Project. An estimated 9 metric tons (23,000 lbs.) of fugitive dust would be generated during construction. M: Same as identified for 'Earth'. SUAI: None expected.	AE: Same as the Proposed Action. I: Same as the Proposed Action with minimal additional construction disturbance and associated fugitive dust relative to the Proposed Action. M: Same as the Proposed Action. SUAI: None expected.	No restrictions identified.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict Phase 1 development to the east-central portion of the site. I: Option 1 would generate and estimated 3.8 metric tons (10,000 lbs.) of fugitive dust in the western portion of the site during Phase 1 construction. Option 2 would generate an estimated 4.7 metric tons (12,000 lbs.) of fugitive dust during Phase 1 construction. M: Same as the Proposed Action. SUAI: None expected.	AE: Same as the Proposed Action. I: Dust would continue to be generated from farming, vehicle travel on dirt roads, construction and other sources. M: None. SUAI: None.

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Transportation	AE: Four roadways provide access to the general site area. U.S. Highway 97 (US-97) west of the Project site, Washington State Route 14 (SR-14), south of the site, Interstate 84 (I-84), south of the site in Oregon, and Hoctor Road which runs along the northern border of the site. A network of other paved and gravel roads serve the site area and adjacent properties. Sections of Hoctor Road are scheduled for repairs by Klickitat County in May-Sept. of 1995. I: Construction traffic is estimated to be 271 vehicle trips per day. Approx. 65 percent of daily trips during construction would be heavy vehicles. Average Daily Traffic Volume (ADT) would increase by five percent on US-97 south of Hoctor Road and three percent on SR-14 east of Stonehenge Drive. Average daily traffic volumes on Hoctor Road are estimated to increase up to 87 percent during Project construction. Heavy vehicle traffic along Hoctor Road could result in schedule conflicts with scheduled road repairs and some heavy vehicles may exceed seasonal load restrictions set by Klickitat County. Traffic conflicts could arise due to left turning vehicles at Hoctor Road and site Access Roads. M: Coordinate Project construction traffic routing and travel times with Klickitat County Public Services for work scheduled on Hoctor road in spring and summer of 1995. Require Applicant to pay for repair/restore Hoctor Road to satisfactory condition following completion of Phase 1 construction. Schedule the Project to avoid use of Hoctor Road during freeze/thaw cycles. Use on site materials for gravel production. SUAI: With mitigation, no significant unavoidable impacts are expected.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action. SUAI: Same as the Proposed Action.	AE: No restriction identified. I: Schedule conflicts with other construction projects around the project site do not allow for ready access to the eastern portion of the site, alternative routes will require investigation. M: Same as the Proposed Action. SUAI: Same as the Proposed Action.	AE: Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict development to the east-central portion of the site. I: Under both options sub-area development would reduce heavy vehicle traffic by approx. 50 percent during Phase 1 construction. Option 1 would further reduce impacts to Hoctor Road by avoiding the east-central portion of site, therefore most of the site could be accessed off of US-97 and SR-14. With construction of a new on-site access road from the western portion of the site to the central portion of the site, use of Hoctor Road could be eliminated during Phase 1 construction. M: Same as the Proposed Action. SUAI: None expected.	AE: Same as the Proposed Action. I: None. M: None. SUAI: None.
Public Services and Utilities	AE: The areas surrounding the Project site are serviced by the Klickitat County Rural Fire District #7 and the Klickitat County Sheriff's Department. Communication systems in the general Project vicinity include microwave, television, radio and navigation systems on Juniper Point, Luna Point, Haystack Butte, and Observatory Hill. A number of utility corridors currently cross the site including transmission lines and a natural gas pipeline. Potable water is supplied by individual domestic wells. Waste disposal is provided by a private company. I: Potential increase in demand for fire and medical service during construction and to a lesser extent, operation of the Project. Potential for turbines in a few strings to block 'line of sight' microwave transmissions. Existing utilities are not expected to be effected by Project construction or operation. Construction debris is not anticipated to be generated in significant quantities. Impacts could result from broken or decommissioned equipment being stored on site. M: A readily accessible water truck should be located on site during all Project construction and welding operations. Restrict high fire-risk activities during extreme dry periods. Provide staff with cellular phones for timely communication with emergency services. Prohibit smoking on the site except in designated areas. Equip all emergency departments and vehicles with access to electronic gates. Precisely determine the location and frequency of potentially impacted communication transmitters and receivers when siting individual turbines. Avoid construction in the immediate vicinity of the existing natural gas pipeline or employ hand-digging if required. Require the Applicant to remove all turbine structures taken out of operation. SUAI: With the recommended mitigation none are expected.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action. SUAI: None expected.	No restrictions identified.	AE: Same as the Proposed Action, but Option 1 would restrict Phase 1 development to the western portion of the site. Option 2 would restrict development to the east-central portion of the site. I: Option 1 would avoid potential Phase 1 impacts to communication systems in the east-central portion of the site and reduce the overall area of construction activities near the natural gas pipeline prior to development of subsequent phases. Option 2 would avoid potential Phase 1 impacts to communication systems in the western portion of site. M: Same as the Proposed Action. SUAI: None expected.	AE: Same as the Proposed Action. I: None. M: None. SUAI: None.

Elements	Proposed Action	Alternative Powerline Route	Restricted Areas Alternative	Subarea Development Alternative	No Action
Health & Safety Risks	AE: Potential environmental risks on the Project site currently include: existing powerlines, farming-related risks, and existing gas pipeline and pumping stations. I: Potential for electric shock, fires, and worker injury from construction, operation and maintenance of the Project. No significant impacts to air traffic safety or from electromagnetic fields are expected. M: Develop and maintain an on-site health and safety plan informing employees and others on site what to do in case of emergencies, including the locations of fire extinguishers and nearby hospitals, important telephone numbers, and first aid techniques. SUAI: None expected.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action SUAI: None expected.	No restrictions identified.	AE: Same as the Proposed Action. I: Same as the Proposed Action. M: Same as the Proposed Action. SUAI: None expected.	AE: Same as the Proposed Action I: Existing risks would continue. M: None. SUAI: None.

PART 1: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Part 1–Alternatives Including the Proposed Action

1.1 Overview

1.1.1 Existing Setting

The Washington Windplant #1 site is located in the Columbia Hills area of Klickitat County, 9.6 km (6 miles) southeast of Goldendale and to the east of U.S. Highway 97 (US-97). Specifically, the site is located south of Hoctor Road and north of State Route 14 (SR-14). (See Figure 1.1, Location Map.) The 5,110 hectare (12,630 acre) Project site extends for approximately 23 km (14 miles) along the crest of the Columbia Hills. The Columbia River serves as a major barge transportation route and recreational resource. In addition, the river has been highly developed with dams and associated hydroelectric generating facilities. One such facility — John Day Dam — is located below the Project site. A large industrial facility — Columbia Aluminum — is located adjacent to John Day Dam. KENETECH Windpower, Inc. has collected wind data in the Columbia Hills and has determined that the area has an adequate wind resource to support a commercial-scale wind power project.

Project lands are all privately owned and have been used for grazing and, to a lesser extent, for cultivated crops for more than a century. Prior to european settlement and private ownership of the land, the Columbia Hills were used by Native American tribes and bands which ceded the lands to the U.S. government pursuant to the Treaty of June 9, 1855. This treaty created the Yakima Indian Reservation, approximately 28 km (17 miles) to the north. Traditional cultural use of Project lands by Native Americans is discussed in Section 2.6.

The Applicant has entered into wind power easement agreements with Project landowners. Project lands are currently zoned Extensive Agriculture and Open Space, and are primarily cultivated or used for grazing. The proposed Project would reduce the amount of land on the site available for agricultural use by about 1.5 percent. Roads would displace about 1.6 hectares (4 acres) of cultivated land. The overhead powerline would traverse approximately 3.2 hectares (8 acres) of cultivated land, but most of this area could remain in agricultural use following Project development. The compatibility of the Project with agricultural uses is discussed in Section 2.8.

The Project would add an additional utility facility to the site. A number of existing public utility corridors currently occupy portions of the Project site. Two BPA high-voltage transmission lines are partially located on Project lands: the 230-kV Midway-Big Eddy line crosses the northwestern corner of the site; and the 500-kV Hanford-John Day line passes through the far eastern portion of the site. A 115-kV Klickitat County Public Utility District (PUD) transmission line crosses the western portion of the site enroute from John Day Dam to Goldendale. A natural gas pipeline runs east-west just south of Hoctor Road and passes through the northern portion of the Project site. Several public and private communication facilities are also located on or near the Project site on Juniper and Luna points. The Project's potential impacts on public utilities and services are discussed in Section 2.12. Figure 1.2 shows the location of existing roads and utilities on the site.

1.1.2 Proposal

KENETECH Windpower, Inc. (the Applicant), has applied for a Conditional Use Permit from Klickitat County to develop Washington Windplant #1 (the Project) in the Columbia Hills area of Klickitat County, southeast of Goldendale (see Figure 1.1). The proposed Project would provide 115 megawatts (MW) of wind-powered electrical generation capacity. Electrical power from the proposed Project would be transmitted by the Bonneville Power Administration (BPA) over its transmission system to utilities purchasing the Project's output. A Transmission Services Agreement or Agreements between BPA and the purchasing utilities will, therefore, be required for this Project.

1.2 Purpose and Objectives

1.2.1 Applicant's Objectives

The Applicant's primary objectives for the Project are:

- To develop and operate the Project in a manner that is compatible with ongoing agricultural and grazing use of Project lands.
- To construct and operate an electrical generation project using advanced utility-grade wind turbine technology specifically designed by KENETECH Windpower, Inc. for large-scale commercial applications.
- To initially deliver 50 MW of installed wind-powered generating capacity to three investor-owned electrical utilities (PacifiCorp, Puget Sound Power & Light Company, and Portland General Electric) that have entered into an agreement to purchase this capacity in order to demonstrate the technical and economic feasibility of integrating wind energy into their mix of generating resources (Phase 1).
- To have the permitted capability to construct and operate an additional 65 MW of wind-powered electrical generating capacity on the Project site.
- To meet the public demand for power.

The Applicant has applied for a Conditional Use Permit that would apply to the entire 115-MW Project, and this EIS addresses the environmental impacts of the full Project development. However, the Project would be developed in two or more phases. The first 50-MW phase (Phase 1) would be constructed once necessary permits are obtained. Subsequent phases totalling 65 MW would be developed once options for additional generating capacity are exercised by the three investor-owned utilities or once the Applicant has entered into other sales agreements for the remaining capacity.

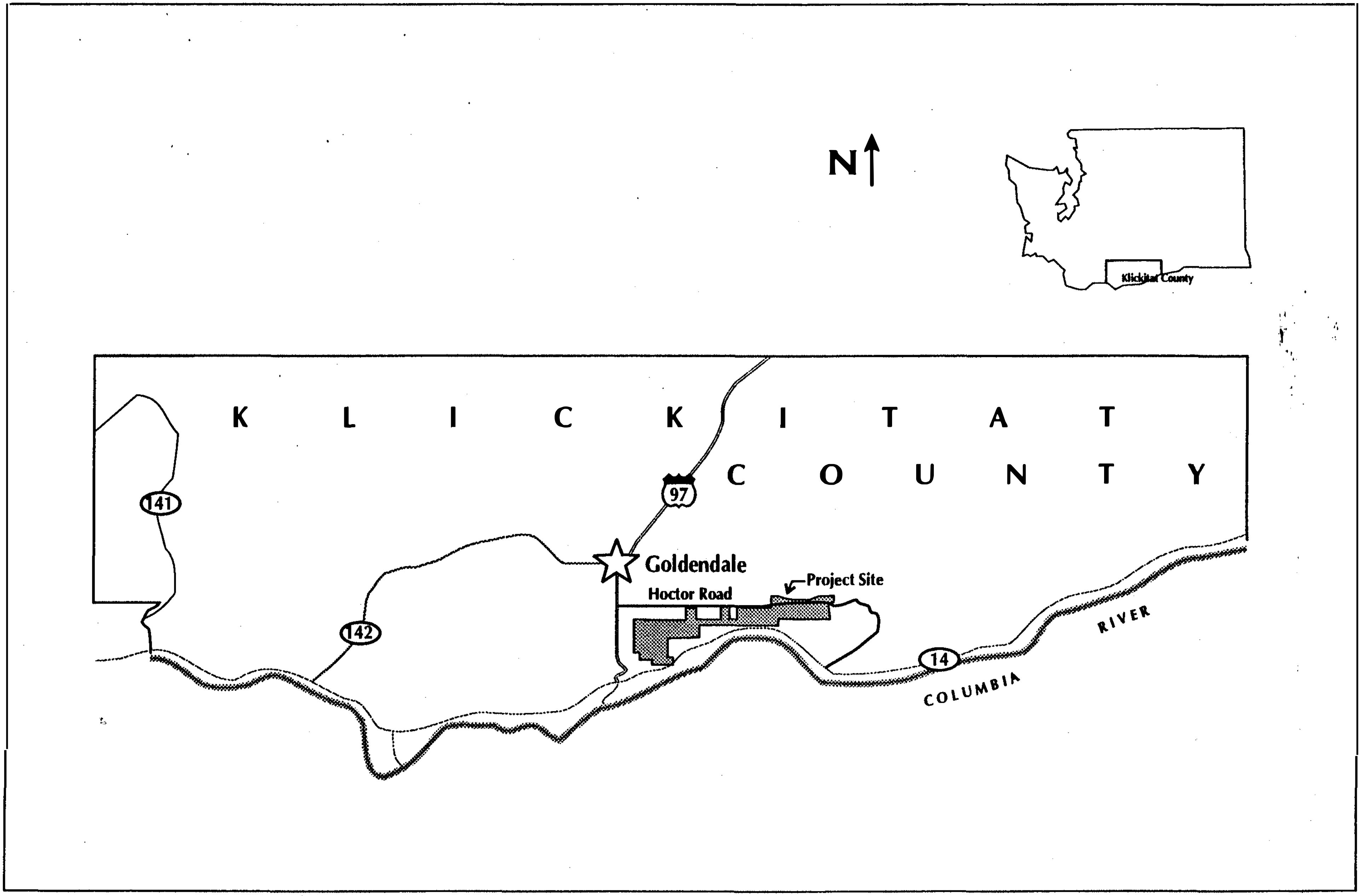


Figure 1.1 – Location Map

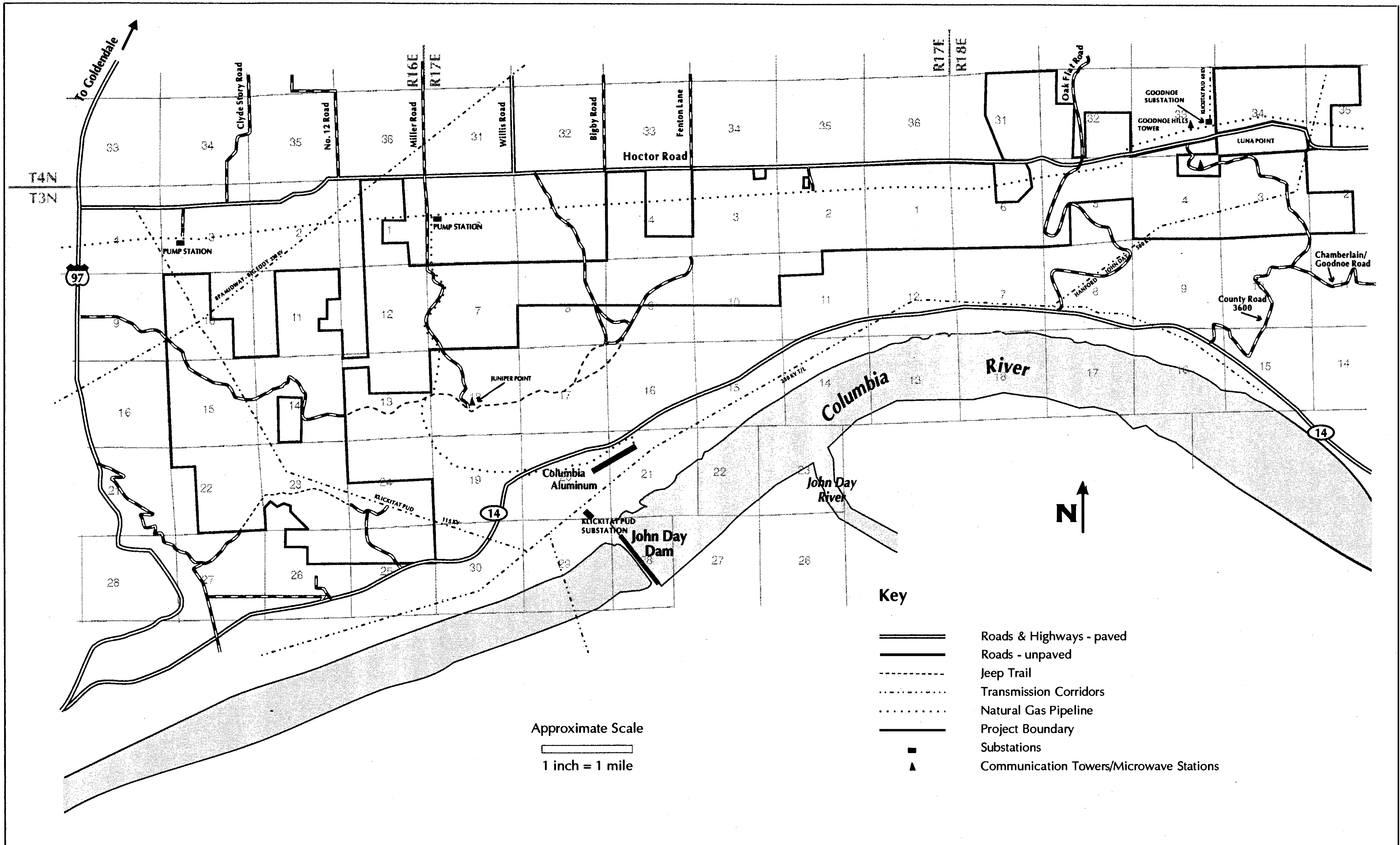


Figure 1.2 — Existing Site Conditions

The Applicant's design objectives for the Project include:

- Locating turbines in a manner that maximizes use of the available wind resource on the site.
- Using modified tubular turbine towers, designing powerline poles and lines with "raptor-protection" measures, and employing other design features to reduce the potential for bird strikes or electrocution.
- Where feasible, upgrading existing on-site roadways for access to turbine strings rather than developing new roads.
- Locating turbines in strings to improve aesthetics by providing a more uniform-looking development and to reduce the amount of land disturbance required for roads and utilities.
- Locating certain utility lines underground to improve Project aesthetics, increase the amount of land available for agriculture or grazing after Project development, and reduce perching opportunities for raptors and other birds.

1.2.2 BPA Purpose and Need

As discussed in Section 1.2.1, PacifiCorp, Puget, and PGE have purchased a portion of the Project's generating capacity in order to understand the technical and economic feasibility of integrating wind energy into their mix of generating resources and to meet a demand for power.

Public Law 93-454, the Transmission System Act, requires that BPA make excess transmission capacity available to utilities requesting transmission service. The Energy Policy Act of 1992 also requires utilities, including BPA, to make arrangements to provide transmission wheeling subject to certain constraints. PacifiCorp, Puget, and PGE have submitted to BPA a "good faith request," pursuant to the implementing regulations of the Energy Policy Act of 1992, to wheel 50 MW of power generated by the Project over the BPA transmission system. BPA needs to respond to this request. The BPA purposes that will be considered in evaluating the utilities' request and future wheeling requests for this Project include:

- Restoring and enhancing environmental quality and avoiding or minimizing possible adverse environmental effects.
- Assuring consistency with BPA's statutory responsibilities, including the Pacific Northwest Electric Power Planning and Conservation Act (Regional Power Act), the Transmission System Act, and the Energy Policy Act of 1992.
- Protecting BPA's ability to serve its existing contractual obligations and to remain able to meet the needs of its customers.
- Providing electrical system reliability that meets BPA's reliability criteria.
- Preserving transmission capability for future BPA resources.
- Demand for power.

1.3 Scoping Summary

The Klickitat County Planning Department and BPA conducted joint scoping for this EIS under the Washington State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA). The public scoping period for the Project ran from January 24, 1994, through February 28, 1994. Public scoping meetings were held in White Salmon, Washington on February 15, 1994 and in Goldendale, Washington on February 16, 1994. Agency scoping meetings were held with state and federal wildlife agencies. An extended scoping period through July 22, 1994, was provided to the Yakama Indian Nation. Table 1.1 summarizes those oral and written scoping comments received on the Project that are appropriately addressed in this EIS. The sections where these scoping issues are addressed are also listed in Table 1.1.

Table 1.1
SCOPING SUMMARY

General Topic	Issue	Where Discussed in EIS
Geology/Soils/ Hydrology	▪ Soil stability and erosion. ▪ Contamination from oil and grease leakage from turbines. ▪ Sensitive geologic areas.	2.1.3, 2.1.4 2.1.4, 2.2.4 2.1.3
Plants	▪ Impact of construction on shrub steppe/scrub desert habitat and flora such as Indian paintbrush, lupine, and ponderosa pine. ▪ Possible introduction of noxious weeds.	2.3.4 2.3.4
Wildlife	▪ Effects on wildlife, especially deer populations. ▪ Effects of lighting on nocturnal animals. ▪ Impacts on resident fish in Swale and Rock Creek. ▪ Impacts to invertebrates. ▪ Impacts to western gray squirrel and supporting habitats, and other special status wildlife.	2.4.4 2.4.4, 2.13.2 2.2.2 2.4.4 2.4.4, 2.3.4
Avian Resources (Birds)	▪ A year-long avian study of the Columbia Hills area should be conducted. ▪ Impacts on migratory birds. ▪ Effects on mortality rates of raptors. ▪ Avian surveys and inventories should cover the Oregon side of Columbia River and tributaries within the home ranges of birds using the Project site. ▪ Impacts on seasonal occurrence, habitats, and use by peregrine falcon, bald eagle and other threatened or endangered bird species. ▪ Habitat inventory.	2.5.1 2.5.4 2.5.4 2.5.1 2.5.4 2.5.3, 2.3.3
Cultural Resources	▪ A survey of the site should be conducted to identify potentially significant archaeological sites. ▪ Access to areas important to the Yakama Indian Nation for traditional and spiritual uses should be considered.	2.6.1 2.6.1, 2.6.4

Table 1.1 (Continued)

General Topic	Issue	Where Discussed in EIS
Aesthetics	▪ Mitigation should be considered to minimize visual impacts to Columbia Hills Estates tract and along ridgetops. ▪ Unique cumulative impacts may result from different placement of turbines, rotational directions, and colors[1]. ▪ Visual impacts to Maryhill State Park.	2.7.4 3.2.7 2.7.4
Land Use (including Recreation and Socioeconomics)	▪ Effects on cattle from ingesting oil/grease from leaking turbines. ▪ Appropriate setbacks to residential and other uses. ▪ Impacts on electric power rates. Jobs created by the local, temporary, and permanent Project. ▪ Financial liability for abandonment. ▪ Impact on Goldendale Observatory. ▪ Sightseers drawn to the area due to the Project. ▪ Compatibility with the Columbia River Gorge National Scenic Area.	2.8.4 2.8.2, 2.9.2 2.8.4 2.8,4, 2.13.2 2.8.4 2.8.2, 2.8.4, 2.7.4 2.8.2, 2.7.2
Noise	▪ Noise impacts on existing or planned nearby residential properties. ▪ Cumulative noise impacts to specific sensitive receptors. ▪ Noise from construction activities.	2.9.4 3.3.9 2.9.4
Air Quality	▪ Dust from construction activities.	2.10.4
Transportation	▪ Building of new roads, access to turbines, compatible use with agricultural equipment. ▪ Damage to and effects of weight restrictions on Hoctor Road. ▪ Erosion problems. ▪ Traffic conflicts (agriculture/sightseer) on Hoctor Road. ▪ Lightly graveled on-site access roads may not be appropriate for winter use.	2.11.4 2.11,2, 2.11.4, 2.1.4 2.1.4 2.11.4, 2.7.4 2.11.2, 2.11.4, 2.1.4
Public Services and Utilities	▪ County staff required for building inspections, monitoring. ▪ Solid Waste generation and disposal. ▪ Firefighting needs and financial responsibility. ▪ Impact on repeater station transmission on Juniper Point for emergency services. ▪ Reduce cumulative impacts by jointly used powerline routing/substation location/roads[1].	2.12.4 2.12.4 2.12.4 2.12.4 3.4
Health/Safety	▪ Wind will cause turbines to blow over.	2.13.4
Alternatives	▪ Alternatives analysis should include evaluation of gas turbines and their contribution to the greenhouse effect.	1.4.4

[1] A different wind power development project (Columbia Windfarm No. 1) is proposed by CARES, a consortium of public utilities, on land adjacent to Washington Windplant #1 (Section 13, T3N R16E and Section 18, T3N R17E). The cumulative impacts of these two wind power proposals are discussed in Part 3 of this EIS.

1.4 Proposed Action (Project Description)

1.4.1 Proposed Site Development

Figure 1.3 shows overall proposed Project development on the site. As proposed, development of Washington Windplant #1 would ultimately entail installation of approximately 345 wind turbines arranged in 39 distinct rows (turbine strings). Development within each turbine string would include turbine structures and foundation pads, controls, small transformers, underground collection and communication lines, and an access road. Turbine strings would range in length from approximately 213 to 2,316 meters (700 to 7,600 feet). The location of these turbine strings is shown on Figure 1.3. Altogether, construction of turbine strings would temporarily disturb about 98 hectares (243 acres). Following construction, secondary roads and associated drainage ditches within turbine strings and turbine and transformer foundations would permanently occupy about 33 hectares (82 acres).

Each turbine string would interconnect to a new, 34.5-kV powerline. The line would generally run east-west across the central portion of the site. Construction of the powerline would temporarily disturb about 17 hectares (42 acres). The powerline would permanently occupy about 14 hectares (34 acres). The powerline would connect to a new substation located on-site, where power voltage would be increased to 230 kV prior to interconnection with the BPA Midway-Big Eddy transmission line. The Project substation would occupy less than 0.5 hectare (less than 1 acre).

Project site development would also entail upgrading existing roads and constructing new roads outside of the turbine strings. Temporary staging areas for construction equipment and materials would also be required.

The total amount of land that would be disturbed during construction is about 155 hectares (382 acres). After restoration of temporarily disturbed areas, Project features would permanently occupy about 79 hectares (193 acres). Less than 2 hectares (less than 3 acres) would be impervious surface (see Table 1.2).

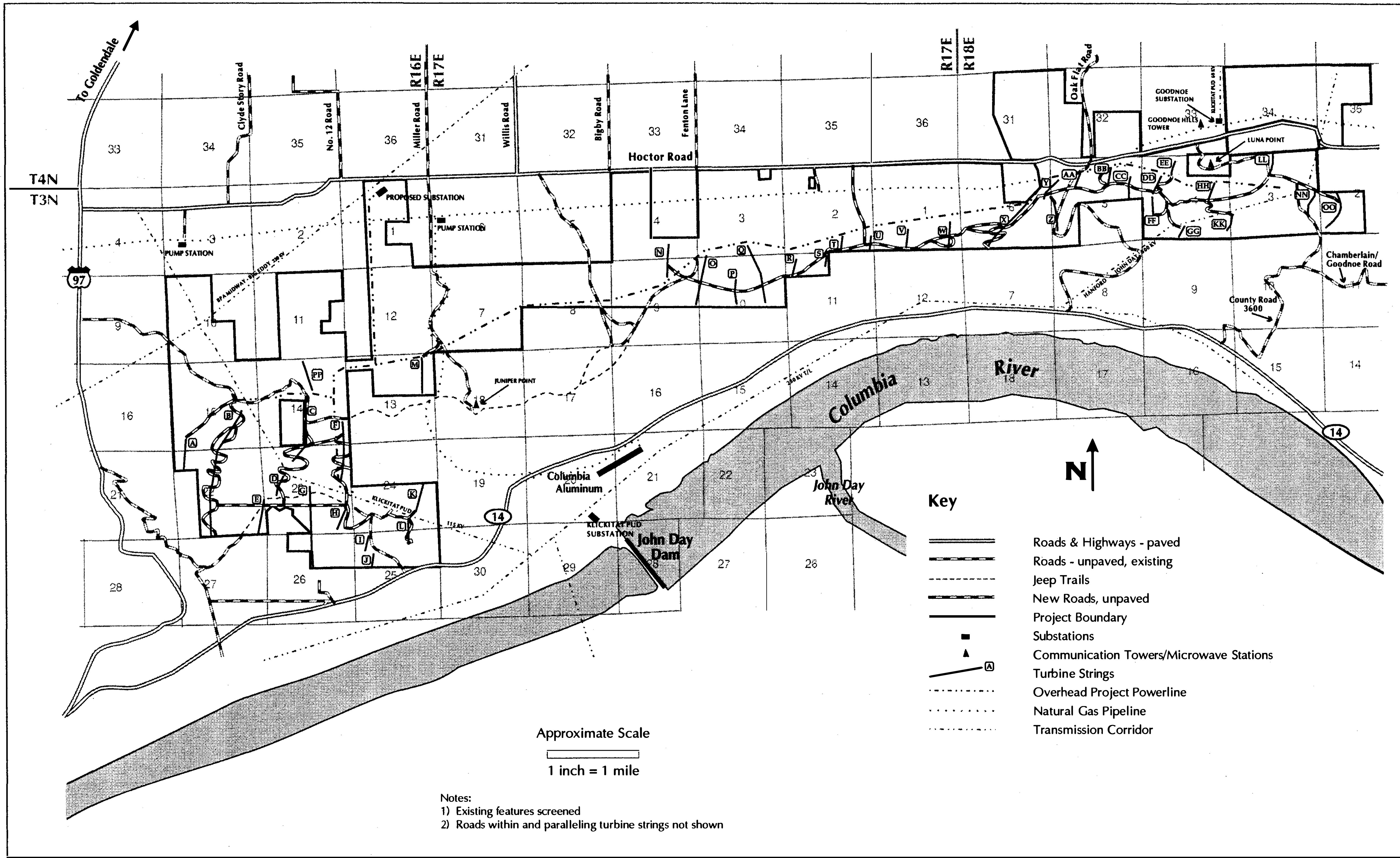


Figure 1.3 — Proposed Site Development

Table 1.2
SUMMARY OF PROJECT FEATURES

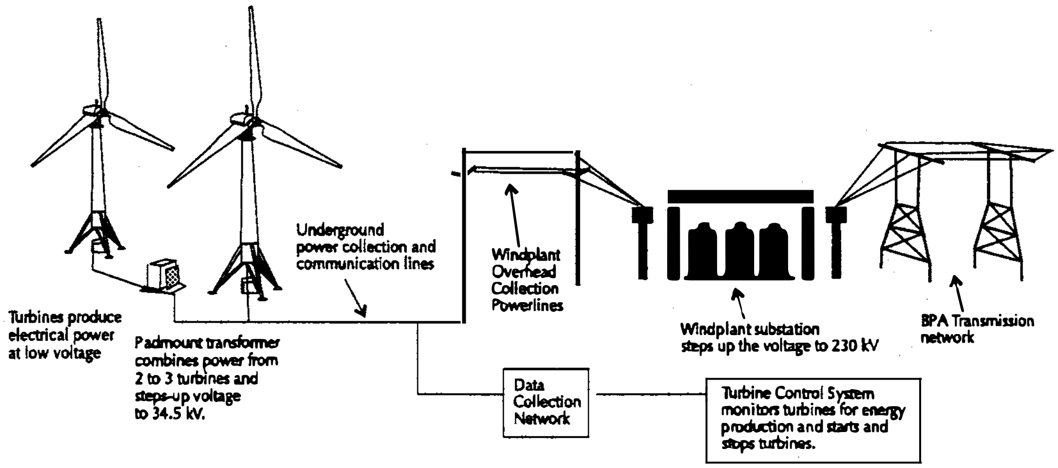
Features	Area Temporarily Disturbed		Area Permanently Occupied	
	HECTARES	ACRES	HECTARES	ACRES
Turbine String and New Secondary Access Road[1]	98	243	33	82
Powerline	17	42	14	34
New Primary Access Road[2]	27	66	24	58
Substation	<1	1	<1	1
Upgraded Access Road	8	20	7	18
Construction Staging Area	4	10	0	0
TOTAL (rounded to closest hectare/acre)	155	382	79	193

(1) Assumes 30-meter (100-foot) disturbance corridor along turbine strings except where steep terrain dictates the use of road switchbacks. Secondary roads along turbine strings are about 4 meters (12 feet) wide plus associated drainage ditches.

(2) Assumes area required for an approximately 5-meter (16-foot) primary road and associated drainage ditches.

1.4.2 Key Design/Operating Features

Key features proposed for Washington Windplant #1 include: turbines and associated transformers; underground power and data collection lines between turbines; an above-ground wood-pole powerline; substation; access roads; and meteorological towers. All electrical equipment would be designed and installed in compliance with National electrical safety codes and standards, including NEMA (National Electrical Manufacturer's Association), ANSI (American National Standards Institute) and IEEE (Institute of Electrical and Electronics Engineers), and with the requirements of WAC 296-44. The Project maintenance facility and office would be located off site. Figure 1.4 is a schematic of the overall generating and collection system. The following paragraphs describe the key Project features; environmental impacts of these features are evaluated in Part 2 of this EIS.



Source: KENETECH Windpower

Figure 1.4 - Windplant Schematic

1.4.2.1 Turbines

Development of the proposed 115-MW Project would involve installation of about 345 turbines designed and manufactured by the Applicant. Each turbine consists of three main components: 1) the rotor/generator assembly, which converts wind power to electrical energy; 2) a modified tubular tower; and 3) a foundation supporting the entire turbine structure. These components are discussed in detail below.

Rotor/Generator

The KENETECH 33VMS turbine (see Figure 1.7) is designed to convert wind power to electrical energy using a 33- to 39-meter-diameter (108- to 128-foot), 3-blade rotor, which resembles an airplane propeller. The rotor blades are made of laminated fiberglass, and each blade is connected to a central hub. These turbines use a horizontal axis, upwind, variable speed design, where the axis of the blades' rotation is parallel to the wind stream and the rotor assembly is located upwind of the turbine tower (see Figures 1.5 and 1.6).

Several features allow the rotor assembly to respond to changes in wind speed and direction. For example, the yaw system allows the entire rotor, gearbox, and generator assembly to rotate around the vertical axis of the tower in order to orient the rotor into the wind. In addition, each turbine blade can be rotated around its longitudinal axis to change its pitch relative to the central hub.

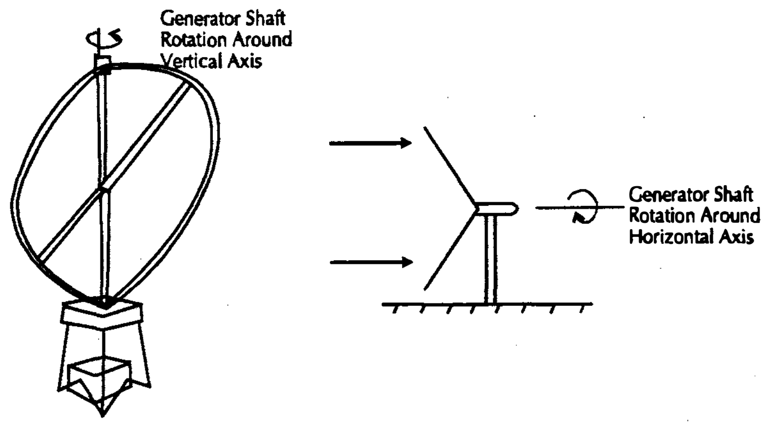


Figure 1.5 – Horizontal versus Vertical Axis Turbines

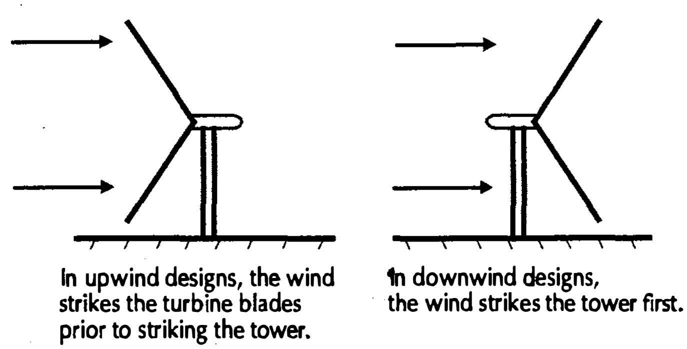


Figure 1.6 – Upwind versus Downwind Turbines

The speed of the rotor's rotation ranges from 14 to 54 rpm. Through a series of gears and shafts (the transmission), the rotation of the rotor shaft induces an electrical current in the generator to produce electricity. The gearbox, generator, and hydraulic controls are all contained within a reinforced fiberglass housing (the nacelle) located on top of the turbine tower. Petroleum-based hydraulic fluids are used in the yaw and pitch control systems; lubricating oils are used in the transmission.

Towers

The Applicant proposes to use modified tubular steel turbine towers as shown in Figure 1.7. Towers would range from 24 to 36.6 meters (80 to 120 feet) high, depending on localized site conditions. Each tower incorporates an enclosed climbing ladder to provide access to the turbine unit.

Foundations

Turbine foundations would be constructed in the 30-meter-wide (100-foot) corridor disturbed along each turbine string during Project development. Following construction, concrete foundations would occupy a cleared and graded area measuring approximately 6 meters by 6 meters (20 feet by 20 feet). The graded area would have a subgrade of compacted native soil and a gravel surface. Concrete foundations would consist of: 1) three or four concrete pier foundations for the turbines, each measuring about 76 cm (30 inches) in diameter; 2) a concrete slab foundation for certain electronic controls measuring approximately 1.25 by 2.5 meters (4 feet by 8 feet); and 3) a concrete slab foundation for the access ladder measuring approximately 0.6 meter by 1 meter (2 feet by 3 feet). Excavation of the pier foundations would be conducted using an auger or drill. Pier foundations would extend to sound bedrock. The turbine tower would be secured by anchor bolts to the pier foundations.

1.4.2.2 Underground Collection and Communication Lines and Transformers

Power from each wind turbine would be fed through underground 600-Volt power cable to pad-mounted transformers that would "step up" the electrical voltage to 34.5 kV. Each transformer would serve two to three turbines. Communication lines and conduits containing electrical power cables would be laid in open trenches running along each turbine string. Trenches would be approximately 1.25 meters (4 feet) deep and 3 meters (10 feet) wide, and would be backfilled with excavated material. In areas where excavated material does not meet specifications for backfill, off-site material would be used and unsuitable excavated material would be removed from the site for disposal.

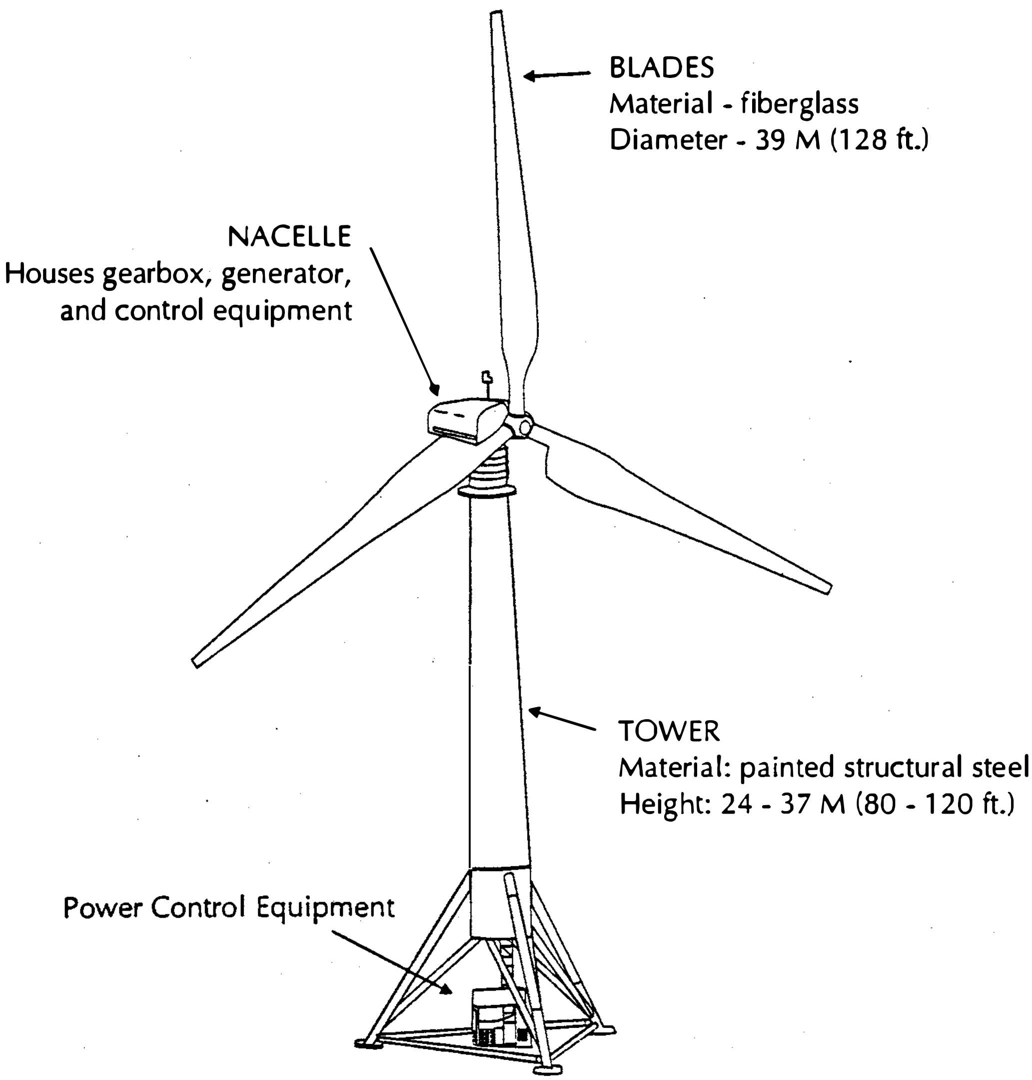


Figure 1.7
Proposed Turbine

Source: KENETECH Windpower

1.4.2.3 Overhead Powerline

Power from the underground power collection lines running along each turbine string would be fed directly to the overhead Project powerline, which generally would run east-west across the site as shown on Figure 1.3. The 34.5-kV Project powerline would be supported by single wood poles. Approximately 400 poles would be required. The height of these poles would be about 10 meters (30-35 feet). The length of the powerline corridor would be approximately 24.6 km (15.3 miles). From the substation south to Section 13, T3N, R16E, (about 3.2 km or 2 miles) two 34.5-kV powerlines would run in parallel along the same corridor.

1.4.2.4 Substation

A Project substation would be constructed in the northwest portion of the site directly adjacent to the BPA Midway-Big Eddy transmission line. The substation would increase power voltage from 34.5 kV to 230 kV prior to interconnection with the Midway-Big Eddy transmission line. The substation would be an outdoor facility with equipment mounted on a concrete slab. The substation would occupy less than 0.5 hectare (less than 1 acre). Security fencing would be constructed around the perimeter of the concrete slab.

1.4.2.5 Roads

Project roads would include primary access roads to the turbine strings and secondary access roads running along each string. 25.3 km (15.7 miles) of primary access roads and 40.7 km (25.3 miles) of secondary roads along turbine strings would be located on the site. Generally, primary access roads would follow ridgelines across the site. Where feasible, existing roads would be upgraded to serve as primary access roads. Of the 25.3 km (15.7 miles) of primary access road on site, 19.3 km (12.1 miles) would be new construction. All secondary roads would be new construction.

Roads would be constructed on grades up to about 10 percent. Where required by site conditions, such as steep slopes, switchbacks would be used. Primary roads would be about 5 meters (16 feet) wide; secondary access roads would be about 4 meters (12 feet) wide. Roads would be constructed with a 15 cm minimum (6-inch) gravel surface.

1.4.2.6 Construction Staging Areas

Up to 4 hectares (10 acres) would be required during each construction phase for temporarily storing construction equipment and materials. An area adjacent to each turbine foundation would also be used for foundation staging and assembly of each turbine. The location of staging areas would be identified prior to construction, but after obtaining a Conditional Use Permit for the Project. Following each phase of construction, temporary staging areas would be restored and replanted. Impacts resulting from use of these construction staging areas would be localized and would depend on the actual areas where they are sited. Appropriate factors to consider in siting the staging areas are identified as mitigation in Part 2, where appropriate.

1.4.2.7 Meteorological Towers

A total of five permanent meteorological towers to collect data on windspeed and direction would be included in the first phase of the Project. Forty temporary towers were installed previously, pursuant to County building permits, in order to collect wind data for siting turbine strings. Temporary towers will be removed following Phase 1 construction. Towers are three-legged lattice structures ranging from about 24 to 30 meters (80 to 100 feet) high. Tower foundations are approximately 0.6 meters (2 feet) on each side.

1.4.3 Project Construction

1.4.3.1 Construction Schedule

Construction of Phase 1 of the Washington Windplant #1, and each additional phase, is estimated to require eight to 11 months and will involve the construction activities shown in Table 1.3.

Table 1.3
GENERALIZED CONSTRUCTION SCHEDULE FOR EACH PHASE

Activity	Month										
	1	2	3	4	5	6	7	8	9	10	11
Civil Construction — Clearing, Roads, Grading, and Stormwater	X	X	X								
Foundations			X	X					X		
Electrical and Communications Equipment Installation			X	X	X	X	X				
Turbine Installation			X	X	X	X	X				
Substation Construction			X	X	X	X	X				
Permanent Surface Water Controls/Cleanup								X			
Startup and Testing									X	X	X

1.4.3.2 Construction Equipment and Traffic

Table 1.4 summarizes the types of construction equipment required during construction of Phase 1. Construction equipment for subsequent phases would be similar.

Table 1.4
CONSTRUCTION EQUIPMENT AND TRAFFIC ESTIMATES

Equipment Type	Purpose	Gross Vehicle Weight Metric Tonnes (Tons)	Maximum Axle Loading Metric Tonnes (Tons)	Phase 1	
				No. of Vehicles	No. of Trips To/ From Site[2]
D-7 Bulldozer	Road and foundation; pad construction	24.8 (27.5)	17.8 (19.8)[1]	2	4
Grader	Road and foundation; pad construction	18.4 (20.4)	15.3 (17)[1]	1	2
Backhoe/Pay Loader	General use	6.8 (7.5)	10.6 (11.8)[1]	2	4
Water Trucks	Compaction, erosion, and dust control	19.2 (21.4)	11.6 (12.8)	3	6
Roller	Road and foundation; pad compaction	17 (18.8)	14.7 (16.3)[1]	1	2
Trenching Machine	Underground Utilities	13.5 (15)	13.3 (14.8)[1]	1	2
Truckmount Driller	Pier foundations	22.7 (25)	13.6 (15)	2	4
Concrete Mixer Trucks	Foundations	31.5 (35)	9.2 (10.2)	4	8
Mobile Cranes	Tower erection	72 (80)	12.2 (13.5)	2	4
Flatbed Trucks/ Box Vans	Delivery of tower/blades/machinery	41.4 (46)	8.1 (9)	8	250
Dump Trucks	Gravel	24.6 (27.3)	9.5 (10.5)	20	10,000[5]
Pickups and Misc. Small Vehicles	General use	N/A	N/A	6	12
Light Cars/ Trucks	Employee	N/A	N/A	40[2]	100/day[3] [4]

1 Maximum axle load based on a flatbed truck hauling equipment to and from the construction site.
2 Total over construction period. One vehicle going to and from the site is equivalent to two trips.
3 Based on the average construction workforce. Peak construction workforce is estimated at 150.
4 Assumes each employee makes 2.5 trips per day on average with one vehicle going to and from the site is equal to two trips. For an eight-month construction period, this is equivalent to 18,300 trips.
5 Assumes all roads constructed in Phase 1 and all upgraded roads require new subgrade and gravel surface.

1.4.4 Project Operation

The Project would provide power throughout the year, but power generation would vary according to seasonal and diurnal wind conditions. Peak power production would occur from April through September. During the peak season, peak daily power production would occur from late afternoon through early evening.

Much of the Project would operate automatically through an electronic communications and control system. During operations, the Project would employ approximately nine full-time workers (Business Development Concepts, 1994). Although the Project would be operated remotely, maintenance employees would tour and inspect the Project site daily.

1.4.5 Mitigation Proposed by the Applicant

The Applicant's proposal includes the mitigation measures identified in this section. The evaluation of impacts contained in Part 2 of this EIS focuses on impacts that would result, assuming mitigation proposed by the Applicant is incorporated into the design and operation of the Project. Part 2 also identifies additional mitigation measures that would reduce or eliminate expected adverse impacts.

1.4.5.1 Bird Protection

As discussed in Section 2.5, wind power projects can create the potential for bird collisions with structures (turbine blades, towers, transmission poles) and electrocution. The Applicant proposes a number of measures to reduce the Project's potential to harm birds. These measures include:

- Eliminating the potential for collision with guy wires by installing turbines, meteorological and microwave towers that do not require guy wires for support.
- Reducing the potential for turbine towers to attract birds by using a modified tubular tower rather than a lattice tower structure. (Research indicates that lattice towers may be used by birds for perching.)
- Reducing the potential for collision and electrocution by locating powerlines underground where they run along turbine strings.
- Reducing the potential for electrocution by designing the 34.5-kV powerline with raptor protection measures. Raptor protection measures will be designed in accordance with *Suggested Practices for Raptor Protection on Powerlines* (Miller, 1975) and may include:
    - Using wood, rather than metal, blades on crossarms.
    - Spacing energized wires at least 152 cm (60 inches) apart.
    - Providing insulated jumper wires.
    - Lowering the crossarm at least 97 cm (38 inches) below the top of the pole.
    - Providing protective equipment (lightening arrestors, power cutouts) on a secondary crossarm at least 122 cm (48 inches) below the crossarm that supports the powerlines.
    - Covering all exposed terminals with wildlife boots or other insulating materials.

1.4.5.2 Safety Measures

As discussed in Section 2.13, the Applicant proposes a number of design measures to minimize risks to public and employee health and safety. These measures include:

- Providing turbines with overspeed protection. Overspeed protection systems include:
  - Tachometers to constantly monitor rotor speed.
  - A control system programmed to immediately shut-down the turbine by rapidly pitching the blades to the "feather" position.
  - In the event of a failure of the hydraulic power unit, a safety mechanism uses stored pressure to pitch the blades to the "feather" position.
- Designing the turbine towers and foundation to survive wind speeds of 161 km per hour at 9 meters (100 mph at 30 feet) above the ground surface.
- Providing a climbing ladder on the inside of the tower to provide safe access during icy weather conditions and designing the ladders to meet all applicable health and safety standards.
- Housing gears and moving parts within the nacelle to contain sparks.
- Providing locks and high voltage warning labels on all control cabinets and transformer cabinets.
- Fencing and locking the Project substation and providing warning signs about the presence of high voltage equipment.
- Providing radio-controlled locked gates onto the Project site and signs warning of high voltage equipment and buried cable.
- Locating the overhead powerline at least 61 meters (200 feet) from the turbines so that cranes working on the turbines will be at a safe distance from the powerlines.

1.4.5.3 Erosion Control/Soil Contamination

Erosion control measures incorporated into the Applicant's proposal include:

- Using and upgrading existing roads wherever feasible rather than building new roads.
- Providing roads with ditches and culverts sized to accommodate the 100-year storm.
- Locating roads along ridgelines to reduce the amount of cut and fill (grading) required.
- Revegetating any disturbed areas that are not permanently occupied by Project features.
- Providing a minimum 15-cm (6-inch) gravel surface on Project roads to reduce wind erosion.

1.4.5.4 Aesthetics

Design measures proposed by the Applicant to reduce aesthetic impacts include:

- Using non-reflective paints to reduce glare.
- Reducing the amount of road construction and cut and fill by using existing roads wherever possible and following ridgelines wherever feasible.
- Installing power collection and communication wires underground along turbine strings.
- Revegetating disturbed areas not permanently occupied by Project features.
- Locating turbines in strings to improve aesthetics by providing a more uniform-looking development.

1.5 Alternatives

This EIS evaluates four alternatives as described below. Impacts of the various alternatives are evaluated in Part 2 of this EIS.

1.5.1 Alternative Overhead Powerline Route

An alternative route for the Project powerline is shown on Figure 1.8. This alternative route would reduce impacts to native plant communities and priority habitats primarily by avoiding a large block of shrub-steppe and Oregon white oak habitats located in the western portion of the site (see Figure 2.3.1). As of the issue date of this DEIS, a portion of the alternative powerline route in Section 12, Township 3N Range 16E is not under easement to the Applicant. This may affect the feasibility of this alternative.

1.5.2 Restricted Areas Alternative

The Restricted Areas Alternative would involve Conditional Use Permit conditions that placed restrictions on development in specific areas of the site or on specific turbine strings. Conditions would specify where development would not be allowed to occur based on the potential for probable significant adverse environmental impacts that could not be mitigated through other means.

1.5.3 Subarea Development Alternative

The Subarea Development alternative compares two options for development of Phase 1 of the proposed Project:

Option 1 – Phase 1 development limited to the western portion of the site.
Option 2 – Phase 1 development limited to the east-central portion of the site.

These two subareas are shown on Figure 1.9. In contrast, the Applicant's proposal places no restrictions on where Phase 1 turbines would be located.

At full build-out, the location of Project facilities would be the same for the Proposed Action and for the Subarea Development Alternative. The objective of the Subarea Development Alternative is to limit the area disturbed during Phase 1 development. This would reduce impacts during the period of time prior to the development of subsequent Project phases and allow for monitoring to evaluate and, if appropriate, modify the implemented mitigation measures. In the event that subsequent phases are ultimately not developed, the long-term impacts of the Project would then be limited to a more confined area of the site. In the event that subsequent phases are developed, the impacts of full build-out, once it occurs, would be the same as impacts evaluated for the Proposed Action.

1.5.4 No Action

The No Action Alternative consists of KENETECH Windpower, Inc., not building and operating a 115-MW, wind-powered electric generating plant in the Columbia Hills east of US-97, near Goldendale, Washington.

One possible consequence of the No Action Alternative would be that utilities purchasing the Project's generating capacity would have to purchase another source of power. Although the actual source of replacement power that would be selected, if required, would depend on a number of factors such as cost and power output, and availability characteristics, it was suggested during scoping that the most likely substitute resource for wind power generally would be natural gas-fired combustion turbine engines because they are the most competitively priced fossil fuel generating resource. (In addition, natural gas-fired cogeneration or combustion turbines are the highest priority fossil fuel generating resource identified by the Pacific Northwest Power Planning Council.)

Natural gas-fired generating options and other resources were evaluated at the programmatic level in the Final EIS for the BPA Resource Program (1993). Site-specific analyses of the impacts associated with natural gas-fired generating resources are not included in this EIS because natural gas generation would not meet the Applicant's objectives and is, therefore, not a feasible alternative for the Applicant. Nonetheless, an overview of the impacts generally associated with natural gas-fired power generation, as described in the BPA Final Resource Program EIS (1993), is included for comparison purposes.

The Resource Program describes the power resources BPA will use to meet a range of projected future demands for electricity. Resource types that BPA has identified to meet future load growth include:

- conservation
- renewable resources (hydropower, geothermal, wind, and solar power)
- efficiency improvements
- cogeneration (natural gas-fired)
- combustion turbines (natural gas-fired)
- nuclear power
- coal

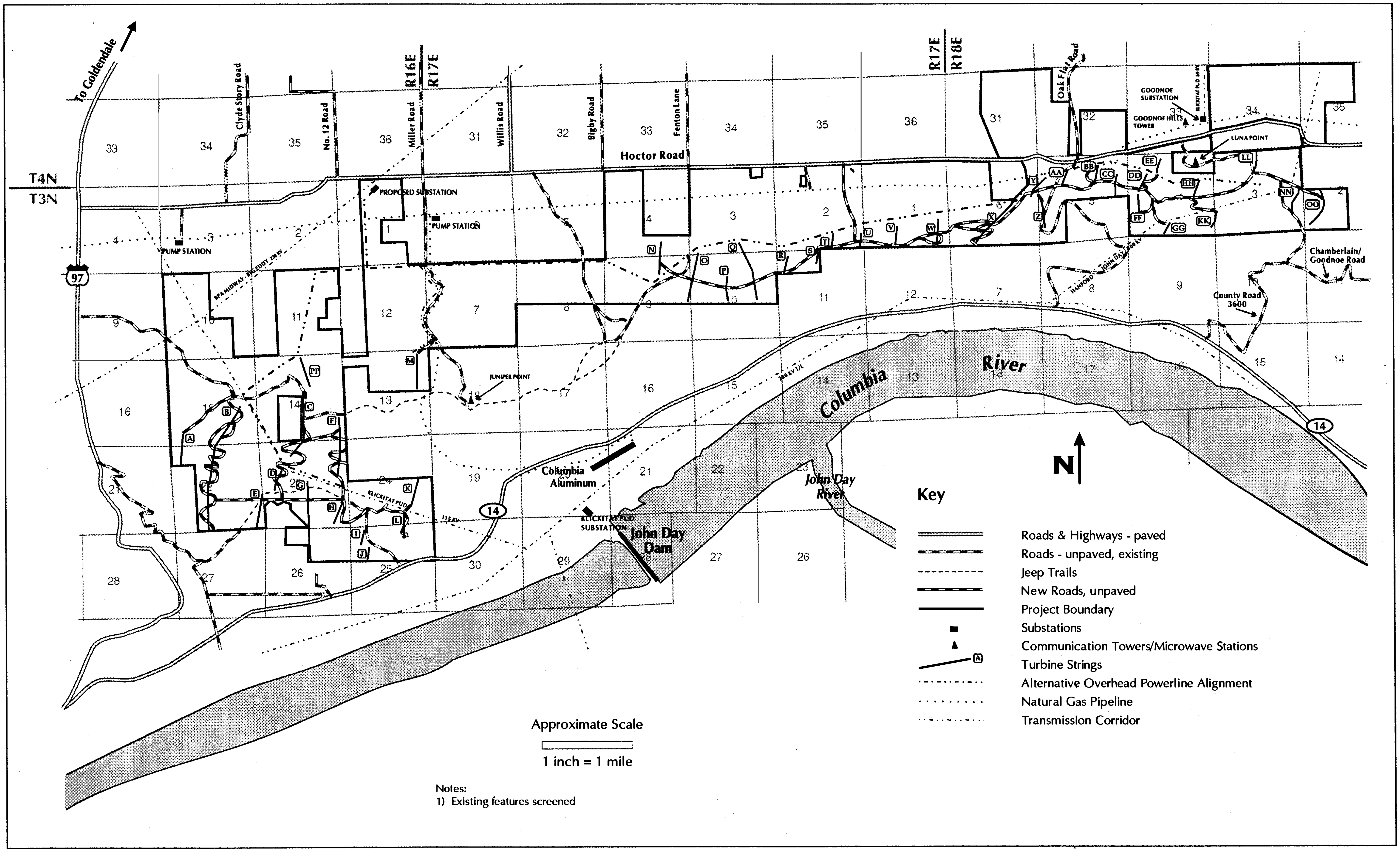


Figure 1.8 — Alternative Powerline Route

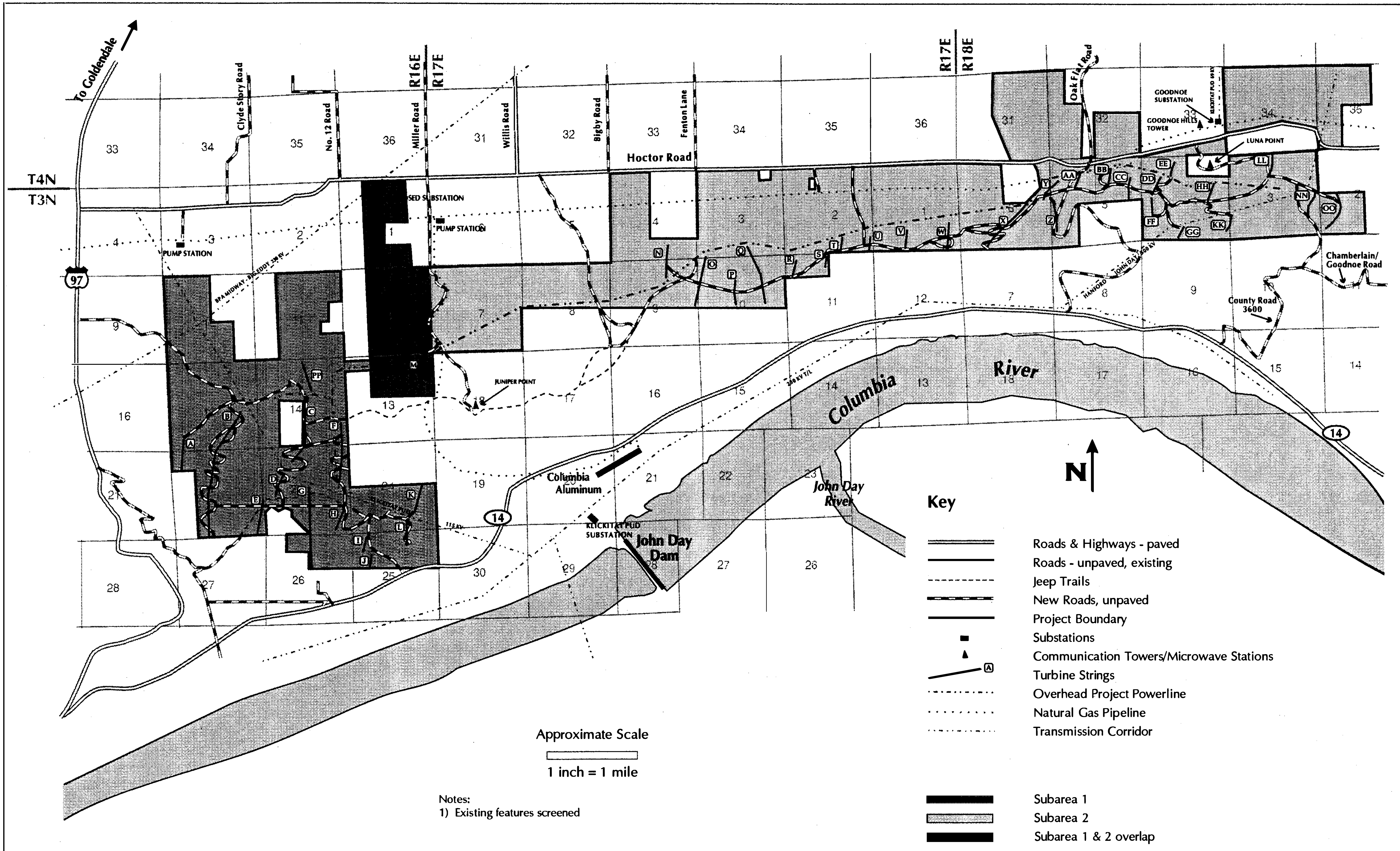


Figure 1.9 — Subarea Development Alternative

The Resource Program EIS evaluated overall system alternatives, each emphasizing a different mix of resources. For all system alternatives, conservation is the highest priority resource; however, even with conservation the BPA Resource Program estimates that additional generating resources will be needed in the Pacific Northwest. Renewable resources, including wind power, are given the next highest priority in the Resource Program. In all but two of the system alternatives, gas-fired cogeneration and combustion turbine resources are to be developed as the third highest priority resources following development of renewable resources such as wind power. Thus, combustion turbines are identified as the most likely replacement for renewable energy projects, if those projects are not implemented. Figure 1.10 illustrates BPA's assessment of the relative environmental impacts typically associated with resources considered by BPA.

On a per-MW basis, gas-fired combustion turbines produce more carbon monoxide than all of the other resource alternatives evaluated in the Resource Program EIS, including other thermal resources. Both cogeneration and combustion turbines produce a relatively large amount of carbon dioxide (CO_2), a gas which has been linked to the greenhouse effect and global warming. Combustion turbines and, to a lesser extent, cogeneration also produce oxides of nitrogen (NO_X). In contrast, air quality impacts associated with wind power development are limited to short-term increases in fugitive dust during construction.

Cogeneration facilities are developed in conjunction with existing heat-producing industrial operations; combustion turbines occupy a relatively small amount of land on a per MW basis. Therefore, the Resource Program EIS concludes that land use impacts from cogeneration and combustion turbines are much less than the land use impacts from wind power projects, which typically require large tracts of land and can create visual impacts. (The analysis does not, however, take into account the land use impacts associated with development of natural gas fields or pipelines. In addition, combustion turbines would require water for cooling.)

1.6 Alternatives Considered but Eliminated from Detailed Study

This section briefly describes an alternative site that the lead agencies evaluated and eliminated from detailed study and is, therefore, not evaluated in Part 2 of this EIS. The Rattlesnake Mountain Site was previously considered by the Applicant, but the Applicant abandoned the site from consideration based on its initial assessment of possible environmental impacts and on a letter from the Department of Energy (June 25, 1993), indicating that the Record of Decision for wind power development on the site would most likely be unfavorable. Based on an evaluation of this information, Klickitat County and BPA concurred with the Applicant that the Rattlesnake Mountain site would not be a feasible alternative for the Applicant. The following summary information on the Rattlesnake Mountain Site is included for comparison purposes.

In 1991, KENETECH Windpower, Inc. proposed to site a wind energy plant along the ridgeline of the Rattlesnake Hills, located on the Hanford Nuclear Reservation in south central Washington. A portion of the windplant site was located within the southernmost edge of the 168,000-hectare (650-square-mile) National Environmental Research Park at Hanford (the Research Park), established by Congress in 1977. Within the southernmost edge of the Park is the 31,000-hectare (120-square-mile) Arid Lands Ecology Reserve (Reserve). Since 1967, it has been U.S. Department of Energy Policy to maintain the area as an undeveloped shrub-steppe ecosystem. Development of the Rattlesnake Hills Windplant was proposed for portions of the shrub-steppe habitat in the Research Park and Reserve, and for adjacent areas outside of the Research Park. Adjacent areas were generally cultivated.

While no detailed environmental studies of the Rattlesnake Hills site were conducted, substantial data is available on the Research Park and Reserve. Table 1.5 summarizes known environmental information and potential impacts of windplant development in the Rattlesnake Hills area. Impacts identified as potentially significant at that site included: disturbance of Priority Habitat, impacts to sensitive and unique plant species, impacts to listed threatened and endangered wildlife species such as the pygmy rabbit, and impacts to archaeological sites or other cultural resources. The presence of eight heavily used communication towers were also identified as a potential impediment to the approval of the Project. Finally, wind power development at the Rattlesnake Mountain site was determined to be incompatible with land management policies for the Research Park and Reserve. Therefore, the Applicant concluded that the Rattlesnake Hills site was probably not available for Project development. Because of the incompatibility with federal land management policies for these areas, Klickitat County and BPA concurred with the Applicant that the Rattlesnake Mountain site would not be a reasonable or feasible alternative to the proposed Project.

TABLE 1.5
POTENTIAL IMPACTS OF WIND POWER DEVELOPMENT AT RATTLESNAKE HILLS SITE

Botanical Resources	■ The site contains ungrazed shrub-steppe habitat with undisturbed native plant communities such as sagebrush-steppe (*Artemesia/Agropyron*), saltbush-greasewood (*Atriplex/Sarcobatus*), and wheatgrass/bluegrass (*Agropyron/Festuca*), and several endangered and threatened species. Most of the proposed development would occur in shrub-steppe habitat and a few adjacent wheat fields. Shrub-steppe is considered a "Priority Habitat" under the Washington Department of Wildlife Priority Habitats and Species (PHS) Project. ■ Along the ridge crest, species include: *Eriogonum thymoides/Poa secunda* association: *Eriogonum thymoides, Phlox hoodii, Haplopappus stenophyllus, Balsamorhiza rosea, Lewisia rediviva,* Sandberg's bluegrass. On the ridge the late melting snow allows other species to grow. These are predominantly *Lupinus spp.* and *Festuca idahoensis*.
Wildlife	■ Species include: Elk, *Odocoileus hemionus* (mule deer), *Sylvilagus nuttallii* (cottontail rabbit), *Aectoris gracea* (chukar), *Canis latrans* (coyote), *Taxidea taxus* (badger), *Lynx rufus* (bobcat), and other smaller mammals and reptiles. ■ Threatened or endangered special status species include: pygmy rabbit (*Sylvilagus idahoensis*), northern grasshopper mouse (*Onychomys leucogaster*), night snake (*Hypsiglena torquata*), and Woohouse's toad (*Bufo woodgousei*).

Avian Resources		■ A migration corridor may exist on Rattlesnake Mountain as the Hanford Reach of the Columbia River is a known flyway for migrating birds. ■ The following special status birds are known to inhabit the reserve for at least part of the year but are not known to nest: Bald eagles (*Haliaeetus leucocephalus*) frequent the Columbia River Gorge in winter; golden eagles (*Aquila chrysaetos*) are present throughout the area; peregrine falcon (*Falco peregrinus*); turkey vulture, and sandhill crane. The extent to which these species use the relatively barren top of the Rattlesnake Ridge is unknown. ■ Wintering raptors at the site include rough-legged hawks, northern harrier, and American kestrel. ■ Nesting birds of prey include sparrow hawk (*Falco sparverius*), Swainson's hawk (*Buteo swainsoni*), great horned owl (*Bubo virginianus*), marsh hawk (*Circus syaneus*), burrowing owl (*Speotyto cunicularia*), ferruginous hawk (*Buteo regalis*), and prairie falcon (*Falco mexicanus*). ■ A remnant sage grouse (*Centrocercus urophasianus*) population inhabits Rattlesnake Mountain, which will be a key habitat area in future population recovery efforts.
Cultural Resources		■ Portions of the Reserve are a traditional Native American hunting and food-gathering site. The Hanford site was ceded to the United States by the Yakama and Umatilla Indians in 1855 and is adjacent to lands ceded by the Nez Perce Indians. ■ Rattlesnake Mountain may have played a significant role in some parts of the religion and culture of Native Americans. ■ 148 archaeological sites have been identified at the broader Hanford site. These include Indian villages, campsites, hunting sites, and cemeteries, and the homestead and ranch remnants.
Land Use/ Public Services		■ Eight communication towers used by numerous groups are found on Rattlesnake Ridge. ■ Windpower development would potentially conflict with the land management objectives of the Research Park and Reserve.

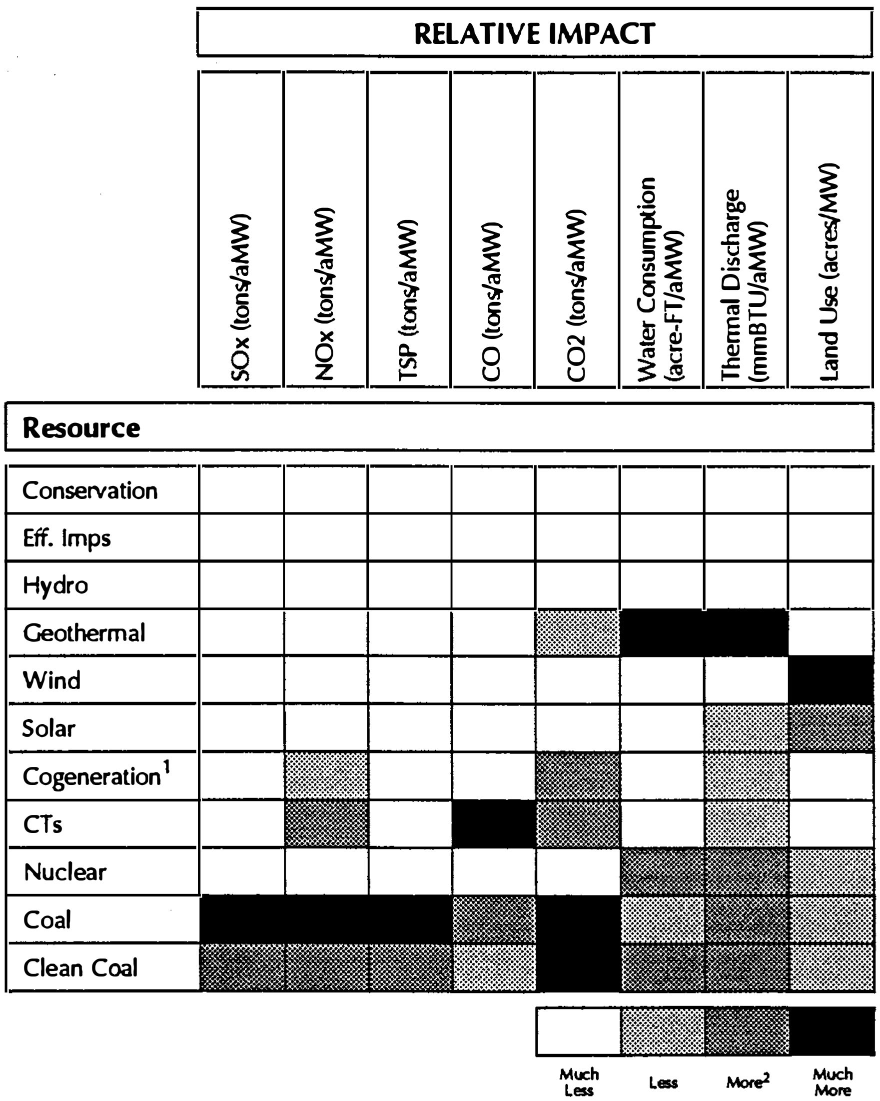
1.7 Timing of Possible Approval (Short-term Uses vs. Long-term Productivity/ Irreversible/Irretrievable Commitments of Resources)

Washington State SEPA rules require that an EIS address the benefits and disadvantages of implementing a proposal at some future time [WAC 197-11-440(5)]. In addition, NEPA regulations require discussions of the short-term uses of man's environment and the maintenance of long-term productivity and any irreversible or irretrievable commitments of resources that would result from implementation of a proposal (40 C.F.R. §1502.19).

The Project would negligibly reduce the amount of land available for cultivation and grazing, and would provide a source of additional income for site landowners. The Project would utilize wind, a renewable resource, for power generation and would not result in the irreversible or irretrievable commitment of resources since areas of the site occupied by Project features could be returned to agricultural use following decommissioning of the Project.

Deferring approval would provide time for additional studies of avian use, but could result in cancellation of the Project due to the Applicant's contractual obligations to deliver power. This would eliminate an opportunity to demonstrate a commercial-scale windpower project in Washington and could ultimately lead to development of additional fossil fuel generating resources as discussed in Section 1.4 (No Action) with comparatively greater environmental impacts on a per-MW basis. In addition, cancellation of the Project would eliminate a source of income to the agricultural property owners with whom the Applicant has entered into easement agreements. Given the relatively low level of expected impacts that would result from construction and operation of the Project with the mitigation measures identified in Section 1.4.5 and Part 2 of this EIS, the benefits of approval at this time may outweigh the benefits of additional studies.

Estimated Environmental Impacts of Conservation and Generation Resource Options



1 Natural gas fired cogeneration assumed
2 "More" means a more negative impact

Source: Bonneville Power Administration
Final Resource Program EIS, 1993.

Figure 1.10

PART 2: AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

2.1 Earth

2.1.1 Studies and Coordination

Primary sources of information for this section include the *Klickitat County Long Range Resources Plan* (November, 1983), unpublished soils information collected by the Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service) office in Goldendale, and various publications on the geology of Klickitat County and the Columbia Plateau. The NRCS was also consulted regarding soil characteristics on the Project site.

2.1.2 Regulations, Standards, and Guidelines

Klickitat County's *Comprehensive Plan* states that it is a County goal to "guide development to areas where soils and geology pose the fewest limitations to quality growth" (Klickitat County, 1977). In addition to this general policy goal, the State of Washington has adopted requirements under its *National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge Baseline General Permit for Stormwater Discharges Associated with Industrial Activities and Construction* General Permit (RCW 90.48, 90.52 and WAC 173-220). For construction activities that disturb more than 2 hectares (5 acres), General Permit requirements include development and implementation of a Stormwater Pollution Prevention Plan covering erosion and sediment control during construction. The Erosion and Sediment Control Plan (ESC Plan) must specify the stabilization and structural Best Management Practices (BMPs) that would be used to reduce soil loss from areas disturbed during construction. The ESC Plan must specify dates when major grading activities occur, dates when construction activities will temporarily or permanently cease on any portion of the site, and dates when stabilization measures will be implemented. In addition, the ESC Plan must include narrative descriptions of BMPs as well as a set of site plans showing the location of the proposed stabilization and structural erosion and sediment control measures.

Stabilization and structural BMPs must be selected from the *Erosion and Sediment Control Handbook* (Goldman, et al.) and must meet the following requirements:

- All exposed and unworked soils must be stabilized by suitable and timely application of stabilization measures.
- Existing vegetation should be preserved wherever possible and areas that are not to be disturbed during construction must be marked in the field.
- Cut and fill slopes must be designed and constructed in a manner that minimizes erosion.
- Stabilization must be adequate to prevent erosion of outlets and adjacent streambanks.
- All BMPs must be inspected, maintained, and repaired as needed to assure continued performance. Inspections must occur at least once every seven days and within at least 24 hours after any storm event of more than 1.3 cm (0.5 inches) of rain in a 24-hour period.

- Provisions must be made to minimize the transport of mud from construction areas onto paved roads.

- Prior to discharge from the site, stormwater runoff must pass through a sediment pond, sediment trap, or other appropriate BMP. Sediment traps, perimeter dikes, barriers, and other BMPs must be constructed prior to site grading.

- Adjacent properties and waterways must be protected from sediment deposition and from downstream erosion due to increased stormwater runoff from the site.

- Temporary BMPs must be removed from the site within 30 days after the date when final soil stabilization is achieved.

Stabilization and structural BMPs typically include, but are not necessarily limited to: covering, seeding, or mulching exposed soils and stockpiles; providing vegetated buffer strips; protecting trees and mature vegetation; using temporary stormwater controls to divert water away from areas disturbed during construction; employing interceptor drainage swales and check dams on steeper, longer disturbed slopes or ditches in order to slow runoff velocity and direct flows toward sedimentation basins; employing sediment fences at the toes of disturbed slopes, at breaks in slopes, and along gullies; permanently restoring disturbed areas as soon as possible following disturbance and prior to the removal of temporary erosion controls; spraying construction roads and disturbed areas with water during dry periods to reduce the potential for dust and wind erosion; and providing sediment basins and traps.

2.1.3 Affected Environment

2.1.3.1 Regional Overview

The Washington Windplant #1 site is located near the western edge of the Columbia Plateau Physiographic province. Within Klickitat County, four major stratigraphic units (geologic layers) are evident:

- **The Ohanapecosh Formation.** This is the oldest stratigraphic unit in the County, possibly dating to the early Eocene period (up to about 58 million years ago) and consisting of a series of volcanic rock such as tuff, pumice, and ash, occasionally interbedded with basalt or other lavas. This formation is not evident at the surface near the Project site.

- **Columbia River Basalts.** This is the most extensive stratigraphic unit occurring in Klickitat County. Basalt is a hard, fine-grained rock formed from lava that flowed out of large fissures in the earth's crust. The basalts underlie most of the County in generally horizontal layers, except in areas where forces in the earth's crust have deformed and tilted the basalt flows. Columbia River Basalts form the distinctive dark brown to black rock cliffs occurring along portions of the Columbia River and other major river canyons in the County. Columbia River Basalts date from the Miocene period (up to about 25 million years ago).

- **Ellensberg Formation.** Sedimentary deposits of the Ellensberg Formation are interbedded with basalt flows. Ellensberg Formation deposits in the southeastern part of Klickitat County include unconsolidated silt, sand, and gravel deposits. This stratigraphic unit dates from 3 to 10 million years ago.

- **Simcoe Basalts and Cinder Cones.** This is the most recent stratigraphic unit evident in Klickitat County. Cinder cones and volcanic domes are evident throughout the Goldendale plateau.

The topography of the western portion of the Columbia Basin reflects volcanic activity, major east-west trending folds, and erosion caused by streams and rivers.

2.1.3.2 Site Geology and Topography

In the vicinity of the Project site, basalt outcroppings are common, with steep basalt cliffs occurring along the north shore of the Columbia River near John Day Dam. A large cinder cone occurs between the Project site and Goldendale, to the east of US-97. This cinder cone is currently being mined for red rock.

The Project site extends along the ridge of the Columbia Hills. This ridge was formed from an upward fold (anticline) in the Columbia River Basalts. The Alder Ridge Anticline has been mapped as a distinctive geologic structure running from the eastern area of the site to the west of Luna Point. The Columbia Hills Anticline is mapped as a distinctive geologic feature to the east of US-97. However, it is likely that these two anticlines are part of the same geologic structure. The Swale Creek Syncline, a depressional fold in the Columbia River Basalts is mapped to the north of the two anticlines. (Brown, 1979).

The topography of the Project site ranges in Elevation from about 305 meters (1,000 feet) mean sea level (MSL) to about 880 meters (2,890 feet). Juniper Point, located just to the south of the Project Site in Section 18, Township 3N Range 17E, is the highest elevation (954 meters, or 3,129 feet) in the immediate vicinity of the site. The Columbia River is approximately 700 to 800 meters (2,300 to 2,700 feet) lower than the crest of the Columbia Hills. Figure 2.1.1 shows Columbia Hills topography in the general vicinity of the Project site.

2.1.3.3 Geologic Hazards

No major faults have been mapped within or near the Project site, although some unidentified faulting may be associated with the basalt folds. Major earthquakes in the Columbia Plateau are relatively uncommon. Since 1893, only 64 seismic events measuring greater than 4.0 on the Richter Scale have been recorded. Seismic events in eastern Washington usually come in rapid, short intervals at depths of less than 3 km (2 miles).

Steep slopes exist within and near the Project site, primarily along the southern side of the crest of the Columbia Hills from Juniper Point to the eastern Project boundary. The other geologic hazards that could potentially affect the site would be an ash fall from an eruption of one of the Cascade Range volcanoes. Mount St. Helens has experienced eight major eruptions in the last 13,000 years. The most recent eruption, which occurred in 1980, deposited ash in the Goldendale area.

2.1.3.4 Soils and Erosion Potential

A published soil survey for the area containing the Project site has not yet been developed. However, the NRCS has mapped much of the site onto aerial photographs and has developed Soil Interpretation Records for the mapped areas. Figure 2.1.2 is a generalized soils map of the Project site based on this unpublished NRCS data. Figure 2.1.2 groups several soil classifications into four categories generally reflecting the soils' susceptibility to erosion. These four categories include:

- **Silt Loams on Slopes Greater than 15 Percent.** These primarily include Slacker-Lickskillet soils in the western portion of the site, Goldendale and Lorena soils in the central portion of the site, and Slacker-Lickskillet or Asotin soils in the eastern portion of the site. These soils would be the most susceptible to erosion.

- **Silt Loams on Slopes Less Than 15 Percent.** These primarily include Lorena soils in the western portion of the site and Goldendale soils in the central and eastern portions of the site. Milder slopes would make these soils relatively less susceptible to erosion compared to silt loams on slopes greater than 15 percent.

- **Cobbly Silt Loams/Loamy Sands.** These primarily include Rockly and Rockly-Lorena soils. Due to the higher percentage of sand and cobble in these soils, they would be less susceptible to erosion than the silt loams.

- **Rock Outcrops/Haploxerolls Complex.** These would generally not be susceptible to erosion although in certain locations they may be susceptible to slides because of very steep slopes.

Table 2.1.1 summarizes characteristics of these major soils classifications. Silt-loam soils mapped on the site are generally susceptible to wind and water erosion because they include a large proportion of fine-grained soil particles. Slope length and gradient also contribute to an area's potential for erosion as do general land management and agricultural or grazing practices.

Silt-loam soils in Klickitat County are generally capable of sustaining soil losses from erosion in the range of 1.8 to 2.7 metric tons (2 to 3 tons) per acre per year because natural processes replace the soil at similar rates; however, portions of the site have been mapped as critical erosion areas (Long Range Resources Plan, 1983). Areas of the site with estimated soil loss in the range of 4.5 to 9 metric tons (5 to 10 tons) per acre per year include Sections 11 and 12, Township 3N Range 16E and portions of Sections 7 and 8, Township 3N Range 17E. Sections 2, 3, 4, and a portion of Section 5 in Township 3N Range 18E experience estimated soil loss in the range of 1.8 to 7.3 metric tons (2 to 8 tons) per acre per year.

Because of the large proportion of fine particles in the silt-loam soils, they can be moisture sensitive and difficult to compact during wet or freezing weather. This also may limit the suitability of these soils as structural fill for roadway foundations.

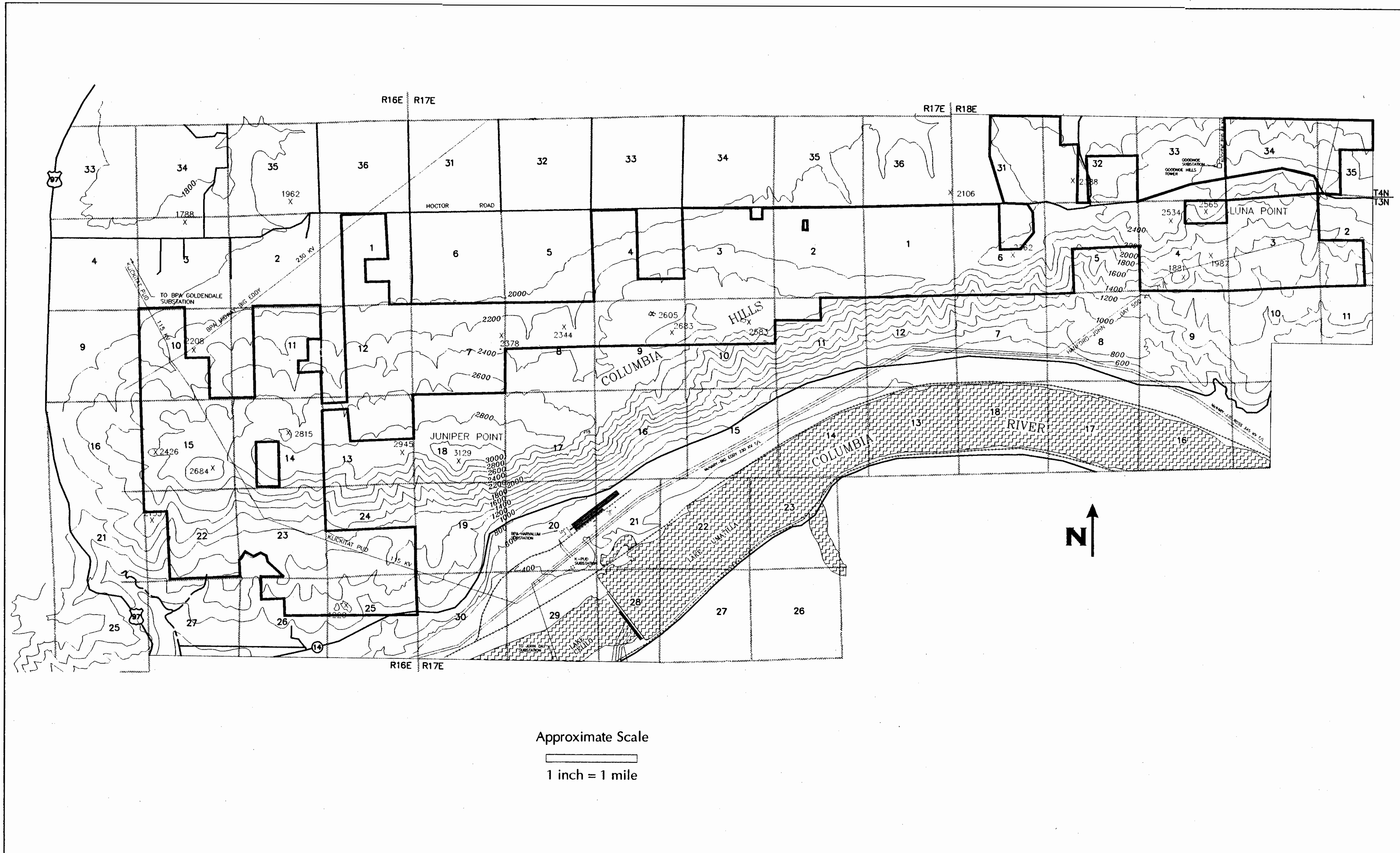


Figure 2.1.1 — Site Topography

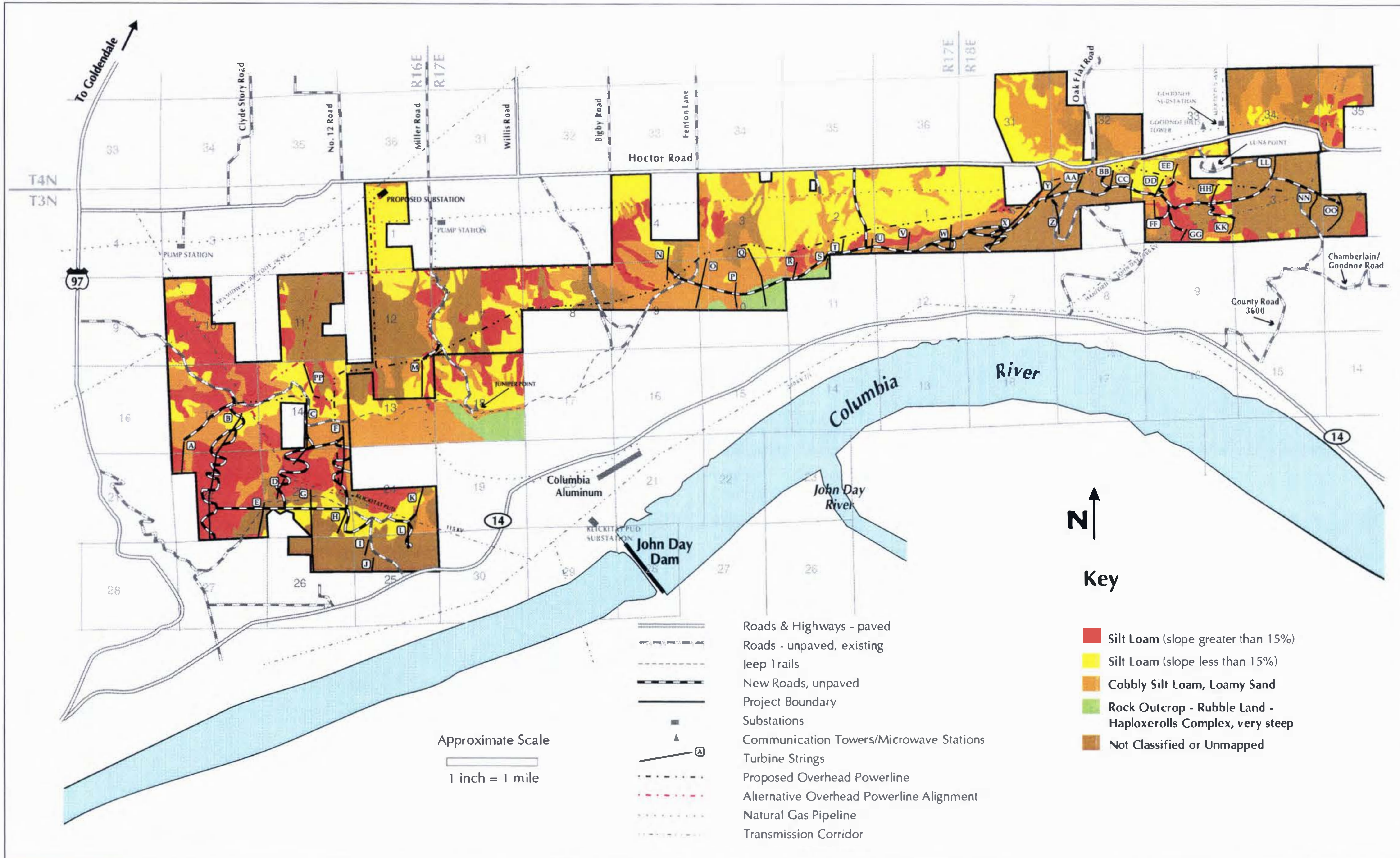


Figure 2.1.2 — Project Soils

TABLE 2.1.1
SOIL CHARACTERISTICS

	Principal Soil Classifications	Characteristics					Limitations To:	
		Slope Range %	Depth to Bedrock	Surface Layer Erosion Factor	Corrosivity		Local Roads and Streets	Road Fill
					Steel	Concrete		
Silt Loams > 15%	Goldendale	15-60	Greater than 150 cm (Greater than 60")	.43	Mod.	Mod.	Severe-low strength, slope	Poor-low strength, slope
	Lorena	15-65	50-102 cm (20"-40")	.37	Mod.	Mod.	Severe-slope	Poor-depth to rock, slope
	Stacker[1]	15-65	50-102 cm (20"-40")	.43	Mod.	Low	Severe-slope	Poor-depth to rock, slope
	Lickskillet	15-90	30-50 cm (12"-20")	.17	Mod.	Low	Severe-depth to rock, slope	Poor-depth to rock, slope
Silt Loams < 15%	Goldendale	2-15	Greater than 150 cm (Greater than 60")	.43	Mod.	Low	Severe-low strength	Poor- low strength
	Lorena	2-15	50-102 cm (20"-40")	.37	Mod.	Mod.	Moderate-depth to rock, shrink-swell, slope	Poor- depth to rock
Cobbly Silt Loam Loamy Sand	Rockly[2]	2-12	13-30 cm (5"-12")	.10	Low	Low	Severe-depth to rock	Poor-depth to rock
Haploxerolls Complex	Rock Outcrop Rubble Land Haploxerolls Complex	0-30	25-102 cm (10"-40")	.20	Mod.	Low	Severe- depth to rock, slope	Poor-depth to rock, slope

1 Stacker-Lickskillet Complex are the actual soils located on the site.
2 Includes Rockly, Rockly-Lorena, and Lickskillet Cobbly Silt Loam.

2.1.4 Proposed Action

2.1.4.1 Environmental Impacts

Earthwork and Erosion

Construction activities would include clearing and grading associated with the development of new primary access roads, turbine strings (including secondary access roads), and the Project powerline. Trenching for utility and communication lines, and substation construction would also disturb site soils. Temporary construction staging areas would disturb an additional 4 hectares (10 acres). Together, these activities are expected to disturb about 155 hectares

(382 acres) during construction. Approximately 42 percent of this disturbance would occur on silt-loam soils; about 23 percent would occur on cobbly silts and loamy sands; about 33 percent would occur on unclassified soils; and about two percent would occur on steep, rocky outcrops.

As discussed in Section 2.1.3.4, silt loams are difficult to compact and may not be suitable for roadway foundations without an engineered subgrade. Roads constructed on silt loam soils could be susceptible to rutting and sloughing unless they are constructed with adequate foundations. Gravel would be required for road foundations (subgrades) and surfacing. Assuming 30-cm (12-inch) road subgrades with 15-cm (6-inch) surfacing, the total amount of gravel required could range up to about 99,000 cubic meters (130,000 cubic yards), depending on whether or not existing roadways on the site were completely reconstructed. Gravel would be brought to the site from an off-site location. The Applicant has not yet identified an off-site gravel source.

Silt-loam soils also would be most susceptible to erosion from construction activities. Steeper and longer slopes would increase the potential for soil erosion, and gullies that form intermittent streams during periods of high runoff would also be relatively more susceptible to water erosion. The potential for water erosion would be greatest during late fall-winter rains and spring snowmelt. The potential for wind erosion would be greatest from mid-summer through fall when the area is driest.

Geologic Hazards

In addition to erosion, potential geologic hazards at the site include steep slopes, earthquakes, and an ashfall from a volcanic eruption. Most turbine strings (except for turbine strings H, I, J, N, O, R, Y, and PP) would be at least partially constructed on slopes greater than 15 percent. Twenty-four of the 39 strings would be at least partially constructed on slopes greater than 30 percent. The Project area falls within Seismic Zone 2B (Uniform Building Code, 1991). Any disruption to the Project from an ashfall would likely be short-term although some damage to equipment could result from the abrasiveness of the ash. Unstable slopes and the potential for localized slides could occur on the site; however, these slopes are generally located on talus slopes where Project-related construction activities are not planned to occur.

2.1.4.2 Mitigation Measures

In addition to the ESC Plan required under the General Permit and in addition to those measures incorporated into the Applicant's Proposed Action (see Section 1.4.5.3), additional mitigation measures could be implemented by the Applicant to reduce the potential for significant erosion impacts and other impacts to earth resources. These measures include:

- Limit clearing and grading activities to the late spring through early fall period (typically May through October) in order to avoid grading during spring rains and snowmelt and late fall rains.

- Design road and turbine foundations and cut slopes in consultation with a professional geotechnical engineer to ensure that appropriate slope protection measures are incorporated into the design and that appropriate materials are used in road foundations.

- Design structural foundations and buildings in accordance with Uniform Building Code requirements for seismic zone 2B.
- Account for the effects of snowmelt in sizing drainage ditches and culverts.
- Use rock or other appropriate channel protection in steeper drainage ditches and channels.
- If detailed geotechnical investigations conducted during final Project design reveal any unstable areas that could not be adequately stabilized during construction or over the period of Project operation, avoid those areas during Project development.
- After construction, monitor the site for erosion on a weekly basis and after large rainfall or snowmelt events, and take corrective action as necessary.

2.1.5 Alternative Powerline Route

2.1.5.1 Environmental Impacts

The alternative powerline route would bypass an area of shrub-steppe and oak habitat located in the western portion of the site as shown in Figure 2.3.1. The alternative powerline route would result in disturbance of about 17 hectares (41 acres) compared to about 16 hectares (39 acres) for the route included in the Applicant's Proposed Action. Therefore, the alternative powerline route results in a relatively minor increase in disturbed soils and the potential for earth impacts (erosion and geologic hazards) associated with the alternative powerline route would be similar to those expected for the Proposed Action. However, by generally routing the alternative powerline along existing on-site roads and around shrub-steppe and oak habitats, existing grassland and mature vegetation would be preserved to a greater extent than for the Proposed Action.

2.1.5.2 Mitigation Measures

Mitigation measures would be the same as those identified in Section 2.1.4.2.

2.1.6 Restricted Areas Alternative

This environmental review revealed no areas that should be completely avoided due to steep slopes or other soil conditions. However, as discussed in Section 2.1.4.2, if detailed geotechnical investigations conducted during final Project design reveal any unstable areas that could not be adequately stabilized during construction or over the period of Project operation, those areas should be avoided during Project development.

2.1.7 Subarea Development Alternative

2.1.7.1 Environmental Impacts

The subarea development alternative would restrict Phase 1 to either the western area (Option 1) or east-central area (Option 2) of the site. Option 1 would result in disturbance of about

66 hectares (164 acres) of on-site soils and would eliminate disturbance in the east-central portion of the site during Phase 1. Option 2 would result in the disturbance of about 77 hectares (191 acres) and would eliminate disturbance in the western area of the site. Thus, during Phase 1 either subarea development option would result in a lower erosion potential than the Proposed Action. Because development would be concentrated in either one of these two subareas, this alternative would result in more concentrated Phase 1 development relative to the Proposed Action.

The two options would also reduce the amount of gravel required for Phase 1 road construction, relative to the Proposed Action. For both Option 1 and Option 2, approximately 54,000 cubic meters (70,000 cubic yards) of gravel would be required, a reduction of approximately 46 percent relative to the Proposed Action.

2.1.7.2 Mitigation Measures

Mitigation measures would be the same as those identified in Section 2.1.4.2.

2.1.8 No Action

Potential impacts to earth resources, primarily those associated with erosion during Project construction, would be avoided if the agencies do not issue the required permits and approvals set forth in the *EIS Fact Sheet*. In addition, importing gravel and other earth materials for on-site road construction would not be required. However, impacts to earth resources associated with ongoing grazing and farming activities would continue. These impacts would primarily include wind and water erosion associated with working soil for cultivation and with loss of vegetation on areas that have historically been heavily grazed.

2.1.9 Significant Unavoidable Adverse Impacts

With the mitigation measures included in Section 1.4.5.3 and Section 2.1.4.2, significant unavoidable adverse impacts to earth resources would not be expected for any of the alternatives considered in this EIS.

2.2 Water

2.2.1 Studies and Coordination

This section discusses potential impacts on surface water and groundwater associated with construction and operation of the proposed Project and alternatives. Primary sources of information for this section include U.S. Geological Survey (USGS) topographic maps for the Project area (1971, 1977, 1983a, 1983b), aerial photographs taken August 29, 1993, and *Geology and Water Resources of Klickitat County* (Brown, 1979).

2.2.2 Regulations, Standards, and Guidelines

The Klickitat County Comprehensive Plan has established an overall goal of maintaining high water quality by ensuring that adjacent land uses are compatible with water uses. Comprehensive plan objectives related to this goal include protection of natural drainages and, where the natural drainage system is not adequate, providing supplemental drainage facilities (Klickitat County Comprehensive Plan, 1977). In addition, various federal and state regulations and guidelines address surface water impacts and stormwater management. As discussed in Section 2.1.2, under the NPDES permit program. The Washington State Department of Ecology regulates pollutant discharge to waters of the United States, which include lakes, rivers, streams (including intermittent streams), wetlands, natural ponds, and tributaries. Because of the potential runoff from construction activities into waters of the United States, Project construction would be regulated through the state NPDES permit program. Specifically, Project construction activities would require coverage under the state's NPDES General Permit (see Section 2.1.2.)

As discussed in Section 2.3.2, under a Memorandum of Agreement, the NRCS (formerly SCS) is responsible for wetland delineations on agricultural lands. The U.S. Army Corps of Engineers regulates discharge of dredge and fill material into waters of the United States, including wetlands, under Section 404 of the Clean Water Act. Waters of the United States include intermittent streams and wetlands. Nationwide Permits (33 CFR Part 330) authorize certain activities in waters of the United States as long as specified conditions can be met. For the Proposed Action, nationwide permits related to survey activities (Permit 6), utility line backfilling and bedding (Permit 12), bank stabilization (Permit 13), road crossings (Permit 14), and fills in headwaters or isolated waters (Permit 26) would potentially be applicable. General conditions are applied to the nationwide permits. General conditions that would be relevant to the Proposed Action include:

- Any authorized structure or fill must be properly maintained (General Condition 2).
- Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soils or fill must be permanently stabilized at the earliest practicable date (General Condition 3).
- No activity is authorized that is likely to jeopardize the continued existence of a federally listed or proposed threatened or endangered species, or that might affect critical habitat for those species (General Condition 11).

- No activity is authorized that may affect cultural properties listed or eligible for listing in the National Register of Historic Places (General Condition 12).

- For certain nationwide permits, notice to the Corps must be provided prior to implementing an authorized activity.

In addition to these general conditions, the North Pacific Division of the Corps has added regional conditions that are applicable to projects in the State of Washington. Further, in Washington, Section 401 Water Quality Certification issued by the Washington State Department of Ecology (Ecology) may be more restrictive and may preempt certain activities that would otherwise be authorized under a nationwide permit. Regional conditions and conditions of 401 certification for specific nationwide permits that could be applicable to the proposed Project are summarized in Table 2.2.1.

2.2.3 Affected Environment

2.2.3.1 Surface Water

The Project site is in east-central Klickitat County. In this semi-arid region, summers are relatively dry and most precipitation occurs from late fall through early spring. Average annual precipitation in the vicinity of the Project site ranges from 25 cm (10 inches) per year near the Columbia River to 40 cm (15 inches) per year north of the Columbia Hills ridge. In this area, a 25-year 24-hour storm event results in approximately 6.4 cm (2.5 inches) of precipitation over 24 hours; a 100-year storm event results in approximately 8.9 cm (3.5 inches) of precipitation over 24 hours (Miller, 1973). Although only a few springs of substantial discharge appear in east-central Klickitat County along the Columbia River gorge, there are many small springs, seeps, and intermittent wet areas. Many of these have been developed into stock watering ponds (Brown, 1979).

To the north of the Columbia Hills ridge, site topography ranges from 5 to 30 percent. Drainages near the ridge crest start as rolling swales and evolve into more defined channels further north. Stormwater runoff from the Project site in the area north of the Columbia Hills ridge flows into two drainage basins: Swale Creek and Rock Creek. Drainage to the east of Bigby Road is generally to the Swale Creek basin. Drainage to the west of Bigby Road is generally to the Rock Creek basin. Swale Creek eventually flows into the Klickitat River, which is a tributary of the Columbia River. Runoff entering the Rock Creek basin flows east through Luna Gulch and intercepts Rock Creek east of the Project site. Rock Creek flows to the south and is a tributary of the Columbia River (see Figures 2.2.1 and 2.8.2).

Table 2.2.1
U.S. ARMY CORPS OF ENGINEERS—NATIONWIDE PERMITS
REGIONAL CONDITIONS AND SECTION 401 WATER QUALITY CERTIFICATION

Nationwide Permit	Activities Potentially Authorized	Nationwide and Regional Conditions Applicable in Washington State	401 Certification and Applicable Restrictions
Nationwide Permit 6—Survey Activities	Core sampling Seismic exploration Plugging exploratory bore holes	None	Approved
Nationwide Permit 12—Utility Line Backfill and Bedding	Backfill and bedding of utility lines, including cables, lines, or wires for the transmission of electrical energy, telephone and telegraph messages, and radio or television communication, but excluding activities that drain a water of the United States	<u>Nationwide</u>: ■ Material from trench excavations may be temporarily sidecast (up to three months) provided the material would not be dispersed by currents or other forces. ■ Disturbed area must be limited to the minimum necessary to construct the utility line. ■ In wetlands, the top 15 to 30 cm (6 to 12 inches) should generally be backfilled with topsoil from the trench(1). ■ Excess material must be removed immediately upon completion of construction. ■ Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line. <u>Regional</u>: ■ Installation is not authorized in a watershed specifically designated and protected as a public drinking water source. ■ The top 15 to 30 cm (6 to 12 inches) must be backfilled with wetland topsoil from the trench. ■ Native vegetation shall be used to the fullest extent possible for revegetation, given a reasonable likelihood for success.	Individual certification or waiver is required prior to obtaining a nationwide permit if: (1) the utility line trench exceeds 2 or more feet in width at the top of the trench, or (2) a utility line segment requires a crossing length of 152 meters (500 feet) or more.
Nationwide Permit 13—Bank Stabilization	Bank stabilization necessary for erosion protection	<u>Nationwide</u>: ■ No material in excess of the minimum needed for erosion protection may be placed. ■ Bank stabilization activity must be less than 152 meters (500 feet) in length. ■ The activity must not exceed an average of 2.5 cubic meters per running meter (1 cubic yard per running foot) along the bank below the ordinary high-water mark(1). ■ Material must not be placed in an aquatic site, including wetlands. ■ Material must not be placed in any location or manner that would impede surface water flow into or out of a wetland. ■ The activity must be part of a single and complete project.	Individual certification required for: (1) bank stabilization that exceeds an average of 1.25 cubic meters per running meter (0.5 cubic yards per running foot) of solid-pour concrete along a bank below the ordinary high-water line or (2) bank stabilization that exceeds 152 meters (500 feet) and that does not incorporate structures/ modifications that are beneficial to fish and wildlife, are not (cont'd)

Nationwide Permit	Activities Potentially Authorized	Nationwide and Regional Conditions Applicable in Washington State	401 Certification and Applicable Restrictions
Nationwide Permit 13—Bank Stabilization (cont'd)		Regional: ■ Bank stabilization activities in excess of 1.25 cubic meters per running meter (0.5 cubic yards per running foot) require Notification under General Condition 13. ■ Native vegetation shall be used to the fullest extent possible for revegetation given a reasonable likelihood of success.	designed and constructed in accordance with current engineering standards, and do not meet Washington Department of Fish and Wildlife (WDFW) requirements.
Nationwide Permit 14—Road Crossings	Fills for roads crossing waters of United States	Nationwide: ■ The fill width must be limited to the minimum necessary for the crossing. ■ The fill must be limited to no more than 0.135 hectare (0.333 acres).[1] ■ No more than 61 linear meters (200 linear feet) can occur in special aquatic sites, including wetlands. ■ The crossing must be provided with culverts or must otherwise be designed to prevent the restriction of and withstand high flows and to prevent the restriction of low flows and movement of aquatic organisms. ■ The crossing must be part of a single and complete project. ■ Fills in special aquatic sites including wetlands require Notification and a wetlands delineation. Regional: ■ Fills must be limited to 0.04 hectare (0.1 acres). ■ Revegetation shall use native vegetation to the fullest extent possible given a reasonable likelihood of success. ■ Discharge (fills) are not authorized in documented habitat for state-listed threatened, endangered, or sensitive animal species.	Individual 401 certification or waiver is not required unless road crossing is in tidal waters.
Nationwide Permit 26—Headwaters and Isolated Waters Discharges	Discharges of dredged or fill material into headwaters and isolated waters	Nationwide: ■ Discharge must not cause the loss of more than 4 hectares (10 acres) of waters of the United States[1]. ■ Loss greater than 0.4 hectare (1 acre) requires notification under General Condition 13 and delineation of any special aquatic sites, including wetlands. ■ The discharge must be part of a single and complete project. Regional: ■ Discharge must not cause the loss of more than 0.8 hectares (2 acres). ■ Discharge must not occur in documented habitat for state-listed endangered, threatened, or sensitive animal species.	Fills between 0.4 and 0.8 hectares (1 to 2 acres) require individual 401 certification.

Notes:

(1) Regional Condition is more restrictive.

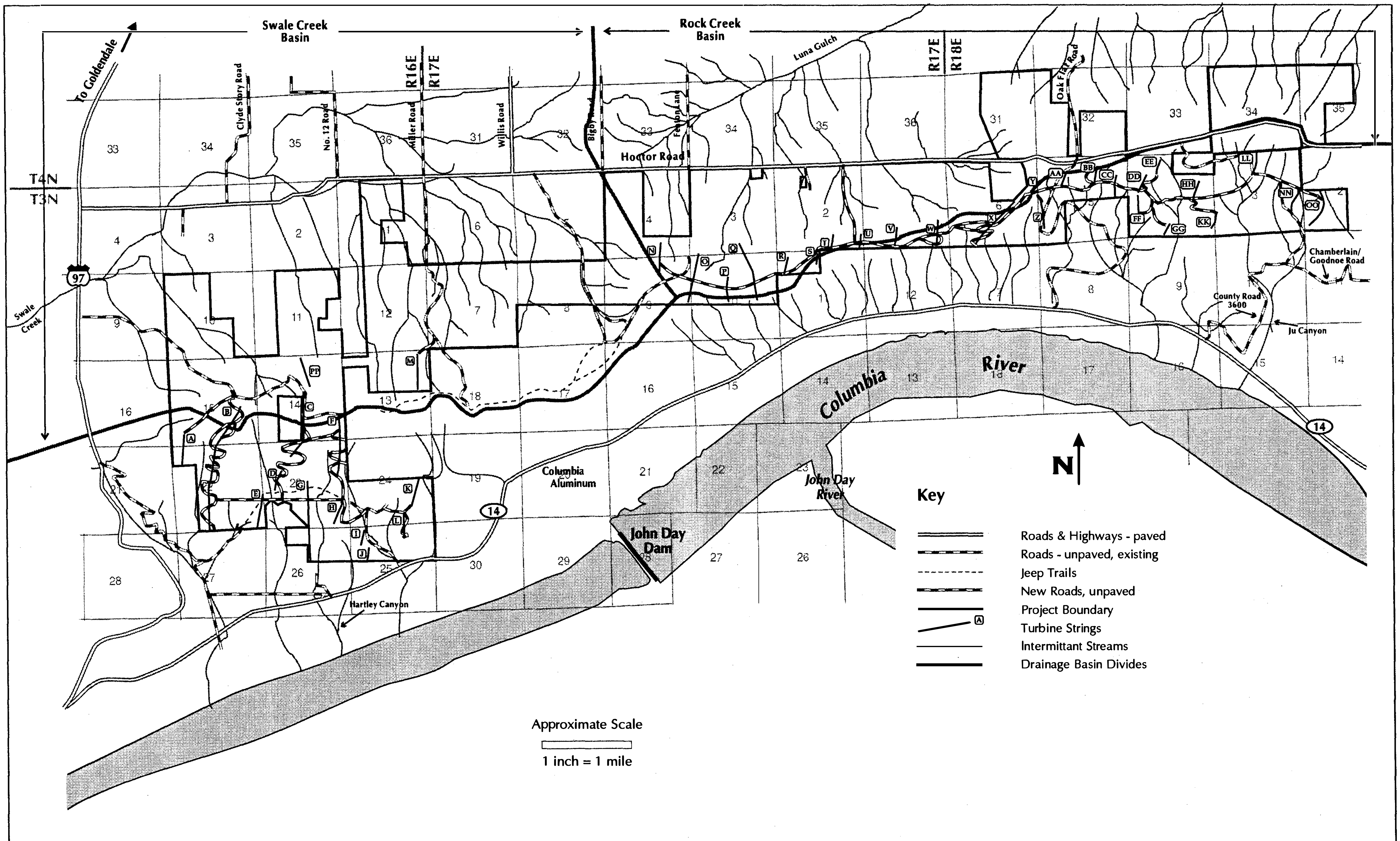


Figure 2.2.1 — Drainage Basins

Stormwater runoff from the Project site in the area south of the Columbia Hills ridge flows to the Columbia River through numerous north-to-south trending drainages. In the southwestern area, deep drainage channels are present and include the canyon directly to the east of Highway 97 and Hartley Canyon, approximately two and one-half miles east of Highway 97 (see Figures 2.1.1 and 2.2.1). Slopes range from 15 percent to greater than 50 percent. To the east of Hartley Canyon and south of the site, the topography is very steep and the area is divided into numerous small drainages. Slopes range from 30 percent to 90 percent. Slopes become less steep in the area of the Hanford-John Day power line, and drainages form a dendritic system of gullies and deep canyons.

Constructed ponds and seepage collectors for livestock watering are located on the Project site, but are outside of the areas that would be disturbed by construction.

2.2.3.2 Groundwater

The primary groundwater source in east-central Klickitat County is from porous interflow zones of the Frenchman Springs Member of the Columbia River Basalts Group (see Section 2.1.3). Most groundwater use is in the Goldendale-Centerville area, which extends from the Horse Heaven Hills to the Columbia Hills and is bounded on the east by Luna Butte and on the west by the Klickitat River Canyon. Domestic wells are generally 45 to 90 meters (150 to 300 feet) deep; irrigation wells tend to be somewhat deeper but rarely exceed 150 meters (500 feet). Other formations such as sediments above the Columbia River Basalts and Swale Creek valley sediments can produce water supply wells where these sediments are course and highly permeable. In the Swale Creek Basin, groundwater elevations along Hoctor Road range from about 600 meters to 500 meters (1,950 feet to 1,650 feet) MSL from east to west. Water wells in the Goodnoe Hills area are drilled to depths of about 60 to 90 meters (200 to 300 feet) and commonly have yields less than 10 gpm, indicating this area receives a limited amount of groundwater recharge.

2.2.4 Proposed Action

2.2.4.1 Environmental Impacts

Impacts to surface water resulting from the proposed Project include placement of fill material in drainages and an increased potential for sediments to enter surface water due to erosion of soils disturbed during construction. As proposed, fill material would not be placed in wetlands or in any areas designated as critical habitat for threatened or endangered species. Turbine string construction would generally follow ridgelines and would typically not cross well defined drainage channels. Turbine strings located on the Columbia Hills ridgecrest may cross shallow swales but would not intercept any intermittent streams. The overhead powerline would cross intermittent stream beds. Portions of underground utilities (communication and power collection lines) could cross intermittent streams; however, their location has not been precisely defined by the Applicant. As proposed, utility trench widths would necessitate individual 401 Water Quality Certification prior to obtaining a nationwide permit (see Section 1.4.2.2). Primary Project access roads would cross intermittent stream beds in several locations on the Project site.

Overall, Project development is not expected to substantially alter runoff quantities and patterns from the site. However, roads would promote increased peak stormwater runoff in localized areas by intercepting hillside sheet flow and creating an area of lower permeability along the roads. (Because roads would be gravel, they would not, however, increase peak flows to as great an extent as would paved surfaces.) Filling of swales and drainage channels for road construction could also impede natural stream runoff unless provided with culverts at appropriate locations.

Increased potential for soil erosion would result from concentration of runoff, disturbed soils, removal of vegetation, cuts and fills, and other construction activities as discussed in Section 2.1.4. This could result in sediments deposited in streams and creeks. During construction, some surface water contamination could also result from fuel or lubricating oil spills related to construction equipment servicing.

The proposed Project would not result in significant depletion or changes to recharge of the groundwater supply, and no significant environmental impacts are anticipated to groundwater due to operation of the Project. However, there is some chance that lubricating and hydraulic fluids could leak from the turbine nacelle during certain types of equipment failure.

2.2.4.2 Mitigation Measures

Certain mitigation measures to reduce erosion, which would also reduce the potential for sedimentation to intermittent streams and downstream surface water bodies, are included in the Applicant's proposal (see Section 1.4.5.3). More extensive erosion and sediment control measures would be required under the NPDES General Permit (see Section 2.1.2). Additional mitigation identified by this environmental review for impacts to earth resources are outlined in Section 2.1.4.2. These additional mitigation measures would also reduce the potential for significant sediment deposits to enter intermittent streams on site. The following mitigation would also further reduce or avoid potential impacts to water resources:

- Where feasible, limit utility trenches across waters of the United States to a top trench width of 0.6 meters (2 feet) or less.

- Provide for lubrication and maintenance of construction equipment in contained areas and use liquid-absorbing booms, socks, pads, or loose absorbent materials in the event of minor spills of fuels, oils, lubricants, and other fluids.

- Provide liquid-absorbing pads under turbines to contain or collect lubricant spills during turbine servicing.

- Conduct regular inspections of turbine sites to detect any leakage of hydraulic or lubricating fluids and take appropriate action to contain leaks and clean up any material coming in contact with the environment.

2.2.5 Alternative Powerline Route

This alternative would disturb slightly more area (2 hectares, 4 acres) than the Proposed Action and could create a slightly greater potential for erosion, but would generally have the same level and types of impacts on water resources. Mitigation would be the same as for the Proposed Action (see Section 2.2.4.2).

2.2.6 Restricted Areas Alternative

This environmental review identified no specific areas that should be restricted from development due to impacts on water resources.

2.2.7 Subarea Development Alternative

2.2.7.1 Environmental Impacts

The subarea development alternative would restrict Phase 1 to either the western area (Option 1) or east-central area (Option 2) of the site. Option 1 would avoid development in the Rock Creek basin. Option 2 would generally avoid development in the Swale Creek basin.

2.2.7.2 Mitigation Measures

Mitigation measures would be the same as those identified in Section 2.2.4.2 but would be applied over a less extensive area.

2.2.8 No Action

Potential impacts to water resources, particularly from new or widened roads and construction of Project facilities, would be avoided if the agencies did not issue the required permits and approvals. Impacts to water resources associated with ongoing farming and grazing activities, including sediment discharge associated with erosion caused by agricultural activities, and any non-point source pollution resulting from livestock, would continue.

2.2.9 Significant Unavoidable Adverse Impacts

With the mitigation included in the Proposed Action, as well as the mitigation described in Section 1.4.5, Section 2.1.4.2, and Section 2.2.4.2, significant unavoidable adverse impacts to water resources would not be expected.

2.3 Plants (Including Wetlands)

2.3.1 Studies and Coordination

This section describes potential impacts to habitat and plant communities and summarizes the findings of the *Washington Windplant #1 Botanical Resources Field Survey*, which is incorporated into this EIS by reference. Pre-survey investigations were conducted to develop preliminary habitat mapping and lists of target plant species for the field surveys. These pre-survey investigations included consultation with universities maintaining herbaria and rare plant inventories; reviewing existing literature, technical reports, and mapping such as the Washington Department of Wildlife Oak Inventory Maps and National Wetland Inventory Maps; and consultation with resource agencies. Special focus was placed on identifying the following botanical resources that could potentially occur on the site:

- Threatened, endangered, or other special-status plants.
- High-quality native plant communities and priority habitat.
- Plants traditionally used by Native Americans.

Federal and state resource agencies were contacted to identify special-status plant species, priority habitats, and high-quality native plant communities that could potentially occur on the Project site. These agencies included the U.S. Fish and Wildlife Service (USFWS); the NRCS (formerly SCS); the Washington Natural Heritage Program, Department of Natural Resources; the Washington Department of Fish and Wildlife (WDFW), Division of Wildlife Priority Habitats and Species; and the Oregon Natural Heritage Program. In addition, a list of culturally important plants provided by a botanist employed by the Yakama Indian Nation (Robson, 1994) was used to develop a target list of plants potentially used by Native Americans. Findings regarding the occurrence of and impacts to these ethnobotanical resources are discussed in Section 2.6, Cultural Resources.

Field surveys included a walk-over of the entire Project site to verify habitat/plant community mapping. In addition, transect surveys for special-status plant species, high-quality native plant communities, and plants potentially used by Native Americans were conducted over a corridor centered along each turbine string and along the approximate alignment of the proposed overhead powerline. Certain portions of entire sections were also intensively surveyed where the Applicant had indicated there was some potential for road switchbacks to be required.[1] Field surveys were timed to correspond with the flowering and fruiting seasons of target plant species. Following field surveys, the Washington Natural Heritage Program was contacted for additional information related to impacts and the regional abundance of certain plant communities.

[1] T3N, R16E: Southern 1/2 of the Southeast 1/4 of Section 14; and Northern 1/2 of Section 23.
T3N, R18E: Southwest 1/4 of Section 4; and Eastern 1/2 of the Southwest 1/4, and Western 1/2 of the Southeast 1/4 of Section 6.

2.3.2 Regulations, Standards, and Guidelines

2.3.2.1 Special Status Plant Species, Communities, and Habitats

Plants and habitats are protected or managed under a range of federal and state laws, regulations, and guidelines. Federal and state management classifications are summarized in Table 2.3.1. Plants listed as federal threatened or endangered species are protected under provisions of the Endangered Species Act. State-listed threatened or endangered species are not protected by state legislation or regulation, but are listed as threatened or endangered to assist with agency management and decision making.

The Washington Natural Heritage Program places a management priority on the preservation of high-quality native plant communities. To be considered high quality, a native plant community must meet the following minimum criteria outlined in the Washington Natural Heritage Plan, and must be placed on the Washington Register of Natural Area Preserves, a state register of "Natural areas containing significant natural heritage resources" [RCW 79.70.030(8)]:

- The community must be dominated by native species with tree layers composed only of native species and at least 80 percent of the shrub and herb layers consisting of native species.
- Any disturbance to vegetation by human activity that would alter in-community processes must be insignificant.
- The community must be large enough to accommodate within-community processes (at least 0.4 hectare (1 acre) for grasslands).

Native plant communities that occur on privately owned land can only be placed on the state register with the prior consent of the landowner. No state or local agency may require such consent as a condition of any permit or approval [(RCW 79.70.030(8)].

The WDFW places a priority on the preservation of designated Priority Habitat. Habitats are given this designation when they provide unique or significant value to wildlife species (see Section 2.4, Wildlife).

2.3.2.2 Wetlands

Discharges of dredged or fill material into certain wetlands is regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act (see Section 2.2.2, Water). However, wetlands that were physically altered to remove excess water and converted to cropland prior to December 23, 1985, are not subject to regulation under Section 404 (U.S. Army Corps of Engineers, 1990). In addition, Section 404 exempts discharges of dredged or fill material associated with normal farming, ranching, and forestry activities. To be exempt, these activities must be part of an established ongoing program and must not convert a wetland to dry land. (U.S. EPA, 1990). A Memorandum of Agreement (MOA) between the U.S. Army (Corps of Engineers), the U.S. EPA, and the U.S. Department of Agriculture sets forth policies governing delineation of wetlands on agricultural land. (USDA/EPA/DOD Army, 1994). Under the MOA, the NRCS (formerly SCS) is responsible for delineating wetlands on agricultural land, which includes intensively used and managed cropland, hayland, and pastureland, but excludes rangeland.

TABLE 2.3.1
PLANT SPECIES MANAGEMENT CLASSIFICATIONS

Classification	Federal	Washington State
Endangered	Species in danger of extinction throughout all or a significant portion of its range.	Species seriously threatened with extinction throughout all or a significant part of its range within the state.
Threatened	A species likely to become endangered within the foreseeable future.	A species likely to become endangered within the foreseeable future throughout significant portions of its range within the state without cooperative management or the removal of threats.
Proposed	A species that is the subject of a proposed or final rule indicating the appropriateness of listing as threatened or endangered. These species are proceeding toward listing and federal agencies are required to not adversely jeopardize them.	Not a state classification category.
Candidate	A species that is a candidate for listing under the Endangered Species Act. There are three categories of candidate species: (1) USFWS has substantial evidence to support listing, (2) conclusive evidence lacking, (3) no longer being considered for listing.	Species that are under review by the WDFW for possible listing as endangered, threatened, or sensitive.
Sensitive	Not a federal classification category.	Species that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their ranges within the state without cooperative management or the removal of threats.
Monitor	Not a federal classification category.	Species that were once classified as endangered, threatened, or sensitive; require habitat that has limited availability; are indicators of environmental quality; require further field investigations; have unresolved taxonomy; may be competing with or impacting other species of concern; or have significant popular appeal.

2.3.3 Affected Environment

2.3.3.1 Special Status Plants

Pre-survey investigations and consultation with resource agencies identified 13 special status plant species that could potentially occur in portions of central-eastern Klickitat County and in conditions generally similar to those that occur on the Project site (Table 2.3.2). Three of these, white meconella (*Meconella oregana*), obscure buttercup (*Ranunculus reconditus*), and Suksdorf's desert parsley (*Lomatium suksdorfii*) are candidates for listing and protection under the federal Endangered Species Act. These three species are also listed as state-threatened species as is the marigold navarretia (*Navarretia tagetina*). The other target plant species have been listed as sensitive by the state of Washington.

No special status plants, including those listed in Table 2.3.2, were confirmed on the Project site during the site walkover or during more intensive transect surveys.

TABLE 2.3.2
SPECIAL STATUS PLANT SPECIES IDENTIFIED THROUGH PRE-SURVEY INVESTIGATIONS

Plant Species	Status		Distribution	Habitat Associations	Confirmed On-Site During Field Surveys
	Federal	State			
palouse milk-vetch [1] *(Astragalus arrectus)*	—	S	Whitman Co., Washington and Idaho, and along Spokane and Columbia Rivers	Grassy, sagebrush flats, river bluffs, and open pine forests	No
Barnaby's pauper milk-vetch[1] *(Astragalus misellus* var. *pauper)*	—	S	Regionally endemic in central and southern Washington and Oregon	Sagebrush zones	No
few-flowered collinsia [1] *(Collinsia sparsiflora* var. *bruciae)*	—	S	Peripheral in its range in Klickitat County. Extends from Klickitat County to the Snake River Canyon and south to California.	Open grassy slopes and swales	No
beaked cryptantha *(Cryptantha rostellata)*	—	S	Peripheral in its range in southeastern Washington and Klickitat County. Extends to eastern Oregon and central California.	Dry open places	No
Douglas' draba *(Draba douglasii)*	—	S	Peripheral in its range in Klickitat County	Exposed rocky and shallow soils of dry areas	No
smooth desert-parsley[1] *(Lomatium laevigatum)*	—	S	Along Columbia Gorge in Washington and Oregon	Basalt cliffs	No
white meconella *(Meconella oregana)*	C2	T	Scattered in south-central and western Washington	Open oak groves with bunchgrasses such as Idaho fescue	No
marigold navarretia *(Navarretia tagetina)*	—	T	Klickitat County	Dry streambeds and gravelly washes near Columbia Gorge	No
hot-rock penstemon [1] *(Penstemon deustus* var. *variabilis)*	—	S	Regionally endemic in Klickitat County	Dry foothills of lowlands and open grassy slopes	No
obscure buttercup *(Ranunculus reconditus)*	C1	T	Locally endemic in Klickitat County	Open meadows associated with phlox, desert parsley, and buckwheat	No
common blue-cup *(Githopsis specularioides)*	—	S	Southern Washington, along both sides of the Cascades, to southern California	Dry open spaces	No
Suksdorf's desert parsley[1] *(Lomatium suksdorfii)*	C	S	Western Klickitat County	Dry open slopes	No
Suksdorf's monkey-flower *(Mimulus suksdorfii)*	—	S	Mt. Adams to southern California, east to Wyoming and Colorado	Open moist to dry areas in valleys and foothills to moderate elevations in mountains	No

Notes: C1 = Category 1 Candidate (USFWS has substantial evidence to support listing)
C2 = Category 2 Candidate (Conclusive evidence to support listing is lacking)
S = Sensitive
T = Threatened
(1) = Other desert parsley species, but not *Lomatium laevigatum* or *Lomatium suksdorfii*, were identified on site.
Other milk-vetch species, but not *Astragalus arrectus*, were identified on site.
Other collinsia species, but not *Collinsia sparsiflora var. bruciae* were identified on site.
Other penstemons, but not *Penstemon deustus var. variabilis*, were identified on site.

2.3.3.2 Habitat and Native Plant Communities

Pre-survey investigations and consultation with resource agencies identified six native plant communities (see Table 2.3.3). Five are grasslands or shrub communities found in shrub-steppe habitat, which is designated as a Priority Habitat. These native communities originally occurred in areas supporting few wild grazing animals (ungulates) and that experienced infrequent fires (5- to 15-year intervals). The greatest threats to these communities include conversion to other uses and invasion by exotic weeds, which is often associated with livestock grazing (Norwood, 1994). The sixth plant community, Oregon white oak, is also designated as a Priority Habitat. Juniper savannah and riparian habitat, which occur on site, are also designated a Priority Habitat by WDFW, but are not designated as high-quality native plant communities.

Figure 2.3.1 shows habitat types confirmed on the Project site. Table 2.3.4 describes these habitats in more detail. Most of the site (approximately 80 percent) is degraded rangeland or cultivated. Approximately nine percent of the site is woodland, and about three percent is range/scattered woodland where the tree cover is less than 25 percent. (Woodlands include Oregon white oak, Oregon white oak/ponderosa pine, and juniper.) Approximately seven percent of the site is shrub-steppe habitat, which supports native shrub and grassland communities.

Two large habitat/complexes are located in the western and eastern areas of the site (see Figure 2.3.1). The western habitat complex extends beyond the boundaries of the Project site and covers over 690 hectares (1,700 acres). Three-hundred sixty hectares (900 acres) are located on the Project site. This complex covers portions of Township 3N Range 16E, Sections 11, 12, 13, and 14 and Township 3N, Range 17E, Section 18. It includes about 280 hectares (700 acres) of Oregon white oak, of which about 175 hectares (430 acres) are located on the Project site. The total amount of shrub-steppe habitat in the western habitat complex is about 390 hectares (960 acres), of which about 170 hectares (425 acres) are located on the Project site. The shrub-steppe habitat has been somewhat disturbed by an existing road (see Figure 2.3.1); however, it supports minimally disturbed areas of the following plant communities: bluebunch wheatgrass-Idaho fescue; bluebunch wheatgrass-Sandberg's bluegrass; Douglas' buckwheat/Sandberg's bluegrass; and Idaho fescue-houndstongue hawkweed. Areas of high-quality Idaho fescue-houndstongue hawkweed community were not, however, located within the intensively surveyed area of this habitat complex.

The eastern habitat complex has been previously mapped by the Washington Natural Heritage Program and covers about 125 hectares (310 acres) on site. It is located in portions of Township 3N Range 18E, Sections 2 and 3 and Township 4N Range 18E, Sections 33, 34, and 35. This habitat complex also extends beyond the Project boundaries. The shrub-steppe habitat has been fragmented by cultivation; however, it was found to contain the following high-quality native grassland communities: bluebunch wheatgrass-Sandberg's bluegrass; Douglas' buckwheat/Sandberg's bluegrass; Idaho fescue-houndstongue hawkweed; northern buckwheat-Sandberg's bluegrass; Idaho fescue-houndstongue; thyme-leaved buckwheat-Sandberg's bluegrass; stiff sagebrush/Sandberg's bluegrass. High quality examples of the first two communities were located within the surveyed corridors.

TABLE 2.3.3
HIGH-QUALITY NATIVE PLANT COMMUNITIES IDENTIFIED THROUGH PRE-SURVEY INVESTIGATIONS[1]

Community	Characteristics	Confirmed On Site
bluebunch wheatgrass/Sandberg's bluegrass lithosolic phase community *(Agropyron spicatum/P. secunda)*	Steppe community, bluebunch wheatgrass and Sandberg's bluegrass dominant. Scattered rabbit brush. Surface soil crust composed of lichens and mosses.	Yes
northern buckwheat/Sandberg's bluegrass community *(Eriogonum compositum/P. secunda)*	Shrub-steppe community. Northern buckwheat shrub layer with carpet of Sandberg's bluegrass. Occurs on stony, shallow soils. Surface soil crust of mosses and lichens	Yes
Douglas' buckwheat/Sandberg's bluegrass community *(Eriogonum douglasii/P. secunda)*	Shrub-steppe community. Douglas' buckwheat shrub layer with carpet of Sandberg's bluegrass. Occurs on stony, shallow soils. Surface soil crust of mosses and lichens.	Yes
Idaho fescue/houndstongue hawkweed *(Festuca idahoensis/Hieraceum cynoglossoides)*	Meadow-steppe community. Moister sites abuting oak woodlands	Yes
bluebunch wheatgrass/Idaho fescue (*A. spicatum/F. idahoensis*)	Steppe. Bluebunch wheatgrass and Idaho fescue dominant.	Yes
Oregon white oak *(Quercus garryana)*	Savannah to woodland community dominated by white oak. Understory a variety of shrub-steppe species and non-native weeds. Also considered a priority habitat	Yes

(1) Additional native shrub-steppe plant communities were identified during field surveys. They include: thyme-leaved buckwheat/Sandberg's bluegrass and stiff sagebrush/Sandberg's bluegrass.

Smaller habitat complexes occur in the central portion of the site. An area of shrub-steppe habitat is located in T3N R17E, Sections 1, 2, 11, and 12 and extends over about 73 hectares (180 acres). About 40 hectares (100 acres) are located on the Project site. This area is of lower quality than the western and eastern habitat complexes because it is smaller and contains patches of disturbed vegetation. An area of oak habitat is located in Section 8, Township 3N, R17E.

TABLE 2.3.4
SUMMARY OF GENERALIZED HABITAT TYPES FOUND ON SITE

Habitat Type	General Location	Approximate Area		% of Site	Overstory (In Order of Dominance)	Understory (In Order of Dominance)
		Hectares	Acres			
oak and oak-pine woodland *(Quercus garryana and Q. garryana-Pinus ponderosa)*	In drainages primarily on northern slope	910	1080	9	Oregon white oak, ponderosa pine, occasionally western juniper	Idaho fescue in areas undisturbed by livestock or wood cutting.
Scattered oak and oak-pine	Transition from woodland to rangeland	90	220	2	Oregon white oak, ponderosa pine, occasionally western juniper (tree cover less than 25%)	Idaho fescue in areas undisturbed by livestock or wood cutting.
juniper woodland *(Juniperus occidentalis)*	Steep south-facing slopes below the crest of the Columbia Hills	2	5	<1	western juniper	bluebunch wheatgrass or cheatgrass.
Scattered juniper woodland	Transition from woodland to rangeland	75	190	1	western juniper (tree cover less than 25%)	bluebunch wheatgrass or cheatgrass.
Native steppe[1] (bunchgrass communities)	Scattered along the crest and northern slopes of the Columbia Hills and occasionally on steep upper southern slopes	260	650	5	None	high- and moderate-quality bunchgrass communities dominated by bluebunch wheatgrass and/or Idaho fescue.
Native shrub-steppe (buckwheat communities)	On crest in areas of shallower soil	115	295	2	None	high- and moderate-quality Douglas' buckwheat/Sandberg's bluegrass communities. Smaller areas of northern buckwheat-Sandberg's bluegrass; thyme-leaved buckwheat-Sandberg's bluegrass; and stiff sagebrush/Sandberg's bluegrass are interspersed.
Riparian	Low elevations on southern exposures along intermittent streams	17	40	<1	Oregon white oak, black cottonwood	typically eroded and low in vegetation due to livestock use.
Cultivated	Northern slopes	910	2,280	18	None	intermediate wheatgrass (CRP program), alfalfa, wheat.
Rangeland	Found over entire site	3,150	7,870	62	None	non-native species, including cheatgrass and weedy forbs. Also gray rabbit brush. Less than 50% native cover.

2.3.3.3 Wetlands

Field surveys indicate that most wetlands mapped by the National Wetland Inventory actually consisted of excavated stockponds heavily used by livestock and would not be considered jurisdictional wetlands (R. W. Beck, 1994). Generally, jurisdictional wetlands are located in portions of areas generally mapped as riparian. In those wetland areas where livestock use is less intense, willows, common cat-tail, western serviceberry, and chokecherry are occasionally present.

2.3.4 Proposed Action

2.3.4.1 Environmental Impacts

The Proposed Action includes development of all turbine strings, the proposed overhead powerline, new road construction and construction staging areas. The location of turbine strings, as well as the approximate location of new roads and the proposed overhead powerline are shown on Figure 2.3.1.

Project development could result in both direct and indirect impacts to plant communities. Direct impacts include the loss of vegetation resulting from construction disturbance and the replacement of plant communities by Project facilities. Indirect impacts include environmental changes such as increased soil erosion or compaction and fracturing plant communities and/or habitat complexes into smaller areas. These indirect impacts could inhibit the reestablishment of native vegetation, facilitate the invasion of exotic, weedy species that over time reduce native vegetation through competition, or otherwise alter natural processes occurring within the plant community. Without mitigation, direct and indirect impacts to plant communities would lead to increased potential for erosion and sedimentation, loss of agricultural productivity in certain grazing areas, and loss of wildlife habitat.

Impacts to Wetlands

Based on the current configuration of Project features, impacts to wetlands are not expected. As noted in Section 2.3.3.3, most areas identified as wetlands on the National Wetlands Inventory consist of excavated stockponds that are heavily used by livestock.

Impacts To Special Status Plants

No special status plants were located on the Project site during either the transect surveys or during the walk over of the entire Project site. Although some road construction may extend beyond the areas intensively surveyed, this would typically occur in range areas where the presence of special status plant species is unlikely. Therefore, no impacts to special-status plant species are expected from Project construction and operation.

Habitat/Plant Community Impacts

Approximately 148 hectares (365 acres) of vegetation would be removed or disturbed during Project construction. Approximately 73 percent of this disturbance would occur within cultivated land or degraded rangeland. The remaining disturbance would affect about 9 hectares (22 acres) of Oregon white oak and about 22 hectares (54 acres) of shrub-steppe habitat, including areas containing native plant communities meeting Washington Natural Heritage Plan criteria for high quality (see Table 2.3.5).

Impacts to the western habitat complex would include:

- Disturbance of about 9 hectares (21 acres) of shrub-steppe habitat including:
  - 2 hectares (4 acres) of high-quality Douglas' buckwheat/Sandberg's bluegrass
  - 5 hectares (12 acres) of high-quality bluebunch wheatgrass-Idaho fescue
- Disturbance of about 2 hectares (5 acres) of Oregon white oak habitat.
- Further fragmentation of the large habitat block, resulting in an increased potential for invasion by noxious weeds.

Impacts to the eastern habitat complex would be minimal because only the northern end of Turbine String LL extends into this complex of shrub-steppe habitat. Impacts would be limited to disturbance of about 0.4 hectares (less than 1 acre) of high-quality bluebunch wheatgrass-Sandberg's bluegrass community located near the edge of the eastern habitat complex.

Impacts to the smaller, central shrub-steppe habitat complex would include:

- Disturbance of about 6 hectares (14 acres) of shrub-steppe habitat including:
  - About 0.5 hectare (1 acre) of high-quality bluebunch wheatgrass-Sandberg's bluegrass;
  - Less than 1 hectare (2 acres) of high-quality Douglas' buckwheat/Sandberg's bluegrass;
  - Possible loss of additional high-quality native grassland communities due to construction of a new road segment linking Turbine String R through Turbine String V.
- Fragmentation of the habitat complex, resulting in an increased potential for establishment of invasive weeds.

Altogether, at least 3 hectares (7 acres) of high-quality Douglas' buckwheat/Sandberg's bluegrass community would be directly impacted by the Project (see Table 2.3.6). A larger amount would be affected when both high- and moderate-quality communities are considered. Table 2.3.7 summarizes Washington Natural Heritage information on the status of this community. Undisturbed soils supporting this community exhibit a crust composed of mosses, lichens, fungi, and nitrogen-fixing bacteria. In addition, soils are shallow and rocky. Under these conditions, the soil crust is critical to reducing erosion and increasing water and nutrient retention. The crust is readily destroyed by trampling by livestock and vehicle use. In addition, when a large area of the crust is destroyed, wind erosion of underlying soils can result in sediment deposits onto surrounding undisturbed areas. Natural recovery times for this community may range from 40 to several hundred years, and successful methods for restoring this plant community are not known. Disturbed soils in areas of Douglas' buckwheat/Sandberg's bluegrass are also highly susceptible to invasion by weeds such as cheatgrass and medusa-head. Cheatgrass is abundant in the heavily grazed rangeland on the Project site. Cheatgrass and medusa-head are difficult to eradicate once established. In addition, areas dominated by cheatgrass and medusa-head can undergo increased range fire frequencies.

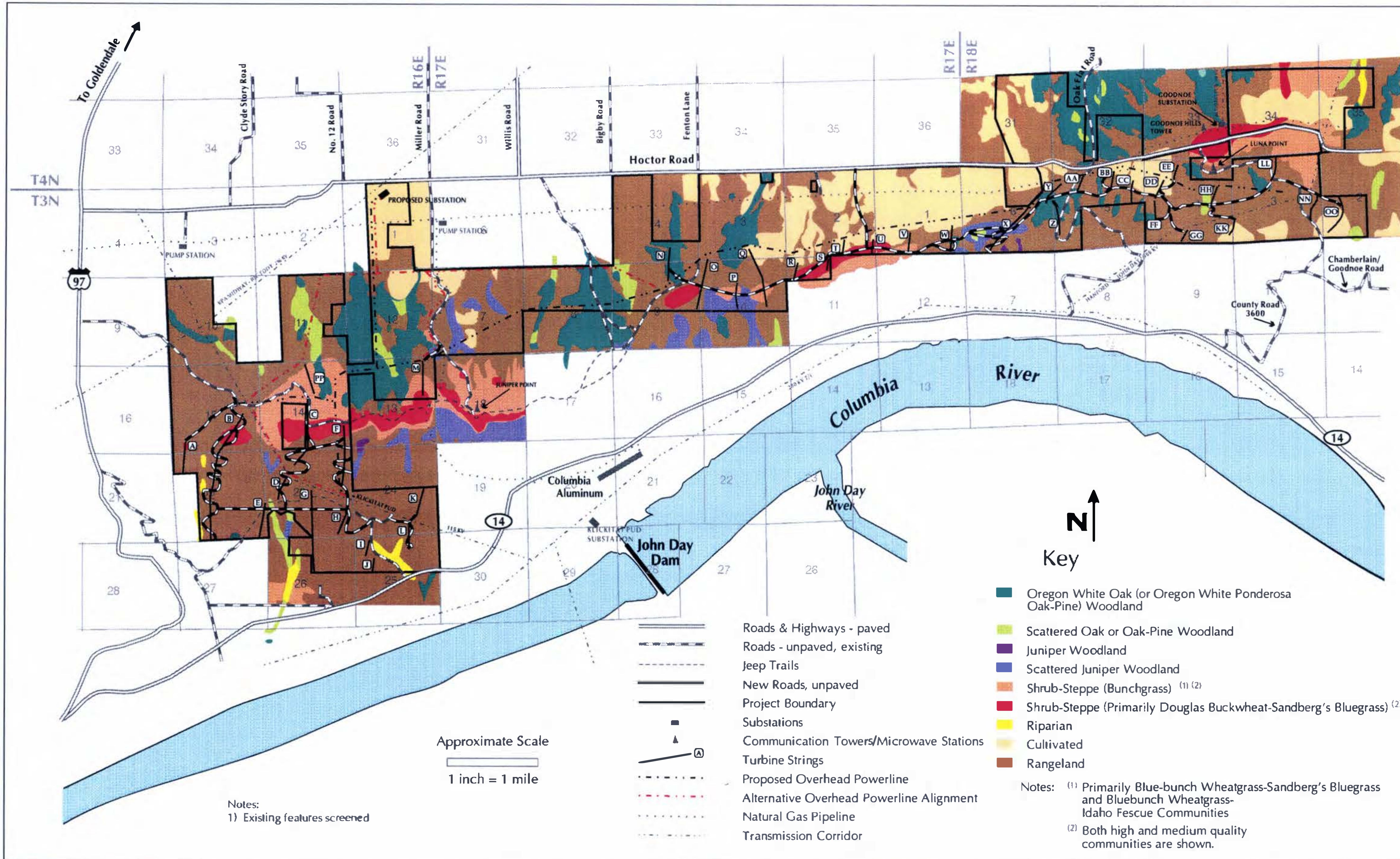


Figure 2.3.1 — Plant Communities/Habitat Map

TABLE 2.3.5
DIRECT HABITAT IMPACTS

Turbine String	Range	Cultivated	Oak/Oak-Pine	Juniper	Shrub-Steppe: Bunchgrass[1]	Shrub-Steppe: Buckwheat[2]	Riparian
	Area Disturbed During Construction (Acres)[4]						
A	4	0	0	0	0	1	0
B	30	0	0	0	0	4	0
C	13	0	0	0	3	3	0
D	6	0	0	0	0	0	0
E	5	0	0	0	0	0	0
F	19	0	0	0	0	2	0
G	12	0	0	0	0	0	0
H	3	0	0	0	0	0	0
I	2	0	0	0	0	0	0
J	3	0	0	0	0	0	0
K	5	0	0	0	0	0	0
L	6	0	0	0	0	0	0
M	2	0	0	0	2	2	0
PP	1	0	0	0	5	0	0
N	0	0	5.5	0	0	0	0
O	5	0	0	0	0	1	0
P	<1	0	0	1	2	0	0
Q	3	2	0	0	3	0	0
R	1	0	0	0	0	1	0
S	0	0	0	0	<1	1	0
T	0	1	0	0	0	1	0
U	0	0	0	0	<1	1	0
V	1	0	0	0	1	0	0
W	3	0	0	0	0	0	0
X	10	0	0	7	0	0	0
Y	0	0	3.2	0	0	0	0
Z	4	0	<1	0	0	0	0
AA	1	0	0	0	0	0	0
BB	5	1	0	0	0	0	0
CC	3	3	0	0	0	0	0
DD	3	2	0	0	0	0	0
EE	2	0	0	0	0	0	0
FF	5	0	0	0	0	0	0
GG	2	0	0	0	0	0	0
HH	5	0	0	0	0	0	0
KK	2	0	0	0	0	2	0
LL	3	0	0	0	<1	0	0
NN	8	0	0	0	0	0	0
OO	3	3	0	0	0	0	0
Subtotal Turbine Strings	181	12	10	8	19	19	0
Roads	43	4	6	4	4	7	0
Powerline	18	8	6	<1	4	<1	0
TOTAL[3]	242 (98 hectares)	24 (10 hectares)	22 (9 hectares)	13 (5 hectares)	27 (11 hectares)	27 (11 hectares)	0

(1) High- and moderate-quality bunchgrass communities. See Table 2.3.4.
(2) High- and moderate-quality buckwheat communities. See Table 2.3.4.
(3) An additional 10 acres would be disturbed by construction staging areas that have not yet been located by the Applicant.
(4) Assumes 100-foot disturbance along turbine strings plus additional disturbance where switchbacks are required; 45-foot disturbance along primary access roads; and 20-foot disturbance along overhead powerline corridors.

Altogether, at least 7 hectares (17 acres) of high-quality bluebunch wheatgrass-Sandberg's bluegrass and bluebunch wheatgrass-Idaho fescue communities would be directly impacted by the Project (see Table 2.3.6); a larger amount would be affected when both high- and moderate-quality communities are considered. Table 2.3.7 summarizes Washington Natural Heritage Program information on the status of these communities. These grassland communities are also associated with a soil crust composed of lichens and mosses; however, they are located on deeper, more productive soils than the buckwheat communities and the potential for reestablishing native vegetation is greater. Reestablishment of native communities would require reseeding, livestock exclusion during the early stages of recovery, and ongoing monitoring and control of invasive weeds.

TABLE 2.3.6
FEATURES AFFECTING HIGH-QUALITY SHRUB-STEPPE GRASSLAND COMMUNITIES[1]

	AREA AFFECTED (Acres)		
Feature Turbine Strings	**Douglas' Buckwheat/Sandberg's Bluegrass**	**Bluebunch Wheatgrass-Sandberg's Bluegrass**	**Bluebunch Wheatgrass-Idaho Fescue**
C	2.1	NI	2.3
PP	NI	NI	4.4
M	1.6	NI	1.3
Powerline Corridor from A-M	0.5	NI	3.7
O	1.0	NI	NI
P	NI	1.4	NI
Q	NI	2.5	NI
S	0.5	NI	NI
T	0.7	NI	NI
U	0.7	NI	NI
V	NI	1.1	NI
LL	NI	0.5	NI
TOTALS	7.1 Acres (2.9 Hectares)	5.5 Acres (2.2 Hectares)	11.7 Acres (4.7 Hectares)

NI = No high-quality communities identified in surveyed areas.
[1] Roads between turbine strings in the eastern portion of the site could result in additional disturbance.

TABLE 2.3.7
WASHINGTON NATURAL HERITAGE PROGRAM STATUS INFORMATION ON HIGH-QUALITY GRASSLAND COMMUNITIES LOCATED IN SURVEYED CORRIDORS

Bluebunch Wheatgrass-Sandberg's Bluegrass	Bluebunch Wheatgrass-Idaho Fescue	Douglas' Buckwheat/Sandberg's Bluegrass
State Rank 3 Conversion of sites low. Number of occurrences stable. Moderate threats to lowering quality of occurrences. Broad natural range.	State Rank 2 Conversion of sites moderate to high. Number of occurrences stable. Continuing threats to lowering quality of occurrences. Broad natural range.	State Rank 2 Conversion of sites low. Number of occurrences stable. Moderate threats to lowering quality of occurrences. Narrow natural range.

2.3.4.2 Mitigation Measures

In addition to those mitigation measures proposed by the Applicant (see Section 1.4.5), which include revegetating disturbed areas, the following measures if implemented by the Applicant would reduce impacts to plants and plant communities:

- Limit construction disturbance by flagging the limits of construction and margins of high-quality native plant communities that can be avoided while still meeting the Project objectives.
- Prepare a site access plan that designates roads and directs construction and maintenance workers to use existing roads wherever possible.
- Locate construction staging areas in locations that do not include priority habitats or high-quality native plant communities.
- Conduct ongoing environmental monitoring during construction to assure that flagged areas are avoided.
- In native grassland areas (shrub-steppe habitats), restrict vehicle access during wet periods and the early growing season (generally from November through May) to minimize soil disturbance and damage to plants.
- In the western habitat area, route the powerline parallel and adjacent to the existing road to the maximum extent possible while still locating overhead powerlines a minimum of 61 meters (200 feet) from the closest turbine (see Section 1.4.5.2).
- Where feasible, given site topography, project boundaries, and safety considerations, adjust the road and powerline corridors to: 1) avoid shrub-steppe and Oregon white oak habitats and 2) to run in the same corridor, thereby reducing the overall amount of site disturbance.
- Develop a reseeding/restoration/and weed management plan that is reviewed by the Washington Noxious Weed Control Board and that, at a minimum, addresses the following:
  - Stockpiling top soils separately from other soils.
  - Specifications for reseeding any areas disturbed during construction with mixes that are certified free of noxious weeds.
  - Specifications that any temporary seeding used for erosion control during construction should also be accomplished with seed mixes certified free of noxious weeds. These specifications should be incorporated into the Erosion and Sediment Control Plan discussed in Section 2.1.4.2.
  - Timing and application rates for seed mixes.
  - Specifications for reseeding disturbed bluebunch wheatgrass-Sandberg's bluegrass and bluebunch wheatgrass-Idaho fescue communities with seed mixes that include species native to those communities, especially dominant species.
  - Specifications for reseeding disturbed Douglas' buckwheat/Sandberg's bluegrass communities and providing temporary erosion control/soil stabilization measures.

- Livestock exclusion from reseeded native grasslands in shrub-steppe habitat for at least two to three years and until native vegetation is established.
- Annual monitoring of restored and/or reseeded shrub-steppe habitat and communities for noxious weeds and ongoing actions to control noxious weeds.

2.3.5 Alternative Powerline Route

2.3.5.1 Environmental Impacts

The alternative powerline route would disturb about 17 hectares (41 acres) of vegetation compared to about 16 hectares (39 acres) of vegetation disturbed by the powerline route included in the Proposed Action. The alternative powerline would reduce the amount of oak habitat disturbed by the Project by about 13 percent (about 1.2 hectares or 3 acres) and potentially avoid impacts to nesting gray squirrels (see Section 2.4). The alternative powerline route would also reduce the amount of shrub-steppe habitat disturbed by the Project by about 10 percent (about 2 hectares or 5 acres). Most of the shrub-steppe habitat that would be avoided consists of high-quality bluebunch wheatgrass-Idaho fescue communities.

By routing around the western habitat complex, the alternative powerline route would also reduce the extent to which Project development would break up that habitat complex into smaller pieces. This would reduce the potential for invasive weeds to become more dominant in the area and would help maintain the value of the area for wildlife and grazing.

2.3.5.2 Mitigation Measures

Mitigation would generally be the same as for the Proposed Action as described in Section 2.3.4.2, except for mitigation related to routing the proposed powerline through the western habitat complex.

2.3.6 Restricted Areas Alternative

2.3.6.1 Environmental Impacts

As discussed in Section 2.3.4.1, successful methods for restoring the Douglas' buckwheat/ Sandberg's bluegrass community are not known. Therefore, this alternative would restrict the high-quality areas of this community in the western and central habitat complexes from Project development. These areas of high-quality Douglas' buckwheat/Sandberg's bluegrass would be required to be flagged and avoided during construction. These restrictions would affect the following Project features:

- Roughly the northern half of turbine string C and associated roads.
- Roughly the southern third of turbine string M.
- Portions of the powerline that run through the Douglas' buckwheat/Sandberg's bluegrass community in the western habitat complex.

- Turbine strings S and U.
- Road segment R to V.

2.3.6.2 Mitigation Measures

Mitigation measures would be the same as those described in Section 2.3.4.2.

2.3.7 Subarea Development Alternative

2.3.7.1 Environmental Impacts

This alternative would restrict Phase 1 Project development to either the western area (Option 1) or east-central area (Option 2) of the site as shown on Figure 1.9. Table 2.3.8 shows the amount and habitat types that would be disturbed during Phase 1 Project construction for each of these options.

TABLE 2.3.8
DIRECT HABITAT IMPACTS
SUBAREA DEVELOPMENT ALTERNATIVES
(PHASE 1 CONSTRUCTION)

Habitat Disturbed Hectares (Acres)								
	Total	Rangeland	Cultivated	Oak	Juniper	Shrub-Steppe		Riparian
						Bunchgrass	Buckwheat	
Option 1	66 (164)	53 (131)	<1 (2)	2 (5)	0 (0)	5 (13)	5 (13)	0 (0)
Option 2	77 (191)	44 (109)	9 (22)	8 (19)	5 (13)	6 (14)	6 (14)	0 (0)

Either option would reduce the overall amount of vegetation disturbed during Phase 1 compared to the Proposed Action and would provide the opportunity to test the success of efforts to reestablish high-quality Douglas' buckwheat/Sandberg's bluegrass communities. Option 2 results in a greater amount of disturbed area and disturbs more oak and juniper habitat than Option 1. However, Option 2 would reduce impacts to the western habitat complex, which is the area of the site containing the largest contiguous areas of Priority Habitat and high-quality native plant communities.

2.3.7.2 Mitigation Measures

Mitigation measures would generally be the same as listed for the Proposed Action except they would apply over a smaller area.

2.3.8 No Action

Impacts to high-quality native plant communities and priority habitats caused by Project construction and operation would be avoided if the agencies do not issue the required permits and approvals. Ongoing grazing and cultivation could, however, result in continued displacement of native shrub-steppe, oak, and juniper habitats on the Project site.

2.3.9 Significant Unavoidable Adverse Impacts

No special-status plants were identified on the Project site. In addition, much of the impact to high-quality native plant communities and Priority Habitat associated with the Proposed Action could be avoided or mitigated through adjustment of road and powerline routes and intensive efforts at reseeding, restoration, and ongoing weed control. Because of the lack of evidence of successful restoration of the Douglas' buckwheat/Sandberg's bluegrass community, there is considerable uncertainty about whether or not efforts to reestablish that native community would prove successful. Although these communities are not protected on private land through the Washington Natural Heritage Program, if efforts to restore those communities prove unsuccessful, it could result in increased erosion and establishment of invasive weeds.

2.4 Wildlife (Non-Avian)

2.4.1 Studies and Coordination

This section addresses non-avian wildlife, including mammals, amphibians, and reptiles, that could potentially be affected by the proposed Project and alternatives. Special emphasis is placed on wildlife-related issues raised during scoping and on special status species and habitats. Because avian resources were a special concern with this Project, they are generally addressed in Section 2.5, Birds.

Wildlife studies were conducted concurrently with year-long Project avian studies. Species and issues to be evaluated were determined through public scoping, through pre-survey literature review and file searches, and through consultation with the WDFW, the Oregon Department of Fish and Wildlife (ODFW), and the USFWS. Field biologists noted observations of target wildlife species while conducting point counts, transects, and other field investigations as part of the avian study conducted for this EIS (see Section 2.5). Habitat types located on the Project site were evaluated in conjunction with Project botanical studies (see Section 2.3). Species habitat requirements, regional distribution, and other ecological information were gathered from the literature and from consultation with resource agencies.

2.4.2 Regulations, Standards, and Guidelines

Klickitat County's Comprehensive Plan has established an overall goal of identifying and preserving wildlife. As with plants, animal species can be listed as threatened, endangered, or otherwise sensitive at either the federal or the state level. Federal and state management classifications are summarized in Table 2.3.1. At the federal level, species listed as threatened or endangered are protected under the authority of the Endangered Species Act. In Washington, state-listed threatened or endangered animal species are not specifically protected by State statute or regulation, but are listed to assist with agency wildlife management efforts and decision making. Species may be listed at the state level because of rarity, vulnerability to disturbance, or other factors.

2.4.3 Affected Environment

2.4.3.1 Regional Overview

Klickitat County is a transitional habitat area supporting wildlife species from several regions. From west to east, the County shifts from the forested eastern slopes of the Cascades to the arid habitats of the lower Columbia basin. The County also includes the northernmost extension of habitats more common to Oregon and California, such as oak woodlands.

2.4.3.2 Project Overview

The Columbia Hills area is extensively grazed, and over 60 percent of the Project site contains rangeland. Rangeland (non-planted grassland found to contain a high proportion of non-native weeds) is heavily grazed, contains mostly non-native grasses and forbs, provides little or no water, and is low in structural diversity. It is regionally common and generally supports regionally common animal species. Cultivated fields and pastures (areas planted with grasses for grazing), which cover about 15 percent of the Project site, also provide habitat for common species.

Overall wildlife habitat on the Project site and vicinity includes:

- rangeland, juniper patches, talus, and basalt outcrops along the steep southern face of the Columbia Hills,
- native shrub-steppe grassland communities and juniper patches along the ridge top,
- oak and oak/pine woodlands within shallow draws north of the ridge,
- cropland and pasture further north, and in the eastern portion of the site.

Plant habitats are mapped on Figure 2.3.1.

The WDFW has designated oak woodlands, juniper savannah, shrub-steppe, and riparian as Priority Habitats. Two other Priority Habitats, talus and cliff, are present south of the Project site. Taken together, the grazed rangelands, cultivated fields and pastures, and Priority Habitats on the Project site provide a diverse array of habitats and associated species.

Table 2.4.1 lists common species that are supported by the habitat types located on the Project site. Common animals present on the Project site include shrews, deer mouse, northern pocket gopher, Great Basin pocket mouse, voles, raccoon, weasels, striped skunk, badger, red fox, coyote, bobcat, and Columbian black-tailed deer. Some species are closely associated with particular habitat types. Porcupine are associated with oak/pine woodlands. Yellow-bellied marmot are associated with basalt outcrops and rocky areas on the ridge face. Columbian ground squirrel are associated with cultivated lands and in rangelands, and Nuttall's cottontail are associated with shrubby thickets and rocky areas (Maser et al. 1984 and Thomas 1979).

Several common species of reptiles are found in the area, including short-horned lizard, western fence lizard, racer, gopher snake, western terrestrial garter snake, and western rattlesnake. These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983).

TABLE 2.4.1
SPECIES ON THE PROJECT SITE

Common Name	Scientific Name	Habitat
MAMMALS		
shrews	(*Sorex* spp.)	General use across Project site
deer mouse	*Peromyscus maniculatus*	General use across Project site
northern pocket gopher	*Thomomys talpoides*	General use across Project site
Great Basin pocket mouse	*Perognathus parvus*	General use across Project site
voles	*Microtis* spp.)	General use across Project site
raccoon	*Procyon lotor*	General use across Project site
weasels	*Mustela* spp.)	General use across Project site
striped skunk	*Mephitis mephitis*	General use across Project site
badger	*Taxidea taxus*	General use across Project site
red fox	*Vulpes fulva*	General use across Project site
coyote	*Canis latrans*	General use across Project site
bobcat	*Lynx rufus*	General use across Project site
Columbian black-tailed deer	*Odocoileus hemionus columbianus*	General use across Project site
porcupine	*Erethizon dorsatum*	oak/pine woodlands
yellow-bellied marmot	*Marmota flaviventris*	basalt outcrops and rocky areas on the ridge face
Columbian ground squirrel	*Citellus columbianus*	cultivated lands and rangelands
Nuttall's cottontail	*Sylvilagus nuttallii*	shrubby thickets and rocky areas (Maser et al., 1984 and Thomas 1979)
REPTILES		
short-horned lizard	*Phrynosoma douglassi*	These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983)
western fence lizard	*Sceloporus occidentalis*	These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983)
racer	*Coluber constrictor*	These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983)
gopher snake	*Pituophis melanoleucus*	These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983)
western terrestrial garter snake	*Thamnophis elegans*	These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983)
western rattlesnake	*Crotalus viridis*	These species use most habitats present on the Project site, but use talus and rocky areas most frequently (Nussbaum et al. 1983)

The scarcity of water makes the Project site generally unsuitable for amphibians although springs provide suitable breeding habitat for Pacific chorus frog (*Hyla regilla*), long-toed salamander (*Ambystoma macrodactylum*), and Great Basin spadefoot (*Scaphiopus intermontanus*). As part of the field surveys conducted for this EIS during spring 1994, Great Basin spadefoot were located in talus along SR-14 south of the Project site and in grazed rangeland along the ridgetop within the Project site.

2.4.3.3 Special Status Species

The USFWS identified no non-avian animal species that are listed as federally threatened or endangered species within the vicinity of the Project site (Frederick, pers. communication, 1994). As shown in Table 2.4.2, three federal candidate species are potentially found on site or in nearby habitats. Two of the federal candidates are bats, which roost in caves or crevices in cliff areas. The third federal candidate species, the northern sagebrush lizard, may use all habitats on the Project site but would typically use talus and rocky areas most frequently.

Several non-avian species listed at the state level by Oregon or Washington are present within the vicinity of the proposed Project (Marshall, 1992; Rodrick and Milner, 1991; Dugger pers. communication; and Cary, pers. communication). Table 2.4.2 summarizes the nine Washington state-listed species assumed to be located on the Project site based on habitat associations, WDFW records, and/or direct observation made during studies conducted for this EIS. One of these species, the western gray squirrel, is listed as a state-threatened species. Another species, the juniper hairstreak is a candidate for listing. The other seven species have been given a "monitor" designation.

Most state-listed species located on the Project site are common elsewhere in the western United States, but are uncommon in Washington. To a large degree, this is because Klickitat County is within a transitional zone, and the Project site includes habitats more common in Oregon, Idaho, and California. Threats to these state-listed species, therefore, are for populations on the regional edge of their range, and populations as a whole may not be threatened or declining.

A few other special status species were evaluated for this EIS but likely do not use the Project site.[1]

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[1] Pygmy rabbit (*Brachylagus idahoensis*), a state threatened species, were determined to be absent because no typical habitat is present on site. The species requires tall, dense sagebrush steppe with deep, loosely compacted soils (WDFW 1994). California mountain kingsnake (*Lampropeltis zonata*) was determined to be absent based upon: (1) the lack of any sightings near the site and (2) the lack of suitable habitat. California mountain kingsnake are known to be present in more forested habitats present in the western portion of Klickitat County (McAllister personal communication). Townsend's big-eared bat (*lecotus townendii townsendii*) and fringed myotis (*Myotis thysanodes*), use caves for breeding, resting during the day, or hibernating during the winter (Barbour and Davis 1969 and Nagorsen and Brigham, 1993). Project site surveys, which included searches of cliffs by helicopter, determined that no caves were present on or near the Project site. Yuma myotis *(myotis yumanensis)* is a federal candidate closely associated with water, which is scarce on the Project site (Nagorsen and Brigham, 1993).

TABLE 2.4.2
SPECIAL STATUS NON-AVIAN WILDLIFE SPECIES CONFIRMED OR LIKELY PRESENT ON THE PROJECT SITE

Species	Status	Potential for Using Site	Status On Site	Habitat Association
western gray squirrel (*Sciurus griseus*)	state threatened	confirmed year-round resident	present in oak/pine woodlands	closely associated with oak/pine woodlands (Rodrick and Milner, 1993)
juniper hairstreak (*Mitoura siva*)	state candidate	high: within species range and suitable habitat present; known to be present near Maryhill	present in juniper woodlands	juniper woodlands (Tilden and Smith, 1986)
fringed myotis (*Myotis thysanodes*)	federal candidate	moderate: may forage but is unlikely to roost since caves and rock crevices are not present	assumed present	colonial bat that roosts in caves and that may also roost in rock crevices (Nargorsen and Brigham, 1993) such as those present south of the site
small-footed myotis (*Myotis ciliolabum*)	federal candidate	moderate: may forage and roost on site	assumed present	cliffs and rocky outcrops in arid regions. Roosts in a variety of areas including cliffs, crevices, and openings, boulders, vertical banks, talus slopes, under rocks, and on the ground (Nagorsen and Brigham, 1993).
northern sagebrush lizard (*Sceloporus graciosus*)	federal candidate	moderate: may use most habitat on site but would tend to frequent talus slopes and rocky areas	assumed present	cliffs and rocky outcrops (Nussbaum et al., 1983)
Ord's kangaroo rat (*Dipodomys ordii*)	state monitor	moderate: soils generally too rocky and shallow, but may be present in some areas	assumed present in small numbers and patchy distribution	open sandy or soft soil areas with sparse vegetation cover (Larrison 1976); sagebrush scrub in open sandy areas (Ingles, 1965)
sharp-tailed snake (*Contia tenuis*)	state monitor	moderate: not reported in the area, but may be present based on habitat	assumed present in riparian and riparian-associated talus	arid, rocky areas (McAllister pers. communication); found in moist rotting logs or stable riparian talus slopes, often near streams or in other damp habitats (Nussbaum et al., 1983)
night snake (*Hypsiglena torquata*)	state monitor	moderate: one record north of Goldendale near Bloodgood Creek	present in cliff and talus	found in vicinity of rock outcrops in arid regions (Nussbaum et al., 1983)
ringneck snake (*Diadophis punctatus*)	state monitor	moderate: known from locations west of site, but suitable habitat is present	assumed present in oak/pine and oak woodlands	oak/pine woodlands; also in open, grassy or brushy areas and in relatively open, rocky canyons (Nussbaum et al., 1983)
southern alligator lizard (*Elgaria multicarinata*)	state monitor	high: within species range and suitable habitat present	assumed present in oak/pine and oak woodlands	oak grassland and edges of pine forest (Nussbaum et al., 1983)
Woodhouse's toad (*Bufo woodhousei*)	state monitor	moderate: within species range, but permanent water lacking on most of site	assumed present near permanent water present in central portion of site	several types of habitats in arid regions, typically found close to permanent bodies of water (Nussbaum et al., 1983; McAllister et al., 1993)
pallid bat (*antrozous*)	state monitor	moderate: not reported in area but suitable habitat is present	assumed present roosting in cliff areas south of the site; foraging throughout the site	cliffs (roosting); open grasslands and shrub-steppe foraging (Nagorsen and Brigham, 1993)
Other Source Not Noted: Rodrick and Milner, 1991, WDFW Priority Habitats and Species Data Base.				

2.4.3.4 Recreational Species

Upland Game Birds

Upland game birds identified during site surveys include chukar (*Alectoris chukar*), Merriam's turkey (*Meleagris gallopavo*), ring-necked pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), and California quail (*Callipepla californica*). Chukar were observed most frequently along the Columbia Hills ridge top and ridge face. Gray partridge were observed near cultivated lands. Ring-necked pheasant were observed most often in thickets near cultivated lands and in riparian draws. Merriam's turkey were not seen, but calls were heard near oak and oak/pine woodlands.

Columbian Black-Tailed Deer

Columbian black-tailed deer are relatively common on the Project site and vicinity. Several wintering areas have been identified north of the Project site (WDFW, PHS data base). Although actual counts were not conducted, based on field observations during January 1994 and on local reports (Dames & Moore, 1993), roughly between 50 and 300 deer are estimated to use habitats on the Project site during winter.

During field surveys conducted in December 1993 and January and February 1994, Columbian black-tailed deer were observed using Conservation Reserve Program (CRP) lands, rangelands, and croplands to feed during the day. Oak woodlands were observed to be used extensively by these deer, as evidenced by droppings and well-used deer trails. Deer are likely to use the oak and juniper woodlands for hiding and thermal cover and to use the south-facing slopes of the Columbia Hills ridge for foraging. The south-facing slopes are most likely to be important during the periods of snow cover, because of the typically lower accumulations and duration of snow fall on these slopes (Loveless, 1964). During hot summer months, trees and north-facing slopes may be important areas where deer can escape direct sunshine during hot periods.

Other Species

Mink *(Mustela vison)* and white-tailed jackrabbit *(Lepus townsendi)* are game animals that WDFW has identified as recreationally important species. Mink are closely associated with water (Chapman and Feldhammer, 1982). Because water is scarce on the site, mink are not likely to be present in any significant numbers. Habitat is suitable for white-tailed jackrabbit, although none were seen during the avian field surveys and they are generally scarce in Washington except for in the Okanogan Valley (Larrison, 1976). Therefore, white-tailed jackrabbit are potentially present, but in small numbers. Waterfowl are also identified as recreationally important species and are discussed in Section 2.5, Birds.

2.4.4 Proposed Action

2.4.4.1 Impacts

Impacts to non-avian wildlife include temporary disturbance during construction, loss of habitat due to permanent Project features, and potential effects on wildlife behavior resulting from Project operation.

Habitat Loss

As discussed in Section 2.3.4.1, about 148 hectares (365 acres) of vegetation would be disturbed during construction. About 79 hectares (193 acres) would be permanently occupied by Project features. This represents about 1.5 percent of the total site area. About 14 hectares (34 acres) would be occupied by the powerline, which would continue to provide some wildlife habitat.

Approximately 66 percent of the disturbed vegetation would be rangeland. This habitat type is heavily grazed and is common in eastern Washington. While many small mammals and other wildlife use rangeland, the habitat does not contain certain features considered important to wildlife such as vegetative structure and diversity.

Disturbance of Priority Habitats would include about 9 hectares (22 acres) of oak and oak/pine woodland, 5 hectares (13 acres) of juniper, and 22 hectares (54 acres) of shrub-steppe habitat. This represents a 2 percent reduction in oak and oak pine woodland, a 7 percent reduction in juniper, and a 6 percent reduction in shrub-steppe habitat compared to what currently exists on the site (see Tables 2.3.4 and 2.3.5). Some restoration of disturbed shrub-steppe habitat could occur after Project construction. These habitats are declining regionally, and the loss resulting from development of the proposed Project would contribute somewhat to this regional decline.

Common Animal Species

The direct removal of habitat would cause an eventual reduction in wildlife abundance in the area. Although common species would be the most affected in terms of numbers of individuals, the effect would be localized. Animal response to human activity differs among species, between seasons, and among individuals within the same species. Most common wildlife, such as the small mammal species on the Project site, are tolerant of human disturbance and would remain on the Project site in areas not directly affected by construction. The presence of humans during construction could cause some wildlife to avoid the Project site. Some common species may be vulnerable to disturbance during certain parts of their lifecycle. For example, bobcat generally avoid areas of high human activity and would likely avoid portions of the Project site during construction, especially if construction coincides with the breeding season when females are taking care of young.

Mortality resulting from traffic during construction and operation would not significantly affect population levels of wildlife species on the Project site because: (1) construction vehicles would typically travel at speeds where most wildlife would be able to avoid collisions, (2) mammals and reptiles are most susceptible at night when Project-related traffic would be minimal (Federal Highway Administration, 1975), and (3) following construction, Project operation would generate only minor traffic volumes (see Section 2.11).

During Project operation, chemicals and lubricants required for Project maintenance would be stored off site. Lighting would be confined to security lights near the Project substation. Turbine towers would not be lighted (see Section 2.13). Because of the minor extent of Project lighting, it is not expected to significantly alter wildlife behavior on the Project site. Existing fencing, which currently surrounds most quarter sections, would remain. Project fencing would be limited to security fencing at road access points and around the Project substation. This should not significantly alter animal access or movements on the Project site.

Special Status Species

The projected loss of less than 9 hectares (22 acres) of oak and oak/pine woodlands would potentially reduce populations of western gray squirrel, which is a state-threatened species. The bisection of the large area of oak woodland in the western area of the site (see Figure 2.3.1) by the overhead powerline would increase predation mortality of these squirrels as they cross open areas. In addition, construction activities within 122 meters (400 feet) of western gray squirrel nests could disrupt western gray squirrel breeding (Dugger, pers. communication, 1995).

Habitat loss could also reduce populations of juniper hairstreak, a butterfly that is a candidate for state-listing as threatened or endangered. The species is closely associated with juniper woodlands, which would be largely avoided by Project development.

Habitat loss for the northern sagebrush lizard, a federal candidate, would be relatively minor since they tend to favor talus and rocky outcrops, which would be largely avoided by Project development. Habitat loss for state-monitor reptile and amphibian species would also be minor. Ring-neck snake and southern alligator lizard are associated with the edges and interiors of oak and oak/pine woodlands, which would be mostly avoided. Night snake and sharp-tailed snake are found in rocky areas. Although these areas are prevalent south of the Project site, only a few rocky areas near the top of the ridge occur on the site. Woodhouse's toads are most likely present near wetlands and springs, which would not be affected by the Project.

The pallid bat, fringed myotis, and small-footed myotis are known to roost in rock crevices and may roost within the limited rocky areas on the Project site and on cliffs south of the Project site. In addition, the small-footed myotis exhibits more generalized roosting behavior (see Table 2.4.1) and could roost in other areas of the site. Direct habitat loss for these bats would be negligible because few rocky areas and no cliff habitat would be disturbed. However, because these bats forage in flight, some may collide with turbines. In addition, the presence of the wind turbines could cause some bats to avoid some areas of the site and would therefore reduce the overall suitability of the area as habitat for these bats. Similar impacts would be expected for the more common species of bats present in the area, including big brown bat (*Eptesicus fuscus*) and little brown myotis (*Myotis lucifugus*).

Recreationally-Important Species

The Project would result in a minor reduction in habitat for upland game birds when considered in the context of the large amount of habitat available on the Project site and elsewhere in Klickitat County. Similarly, the direct loss of habitat used by Columbian black-tailed deer would be nominal in relation to the availability of these habitats on the Project site and in the County. Impacts to these deer would be related to increased human activity rather than to the loss of vegetation.

The potential for adverse impacts to Columbian black-tailed deer would be greatest during construction. Work crews traveling through the Project site during winter could disturb deer and prompt them to flee, causing expenditure of energy during a time when deer are more vulnerable to starvation and exposure. However, construction-related impacts would not be sufficient to cause major shifts in habitat use by wintering deer in most years because areas of construction activity would be concentrated in small areas rather than occurring over the entire Project site, and winter habitat is available outside of the Project site. Specifically, the WDFW has identified extensive areas of deer winter range north of the Project site (WDFW, PHS data base). If construction activity were to coincide with a severe winter, when deer would be most vulnerable to stress caused by human disturbance, construction could cause local increases in winter deer mortality because deer might avoid portions of the south-facing slopes on the Project site. These slopes offer more protection during severe winters. However, any increase in deer mortality would be short-term, and could be reduced if construction activities were to halt or be curtailed during extended periods of snow or harsh weather. Project operation would require much smaller work crews than would construction, and deer are expected to tolerate or easily avoid the types of disturbance that would occur during Project operation. Deer are expected to habituate to the presence of wind turbines in the area.

2.4.4.2 Mitigation

Mitigation for plant communities and habitats discussed in Section 2.3.4.2 would also help partially offset impacts to wildlife. Additional mitigation for non-avian wildlife would primarily relate to measures that, if implemented by the Applicant, would reduce impacts to the western gray squirrel. Based on consultation with the WDFW (Dugger, pers. communication, 1994), these measures include:

- Where feasible given the topography, Project boundaries, and safety considerations, adjust road and powerline routes to avoid Oregon white oak habitat.
- Retain all vegetation and restrict entry within a 23-meter (75-foot) radius of any western gray squirrel nests.
- Retain at least 50 percent canopy cover in oak woodlands within a 120-meter (400-foot) radius of known nest trees. To the extent these species are available, retain conifers (pine) for 25 percent of the remaining canopy cover.
- Avoid construction activity within 122 meters (400 feet) of any known western gray squirrel nest between May 15 and September 30.

2.4.5 Alternative Powerline Route

2.4.5.1 Environmental Impacts

The alternative powerline route would reduce the amount of oak and oak/pine habitat disturbed by about 1.2 hectares (3 acres) and would avoid the two relatively large blocks of this habitat located in the western and central areas of the site (see Figure 2.3.1). This would also reduce indirect Project impacts to wildlife by reducing construction disturbance near areas that provide nesting habitat for the western gray squirrel and allowing these large areas to remain relatively intact.

2.4.5.2 Mitigation

Mitigation would generally be the same as described in Sections 2.3.4.2 and 2.4.4.2.

2.4.6 Restricted Areas Alternative

Environmental review for the proposed Project revealed no areas that should be restricted from development based on impacts to wildlife. However, impacts to western gray squirrels would be reduced by avoiding development in oak habitat to the maximum extent possible.

2.4.7 Subarea Development Alternative

2.4.7.1 Environmental Impacts

This alternative would restrict Phase 1 project development to either the western area (Option 1) or east-central area (Option 2) of the site as shown on Figure 1.8. Table 2.3.8 shows the habitat types that would be disturbed during construction of each of these options. Both options would reduce Phase 1 impacts to Oregon white oak habitat, relative to the Proposed Action. Option 1 would result in Phase 1 loss of 2 hectares (5 acres) of this habitat type; Option 2 would result in loss of 8 hectares (19 acres). Oregon white oak provides habitat for the western gray squirrel. Option 2 would avoid disturbance to the large western habitat complex described in Section 2.3.3. Option 1 would avoid disturbance of juniper habitat, which supports the juniper hairstreak. Both options would avoid development in cliffs, talus, or rock outcrops—areas that provide habitat for bats, including federal candidate species and reptiles.

Both options would limit Project construction activities to a specific area of the site. This would reduce impacts to wildlife with larger home ranges by allowing them access to areas that would be relatively undisturbed by human activity.

2.4.7.2 Mitigation

Mitigation would generally be the same as listed for the Proposed Action in Section 2.4.4.2.

2.4.8 No Action

Impacts to non-avian wildlife caused by Project construction and operation would be avoided if the agencies do not issue the required permits and approvals. However, ongoing agricultural and grazing activities would continue. Agricultural use could include future clearing of Oregon white oak, which provides habitat for the western gray squirrel, and juniper savannah, which provides habitat for the juniper hairstreak.

2.4.9 Significant Unavoidable Adverse Impacts

No non-avian federally threatened or endangered species would be affected by the Project or alternatives. Primary habitat (rock and talus areas) for the northern sagebrush lizard (federal candidate) is not expected to be affected by the Project. Primary roosting habitats (rock and cliff areas) for the fringed myotis and small-footed myotis (federal candidates) would generally not be affected, although the Project would create the potential for bat collisions with wind turbines. The amount of Priority Habitat that would be removed is minor in relation to that available on the Project site and elsewhere in eastern Washington. The Project would reduce habitat for western gray squirrel (state threatened) to a relatively minor extent, and Project construction activity near oak habitat could cause some squirrels to abandon their nests. However, much of this impact can be mitigated as discussed in Section 2.4.4.2. Habitat for juniper hairstreak (state candidate) would be reduced to a minor extent. Both of these species are common elsewhere, but have a limited distribution in Washington State. [The juniper hairstreak is more common in California; the western gray squirrel is more common in Oregon (Tilden and Smith, 1986).].

2.5 Birds

2.5.1 Studies and Coordination

This section addresses birds that could potentially be affected by the proposed Project and alternatives. Existing wind power facilities have experienced avian mortality due to collision with wind turbines, guy wires and overhead powerlines, and electrocution (Biosystems Analysis, 1992. Those issues as well as concerns related to habitat loss, disruption of nest sites, changes in avian behavior, and impacts to special-status birds were identified during scoping as concerns for this Project.

Information in this section is summarized from *Avian Use of the Proposed KENETECH and CARES Wind Farm Sites in Klickitat County, Washington* (Jones and Stokes, 1995), which presents the results of a year-long avian study conducted for this Project. The overall plan and design of the study was based on consultation with the USFWS, the WDFW, and the ODFW; a literature review; and information gained from preliminary site visits.

The Project avian study incorporated four separate elements: (1) a winter raptor and waterfowl study; (2) spring migration and fall migration studies; (3) a raptor breeding study; and (4) a summer resident study. Specific survey dates were selected so that a survey would be made each week during the peak part of each seasonal period and every other week during the remainder of the season. A total of 85 person-days were spent observing bird use in the vicinity of the Project site and at a control area located at Horsethief Lake, about 16 km (10 miles) west of the site.

The primary methods used in gathering data for these studies were fixed-point observations and transect observations.[1] During the fixed-point observations, anytime a bird flew into the observation area counted as a sighting. If a single bird flew into, out of, and into an observation area, it counted as two sightings. If two birds flew into and out of an observation area at the same time, it counted as two sightings but only one observation. The total bird-minutes observed for each species were also recorded. Specific methods for each study included:

- **Winter Raptor and Waterfowl Study.** Winter Raptor study methods consisted of transects throughout the study area, observations of bald eagle winter roosts, observations of bald eagle daytime loafing and foraging behavior, and observations at regular intervals from a grid of 31 fixed point stations established within the Columbia Hills. Waterfowl study methods consisted of road transects following the Columbia River along the entire shoreline adjacent to the Columbia Hills. The winter raptor and waterfowl study was conducted in December 1993 through February 1994. Due to low visibility during December 1993, a supplemental study was conducted during December 1994.

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[1] Fixed point surveys involve a surveyor taking observations from a fixed point (i.e., observation station) over a fixed period of time and at a fixed radius. This method provides standardized data that can be compared between stations, habitat types and seasons. This method allows statistical evaluation of data collected during the study period and also allows future statistical comparison of data collected during subsequent ongoing monitoring. Transect observations consist of a surveyor taking observations while traversing an identified path within the study area.

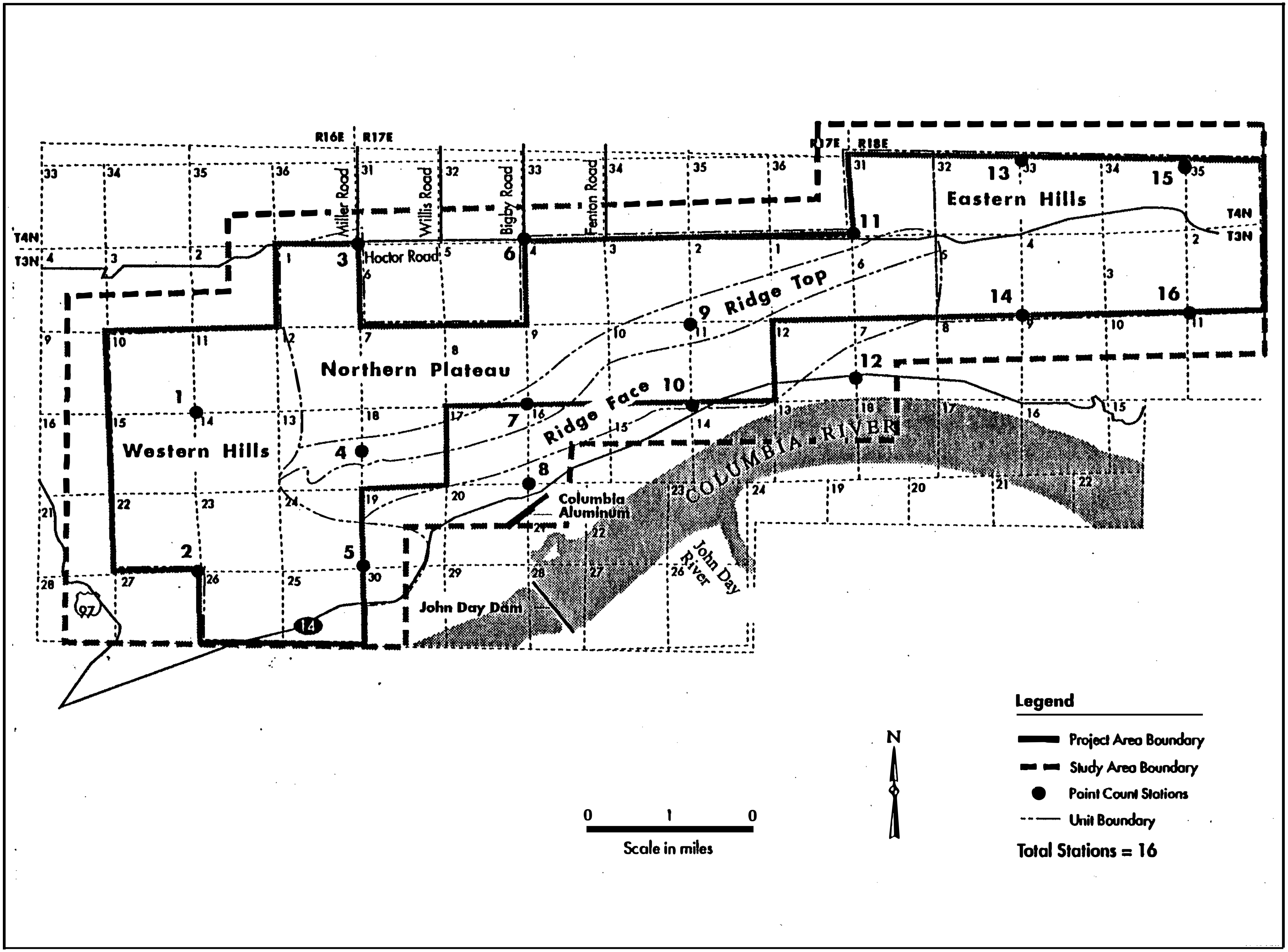

Figure 2.5.1
Fixed Point Stations and Units
Spring and Fall Locations

- **Spring and Fall Avian Migration Studies.** Study periods were determined based on migration behavior published in the literature (Wahl and Paulson, 1991; Jewett, 1953; Heintzelman, 1986). Migration study methods consisted of fixed point and transect observations performed throughout the primary study area shown on Figure 2.5.1. Transect observations were conducted enroute from one fixed point observation station to another.

- **Raptor Breeding.** Raptor nesting survey times were developed based on published breeding dates (Call, 1978) and on recommendations provided by the WDFW. Raptor breeding study methods consisted of fixed point observations from sites providing views of suspected nest sites; helicopter surveys for potential nest sites throughout an extended study area; and walking transects through potential nesting habitat. The extended study area for helicopter surveys for the golden eagle, bald eagle, and peregrine falcon included lands along the Columbia River and associated tributaries within 16 kilometers (10 miles) of potential turbine locations. This distance is the maximum home range for these species as reported by Call (1978) and was the study distance recommended by the WDFW.

- **Summer Resident Use.** Surveys were conducted during the summer to provide a greater level of detail about resident raptor use. The summer resident study incorporated transect surveys and fixed-point observations from the same points used for the spring and fall migration studies.

Data collected from fixed point stations in the spring and fall migration and summer resident studies were statistically analyzed to determine if variability in the number of observations could be correlated with a variety of environmental factors including: season, flight behavior and pattern, temperature, wind, cloud cover, flight direction, habitat traversed, altitude, and distribution across various geographical subareas or study units. Study units included five geographical areas containing similar topography, vegetation, land use, and other habitat features. Specific study units included:

- **Western hills.** This unit includes the steep, rounded hills located in the western quarter of the primary study area. The unit is almost entirely grassland, with some riparian habitat.

- **Eastern hills.** This unit includes the steep, rounded hills located in the eastern corner of the primary study area. The unit contains mostly grassland, interspersed with a few parcels of cropland and some woodland area.

- **Ridge top.** This unit includes lands within 0.5 kilometer (0.3 mile) north of the Columbia Hills ridge crest, where the ridge begins to gently slope down to the north. This unit contains grassland along rolling topography connecting various high points along the ridge crest. These high points are separated by shallow gaps or saddles.

- **Northern Plateau.** This unit includes lands beginning 0.5 kilometer (0.3 mile) north of the ridge top study unit and extending to the northern limit of the study area. The unit contains grassland and oak/pine woodland in the southern portion and agricultural lands (mostly pasture) in the northern portion.

- **Ridge face.** This unit includes the steep, south-facing slopes and cliffs of the ridge situated on the southern edge of the study area. The study unit, which parallels State Route 14 (SR-14), begins approximately 1 kilometer (0.6 mile) west of Juniper Point and continues about 13 kilometers (8 miles) east.

2.5.2 Regulations, Standards, and Guidelines

Klickitat County's Comprehensive Plan has established an overall goal of identifying and preserving wildlife.

As with the animal species discussed in Section 2.4, avian species can be listed as threatened or endangered at the federal level and as threatened, endangered, or otherwise sensitive at the state level. These federal and state classifications are summarized in Table 2.3.1. At the federal level, species listed as threatened or endangered are protected under the authority of the Endangered Species Act. Section 7 of the Endangered Species Act requires federal agencies to consult with the USFWS on actions leading to activities that may affect listed threatened or endangered species. Other federal laws include the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

In Washington, state management classifications include "sensitive" and "monitor" in addition to threatened and endangered. State-listed threatened or endangered species are not specifically protected by state statute or regulation, but are listed to assist with agency management efforts and decision making. Species may be listed at the state level because of rarity, vulnerability to disturbance, or other factors. Communal bald eagle roosts and nest sites are protected under WAC 232-12-292, the Washington State Bald Eagle Protection Rules.

2.5.3 Affected Environment

2.5.3.1 Special-Status Species

General

Consultation with resource agencies, literature review, and review of habitats in the Project vicinity identified 22 special-status bird species that could potentially be present on or near the Project site. Table 2.5.1 lists the federal and state status of these species, as well as their habitat associations. One species—the peregrine falcon—is federally listed as endangered. The bald eagle is federally listed as threatened. Six other species (black tern, burrowing owl, western sage grouse, northern goshawk, long-billed curlew, and ferruginous hawk) are candidates for listing under the Endangered Species Act. Peregrine falcon and bald eagle are also listed as state-endangered and threatened, respectively. Sandhill crane is a state-listed endangered species, but is not federally listed.

Of the 22 special-status species that could potentially use or fly over the Project site, seven (western sage grouse, gray flycatcher, burrowing owl, grasshopper sparrow, bank swallow, black tern, and sage sparrow) were not observed in the study area nor were they listed as present by the WDFW Priority Habitats and Species data base. While these species may be present on the site or occasionally pass through the area, the site does not appear to provide important habitat areas for these species.

Osprey, long-billed curlew, loggerhead shrike, sandhill crane, northern goshawk, ferruginous hawk, ash-throated flycatcher, and Lewis' woodpecker were observed infrequently in the Project area. Osprey occur along the Columbia River and its tributaries and are closely associated with water bodies because they feed exclusively on fish. The long-billed curlew is primarily found in the Columbia Basin and may potentially use grasslands in the vicinity of the Project. Two long-billed curlew were observed in the study area, one in the Eastern Hills study unit and one in the Western Hills study unit, which suggests that the Project site receives only occasional use by this species. The loggerhead shrike is primarily found throughout the shrub-steppe areas of eastern Washington and Oregon, prefers open areas for foraging, and preys primarily upon insects and small birds and mammals. Three sightings of loggerhead shrikes were made during Project surveys; two of these sightings were in the Eastern Hills study unit. One migratory flock of 50 sandhill cranes was observed during transect surveys, but none were observed during fixed-point station observations. Sandhill cranes were observed flying about 90 meters (300 feet) above the ground. The northern goshawk is primarily found in forested areas of Washington and Oregon, but could potentially migrate through the Project area. While the ferruginous hawk roosts and forages in habitat types similar to those in and around the vicinity of Project, it occurs infrequently near the Project site. Three sightings of these birds were made during spring through fall surveys, two in the spring and one in the fall. A single ferruginous hawk was observed during the winter study, in the ridge top study unit. While Lewis' woodpeckers are migratory, they were observed during the winter months, most frequently near the oak woodlands in the North Plateau. Ash-throated flycatcher were observed incidentally during the breeding survey.

TABLE 2.5.1
SPECIAL-STATUS SPECIES

Species	Federal Listing[1]	State Listing[1]	Observed in Primary Study Area	Habitat Association
peregrine falcon	E	E	Yes	Cliffs, large concentrations of flocking birds
bald eagle	T	T	Yes	Water, ponderosa pine forest, rangeland
western sage grouse	C2	M	No[2]	Sagebrush
northern goshawk	C2	C	Yes	Mature forests
long-billed curlew	C2	M	Yes	Annual grasslands
ferruginous hawk	C3	T	Yes	Arid grasslands with level or rolling terrain
western burrowing owl	C2	C	No[2]	Sagebrush steppe, grasslands, pasture, roadsides with sparse level terrain
black tern	C2	Not listed	No[2]	Large bodies of water, primarily inland lakes
loggerhead shrike	Not listed	M	Yes	Shrubland for nesting, open areas for foraging
Lewis' woodpecker	Not listed	C	Yes	Oak and pine woodlands
Swainson's hawk	Not listed	C	Yes	Open areas, agricultural lands

Table 2.5.1 (continued)

Species	Federal Listing[1]	State Listing[1]	Observed in Primary Study Area	Habitat Association
western bluebird	Not listed	C	Yes	Clearings, old farms, fields, pastures, burned areas with snags
grasshopper sparrow	Not listed	M	No[2]	Grasslands
golden eagle	Not listed	C	Yes	Areas isolated from human disturbance, open grassland nests in cliffs or in large trees
prairie falcon	Not listed	M	Yes	Arid lands and open grasslands
sandhill crane	Not listed	E	Yes	Extensive open areas such as green fields, meadows, large marshes, and shallow ponds; nests in large shallow marshes
gray flycatcher	Not listed	M	No[2]	Dry coniferous forests
ash-throated flycatcher	Not listed	M	Yes	Open grasslands and riparian
turkey vulture	Not listed	M	Yes	Open usually arid areas, nests on cliffs
osprey	Not listed	M	Yes	Associated with fish-bearing waters, nests in trees
sage sparrow	Not listed	M	No[2]	Sagebrush steppe
bank swallow	Not listed	Undetermined in Oregon[(1)]	No[2]	Open ground or water, nests in recently cut banks near water

(1) E = endangered
T = threatened
C = candidate
M = monitor

(2) Not observed during Project surveys and not listed in Priority Habitats and Species data base.

The following discussions focus on federally threatened and endangered species, and on those special-status state species most frequently observed near the Project site.

Peregrine Falcon (Federal and State Endangered)

Peregrine falcons are found in areas with cliffs or other tall features (including tall trees and human-made structures) and near abundant sources of prey. Such features provide a good vantage point from which to locate prey. Peregrine falcons feed almost exclusively on birds, which are usually taken in the air. They prefer flocking birds when available, including waterfowl, rock dove, mourning dove, and shorebirds. During the nonbreeding season, peregrine falcons typically follow the movements of shorebirds and waterfowl and have been reported to move through eastern Washington from late November through January (Ennor, 1991). Peregrine falcons typically nest on steep cliffs or other areas where they can avoid predators (Ratcliffe, 1993). Basalt cliffs along the Columbia River are suitable for peregrine falcon breeding (Anderson, pers. communication, 1994). Peregrine falcons usually begin egg laying from around the third week in March to the first week in May, with hatching occurring any time from late April to mid-May. Young usually leave the nest in June.

The national decline in peregrine falcon populations has been attributed mostly to the use of DDT and other pesticides (USFWS, 1982). Since DDT was banned, peregrine falcon numbers in Washington State have increased in part due to active reintroduction programs (WDFW, 1991). Nonetheless, peregrine falcons have never been abundant in Washington or Oregon, and historical numbers have been estimated at 16 pairs for Washington and 30 pairs for Oregon (Platt and Enderson, 1989). In Washington, naturally established nest areas have been documented on the Pacific Coast, San Juan Islands, and Columbia River Gorge. Oregon and Washington (from western Washington and through the Columbia Gorge to eastern Klickitat County) are also used by wintering peregrine falcons originating in Alaska and Canada.

The USFWS' recovery plan for the Pacific population of peregrine falcons identifies specific minimum numbers of breeding pairs within 21 management units. Recovery plan goals for the Columbia Gorge Peregrine Falcon Management Unit include a minimum of three breeding pairs. As of 1993, up to seven pairs were known in this management unit. The Columbia Gorge Management Unit extends from the Portland area east to the point where the Columbia River heads north (USFWS, 1982). Reintroduction activities implemented under the Recovery Plan have included releasing young birds in the Columbia River gorge in Skamania County and placing young in an active prairie falcon nest located east of the Project site. Prior to field studies conducted for this EIS, the closest known pair of peregrine falcons to the Project site was located 25 km (15 miles) west of the Project site (Dames and Moore, 1993). The home range of nesting pairs is estimated to be 16 km (10 miles) (Call, 1978).

Most of the Project site consists of steep grassy slopes rather than the steep cliff areas preferred by peregrine falcons. Nevertheless, because cliff habitat is located relatively near the Project site and because these birds are typically wide ranging, they could fly over the site to more appropriate foraging areas. In addition, peregrine falcons may forage on flocking birds as they travel between regularly used foraging areas.

Helicopter surveys revealed no peregrine nests within the 10-mile greater study area; however, a pair was sighted several times in the vicinity of Rock Creek, approximately 8 km (5 miles) east of the Project site. No peregrine falcons were observed during the winter study. Two sightings of peregrine falcon were made during the spring through fall fixed-point surveys. Both sightings were made in the northern plateau study unit, with both flying between 7.5 and 58 meters (between 25 and 150 feet) above the ground. Tables 2.5.2 and 2.5.3 summarize prey use and foraging methods used by the peregrine falcon.

Bald Eagle (Federal and State Threatened)

Wintering bald eagles typically spend over 90 percent of their daylight hours on perch sites, usually located in tall trees with strong lateral branches on the edge of stands that are closely associated with water (Watson et al., 1991). These perches provide a resting place as well as proximity to foraging opportunities. Wintering bald eagles in eastern Washington feed mainly on waterfowl, upland birds, and deer and livestock carrion, although fish are taken when available (Fielder, 1982; Ichisaka et al., 1989; Fielder and Starkey, 1987). Bald eagles typically spend the night and occasional periods of severe weather in regularly-used roosting areas and often roost in groups. The four primary characteristics of winter roosts are: clear visual access to surrounding terrain, a favorable microclimate, stout perches high above the ground, and isolation from excessive human disturbance (Hansen et al., 1980). Bald eagles may use different roost sites depending on weather conditions. Winter roost sites are often associated with foraging areas, although bald eagles will travel many miles between foraging areas and roosting areas (Stalmaster, 1987).

Bald eagles declined to low levels due to pesticide poisoning, primarily from DDT. Since DDT was banned, bald eagle numbers have approached the recovery goals established by the USFWS (WDFW, 1991). Habitat loss is currently the greatest threat to bald eagle populations in the Pacific Recovery Area (Rodrick and Milner, 1991).

Most bald eagles that winter in Washington are associated with western Washington river systems. However, mid-winter surveys have regularly identified over 3,000 individual bald eagles in eastern Washington each year since 1982 (WDFW, 1990). The upper and middle reaches of the Columbia River support the greatest number of wintering bald eagles in eastern Washington. Bald eagles can be seen year-round in Washington and regularly migrate to eastern Washington from Canada and Alaska for the winter (Fielder and Starkey, 1987).

Klickitat County supports relatively few bald eagles. In 1990 about 1.2 percent of the total state count was found in Klickitat County (35 out of a total of 2,983) (WDFW, 1990). This amounts to about 5 percent of the total count for eastern Washington counties (35 out of 642) (WDFW, 1990).

Bald eagle use of the Columbia Hills is restricted to winter use only, and is limited to a small population of nonbreeding individuals who occupy the area along the Columbia River in the vicinity of the Project site from fall (end of October) through early spring (end of March). During the winter raptor study, three to 10 individual birds were observed at any one time. However, the winter survey was conducted over a relatively mild winter when overall bald eagle numbers in Washington were average. Because bald eagle wintering populations can vary, it is estimated that up to 20 bald eagles could winter in the vicinity of the Project site during years of peak use assuming peak use is roughly twice average use. During supplemental surveys (4 days) conducted in December 1994, there were eight sightings of bald eagles.

Most eagles observed were perched along the river or flying along the ridge face and the Columbia River (see Figure 2.5.2). Flight behavior included gliding and soaring on updrafts along the ridge face, criss-crossing the face, and occasionally crossing the ridge crest to the north. On one occasion, bald eagles were observed flying within 50 meters (about 165 feet) above the ground. Active foraging behavior was not observed. No regular day roosts were located on the Project site; however, three regularly used day roosts were observed along the Columbia River. Three night roosts were identified during the winter surveys. In general, bald eagles using night roost sites located away from the Columbia River left the roosts near dawn and returned within a few hours of sunset. One specific route was observed being used by two adults (see Figure 2.5.3). Tables 2.5.2 and 2.5.3 summarize prey use and foraging behavior employed by bald eagles.

Golden Eagle (State Candidate)

Golden eagles require large territories and nests are generally widespread. For example densities of golden eagles in the western states range from one pair per 34 km^2 (one pair per 13 mi^2) to one pair per 250 km^2 (96 mi^2) (Rodrick and Milner, 1991). They favor steep-sloped open areas as their primary habitat, and were most often observed in the ridge face study unit. They were also regularly observed in the western hills and eastern hills, and occasionally observed in the remaining study units. They were observed most frequently during the summer.

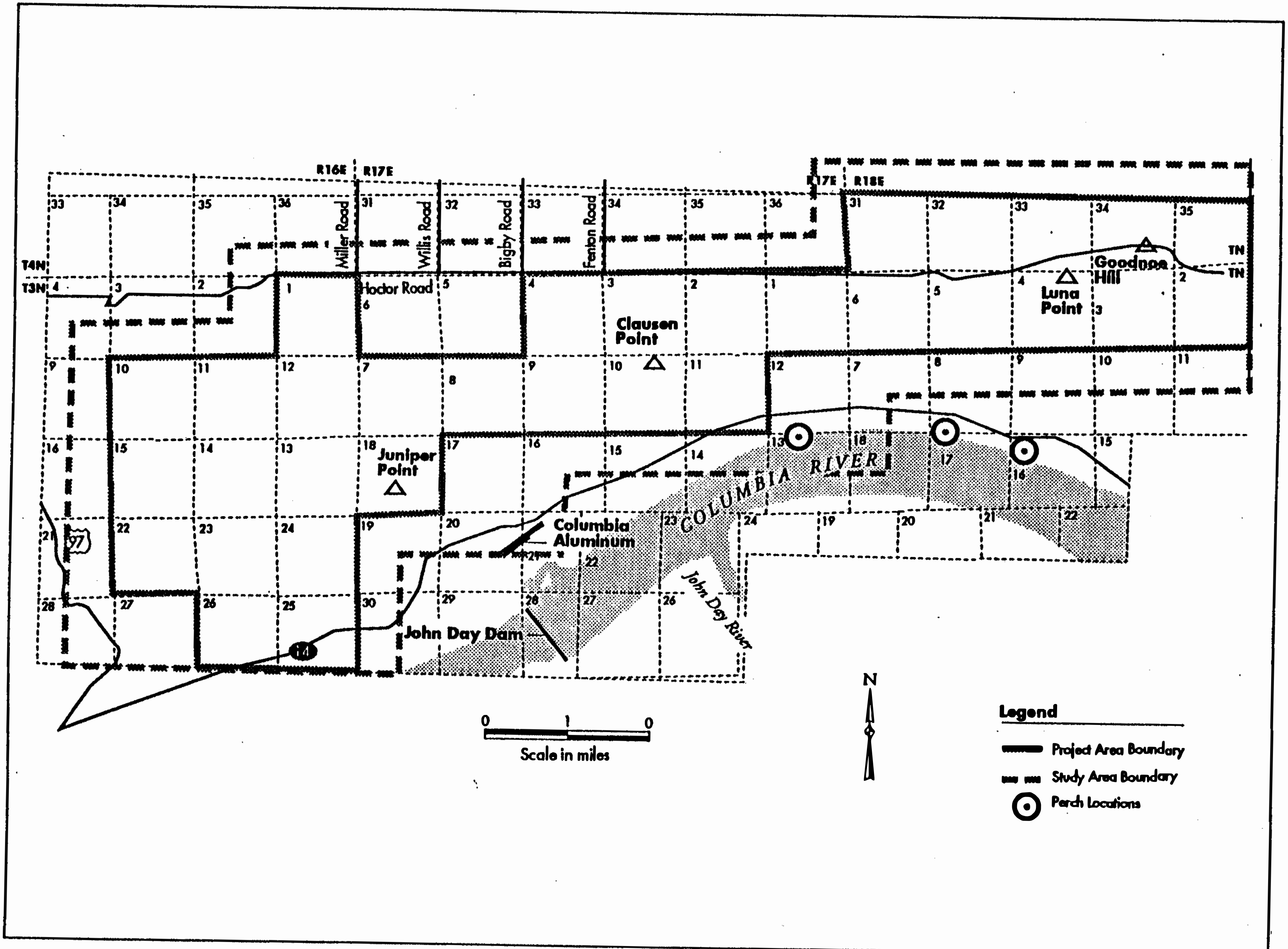

Figure 2.5.2
Bald Eagle Daytime Perch Locations

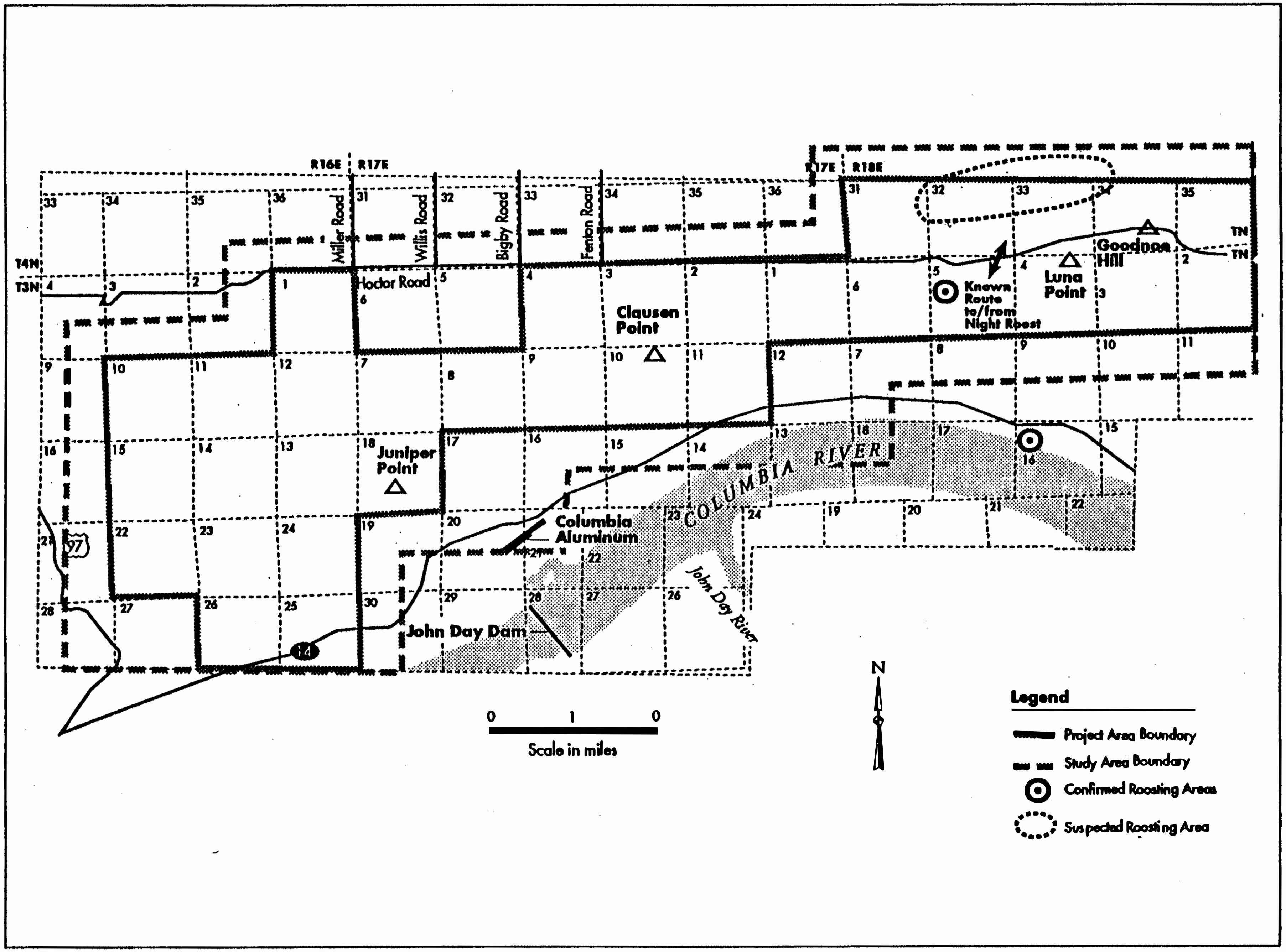

Figure 2.5.3
Bald Eagle Night Roosts

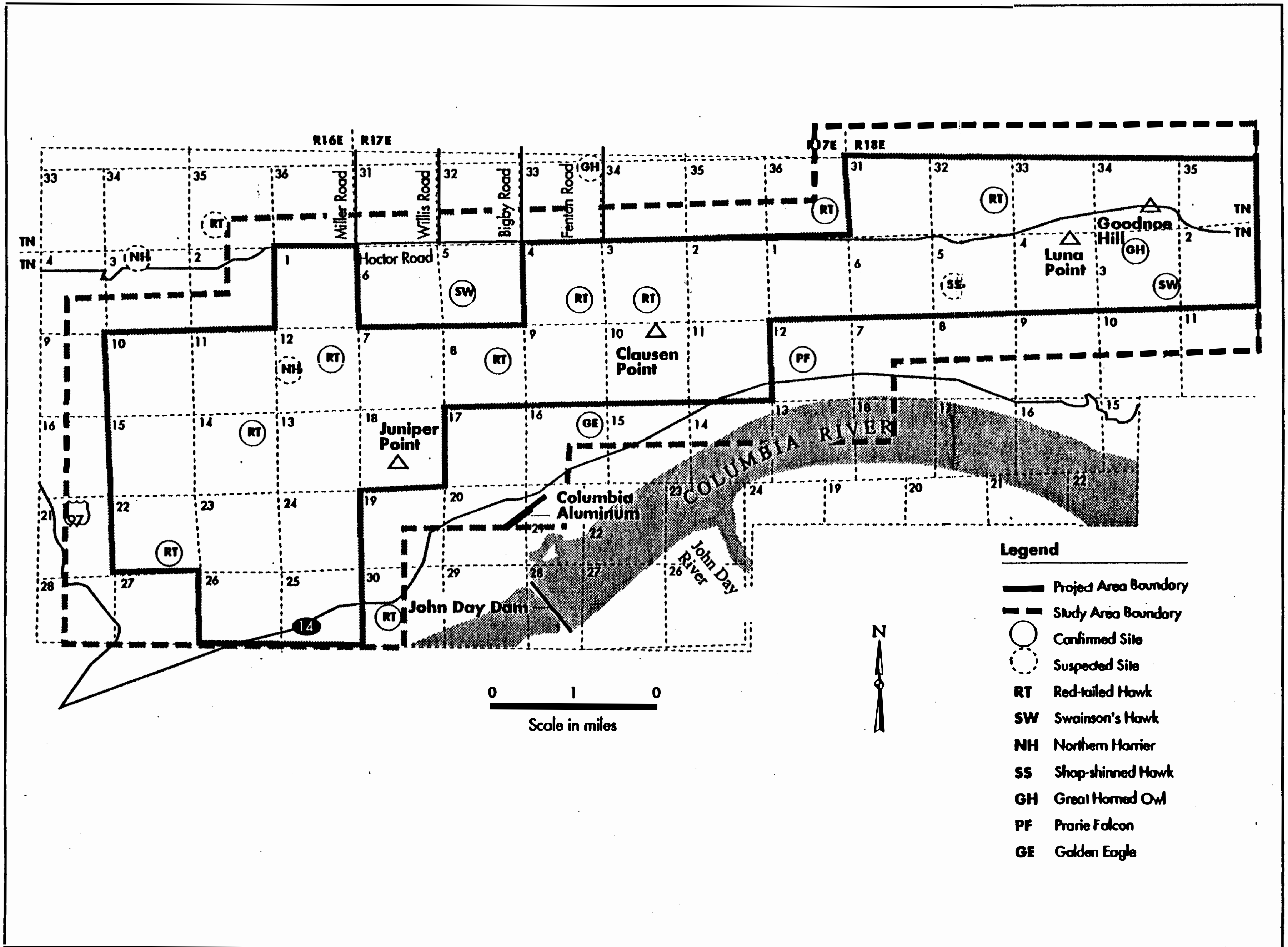

Figure 2.5.4
Raptor Nesting Locations within the Primary Study Area

Golden eagles primarily prey on medium-sized mammals such as rabbits but often prey upon small mammals and upland game birds, and occasionally snakes, lizards and carrion. They most often glide low along the contours of the ground while foraging for food, but also utilize a soar and search technique and sometimes hunt from a perch (Johnsgaard, 1990; Palmer, 1988).

Golden eagles were observed in low to moderate levels in the study area. Thirty-seven sightings were made for a total of 90 minutes of use within the fixed-point observation areas. Based on repeated field observations, it was estimated that approximately four juveniles and three adults were utilizing the Project site. One active golden eagle nest was located in the vicinity of the Project site (see Figure 2.5.4). The nest site was approximately 1.6 kilometers (1 mile) from the nearest proposed Project turbine location. Another nest was located in the greater study area on Miller Island, 11.3 kilometers (7 miles) from the western edge of the site. Tables 2.5.2 and 2.5.3 summarize prey use and foraging behavior of the golden eagle. In 1990, the golden eagle population in Washington was estimated at 80 breeding pairs (Rodrick and Milner, 1991).

Swainson's Hawk (State Candidate)

In Washington, 228 Swainson's hawk territories were documented between 1977 and 1986. Swainson's hawk winters in the vicinity of the Project site where their preferred habitat is cropland and grassland. Swainson's hawk primarily preys on ground squirrels in spring and grasshoppers in summer, and occasionally feeds upon medium-sized mammals, snakes, and lizards. It most often utilizes the soar and search method of foraging, but also forages from a perch or by flying close to the ground. Two Swainson's hawk nests were located in the primary study area: one near Hoctor Road, and another downslope from the Goodnoe Hills (see Figure 2.5.4). Eighteen sightings were made for a total of about 60 minutes of use within the fixed-point observation areas during the spring through fall point-count surveys. Tables 2.5.2 and 2.5.3 summarize prey use and foraging behavior of the Swainson's hawk.

Prairie Falcon (State Monitor)

These birds primarily forage by flying close to the ground, but occasionally forage by gliding low along the contours of the land. Less often, they forage utilizing the soar and search, aerial pursuit, or perching methods. Prairie falcons commonly feed upon small mammals such as ground squirrels in non-winter months, particularly during breeding season. In winter, they are most likely to forage in areas containing sparse ground cover and in croplands, where horned larks, their primary winter prey, are most common. Other winter prey includes small- and medium-sized flocking birds.

An estimated 52 breeding pair of prairie falcon have been identified in Washington (Platt and Enderson, 1984). The statewide estimated number of breeding pair was 175 in 1989, and populations were judged to be stable (Platt and Enderson, 1984). Prairie falcons were observed within all study units at relatively low numbers during spring through fall surveys; however, several observations were made along Hoctor Road in the north plateau study unit and along SR-14 within and south of the ridge face unit. Behavior observed included perching on utility poles and flying close to the ground. Tables 2.5.2 and 2.5.3 summarize prey use and foraging behavior of the prairie falcon.

Turkey Vultures (State Monitor)

Turkey vultures can be found in the Project vicinity in the fall and spring, and are known to breed in the area. The turkey vulture's primary habitat is steep, open areas, where it employs a slow, circling, soar and search technique while foraging. Turkey vultures feed almost exclusively on carrion. Turkey vultures are moderately common on the Project site. A total of 59 sightings were made for a total of 125 minutes during the spring through fall studies. Sightings were most often observed in the updrafts of the ridge face study unit. No nests were found on the site during the breeding survey, however, a communal nest was observed near Maryhill State Park, about 6.4 kilometers (4 miles) southwest of the site. Tables 2.5.2 and 2.5.3 summarize prey use and foraging behavior of turkey vultures.

Western Bluebird (State Candidate)
The nesting season for the western bluebird typically begins in April. They were found to nest in oak/pine woodlands on the Project site. One hundred and one sightings during 16 observations were made during the spring migration period.

2.5.3.2 Other Raptors

Other raptors observed in the primary study area included American kestrel, Cooper's hawk, sharp-shinned hawk, and red-tailed hawk. Red-tailed hawk was the most frequently observed of all raptors (186 sightings) and is present year-round in the Project vicinity. This species prefers open area as their primary habitat, and are most commonly found in areas containing perches. Their primary prey is small mammals, although medium-sized mammals, snakes and lizards, and occasionally upland game birds, carrion and waterfowl are eaten.

2.5.3.3 Waterfowl

The Columbia River and associated tributaries south of the Project area provide the most suitable waterfowl habitat in the vicinity. While waterfowl use is most concentrated along the Columbia River, they can move great distances relatively easily and have been reported to take advantage of foraging opportunities located away from the river (Klickitat County, 1983). This behavior is most likely to occur during nonbreeding periods, especially during the fall and winter. During spring through fall surveys, 48 sightings were made during five observations. In late fall, large flocks of Canada geese and various species of ducks fly through the Columbia River corridor. During the winter study, road counts along the Columbia River immediately south of the study area observed waterfowl individual groups of up to 100 birds. Canada geese and American coots were the most frequently observed. Two transect surveys conducted in December 1994, along the Columbia River below the Project site to Rock Creek documented approximately 1,300 to 1,700 waterfowl along the river. During two weeks of observations in December 1994, no waterfowl were sighted in the Project area.

TABLE 2.5.2
TYPICAL PRIMARY TYPES OF PREY FOR CERTAIN RAPTORS

Raptor Species	Prey									Comments
	Waterfowl	Upland Game Birds	Small Birds	Rabbits, Ground Squirrels, Other Medium-Sized Birds	Carrion	Snakes and Lizards	Medium-Sized Mammals	Small Mammals	Insects	
peregrine falcon	1		2	1						
bald eagle	2	1		3	2		2	3		
golden eagle		2			3	3	1	2		
red-tailed hawk	3	3			3	2	2	1		
rough-legged hawk					3		3	1		
northern harrier			2			3	3	1		May shift from small mammals to young passerine birds during the breeding season (Johnsgard 1990)
Swainson's hawk						3	3	1	2	Ground squirrels (spring) and grasshoppers (summer) are the most frequent prey
mMerlin			2			2		1		
american kestrel			2					1	2	Starling, horned larks, deer mice, and various insects are the typical prey
prairie falcon			2	2			1			Ground squirrels may be more important during breeding; flocks of small- and medium-sized birds may be more important during winter
turkey vulture					1					
sharp-shinned hawk	2	1						2		
Cooper's hawk	2	1						2		
ferruginous hawk							1	2		
great horned owl							1	2		
western screech owl						2		1		

1 = Primary prey species.
2 = Secondary prey species.
3 = Occasional prey species.

Sources: Johnsgard 1990, Palmer 1988.

TABLE 2.5.3
TYPICAL FORAGING BEHAVIOR FOR CERTAIN RAPTORS

Raptor Species	Foraging Behavior					Comments
	Aerial Pursuit	Soar and Search	Perching	Flapping Close to Ground	Contouring Close to Ground	
bald eagle	3	3	1	2	2	
peregrine falcon	1	2	2	3	—	
golden eagle		2	3	3	1	Often fly low to ground or make low and fast final approach on prey (Johnsgard 1990)
red-tailed hawk	3	2	1	3	2	
northern harrier	2	3	3	1	2	
rough-legged hawk		2	1	2	3	
Swainson's hawk	—	1	2	2	—	Rarely observed to fly low at high speed (Palmer 1993)
merlin	2	2	1	—	—	
american kestrel	2	—	1	—	—	
prairie falcon	3	3	3	1	2	
turkey vulture	—	1	—	—	—	
sharp-shinned hawk	2	—	1	2	—	Hunt mostly within woodlands
Cooper's hawk	2	—	1	2	—	Hunt mostly within woodlands
ferruginous hawk	—	2	2	1	—	
northern goshawk	2	—	1	—	—	
great horned owl	—	—	1	2	—	
western screech owl	—	—	1	—	—	

1 = Primary foraging method.
2 = Secondary foraging method.
3 = Occasional foraging method.
— = Rarely used foraging method.

Sources: Johnsgard 1990, Palmer 1988; field observations conducted for the Project avian study.

2.5.3.4 Non-listed Passerines and Other Birds

In addition to the bird species discussed above, several other bird species occur in the study area. Some species of medium- to large-sized birds are common throughout the study area, including common raven, black-billed magpie, western meadowlark, and northern flicker. In general, the north plateau study unit contains habitat for species associated with agricultural lands, including Brewer's blackbird, horned lark, killdeer, swallows, and European starling. Many of these birds are habitat generalists and use habitats in other study units as well. The eastern and western hills study units contain habitat for several species of sparrows, including savannah, grasshopper, and vesper sparrow. The ridge top study unit contains habitat for a variety of songbirds associated with open grassland and juniper savannah, including Townsend's solitaire, American robin, and several types of sparrows and other passerines. The ridge face study unit contains habitat suitable for nesting cliff swallows as well as canyon wrens and chukar. Chukar and California quail were also observed during field surveys.

2.5.4 Proposed Action

2.5.4.1 Environmental Impacts

Potential impacts to raptors and other birds using the study area include collision with wind turbines, loss of habitat, disturbance to foraging and breeding behavior, collision with overhead powerlines, and electrocution.

The Applicant's proposal includes a number of measures to reduce the potential for avian mortality (see Section 1.4.5.1). Project features would not include guy wires, thereby eliminating the potential of collision with those wires. The Applicant proposes raptor-protection measures on overhead powerlines and poles, thereby minimizing the potential for electrocution. It has been suggested that lattice towers may contribute to the frequency of collisions because they provide perch sites (Onloff and Flannery, 1992). The proposed Project would incorporate tubular towers and eliminate this potential risk factor. Direct habitat loss would be limited in extent as discussed in Section 2.3.

Project-related human activity could alter bird behavior during the construction phase of the project, but post-construction activities would be relatively minor and would not be likely to significantly alter avian use. Most raptors would avoid active construction sites, but would continue to use other areas. Construction could disrupt nesting raptors. If conducted during the breeding season, construction activities at turbine strings A, E, PP, N, and Q would disrupt red-tailed hawk nesting activities and construction at turbine string NN could disrupt a Swainson's hawk nesting site. Post-construction activity would not significantly alter avian use because activities would be limited to work crews generally composed of less than 10 workers. Field studies conducted on the Project site indicated that birds fly within areas where wind turbines would be placed. These birds would have to alter flight paths to avoid turbines. This necessary alteration in flight could in turn reduce the foraging efficiency of raptors.

Overall, studies of other wind power projects have found that bird mortality associated with collisions varies from site to site and from year to year. Estimates of raptor mortality from collision with wind turbines in Solano County, California, range from 1.7 to 4.8 raptor strikes per 100 turbines, depending on the year. At Altamont Pass, raptor strikes vary from 2.3 to 5.8 per 100 turbines depending on the year (KENETECH Windpower, 1994). Based solely on these ranges, raptor mortality from collision could range from about 6 to 20 per year at the proposed Project site. Two of the factors that appear to influence overall raptor mortality include: 1) the size of resident populations, and 2) the level of migration through the site. Unlike areas such as Altamont Pass, the proposed Project site does not appear to be a major flyway for migrating raptors based on the number of raptors observed during known migration periods. In addition, based solely on the overall levels of raptor use of existing sites, the potential for raptor mortality at the proposed Project is expected to be somewhat lower.

The following risk factors are considered in assessing the potential for collision impacts on individual species:

- The general abundance of individual species in the vicinity of the Project site and distribution across different areas of the site including seasonal variations in use.
- Behavioral characteristics such as flight patterns and altitude, foraging behavior and preferred prey.

Table 2.5.4 summarizes these risk factors for each species or species group. In addition to risk factors, the assessment of impacts also considers regional distribution and abundance of individual species and their federal and state status.

Federally Listed Threatened and Endangered Species

Peregrine Falcon. Because of their foraging preferences, peregrine falcons would not be particularly susceptible to collision with wind turbines at the Project site; however, flight behavior exhibited during foraging could make them vulnerable. Peregrine use of the Project site for foraging or roosting is infrequent and was only observed in the eastern area of the site. Nonetheless, one pair of peregrine falcon, frequently seen at Rock Creek east of the Project site, likely includes the site in its home range. The Project site is located on the eastern edge of the peregrine falcon's current range in the Columbia gorge. Regionally in the Columbia River gorge, there are up to seven pairs (not including the pair that was found to frequent Rock Creek). Thus, although the likelihood of collision is relatively low, if one of these peregrines were to strike a turbine, it would reduce the Columbia gorge peregrine population, but would be unlikely to affect the viability of the overall population in the Columbia Gorge Management Unit.

Bald Eagles. During winter, bald eagles were observed to fly within areas proposed for wind turbines. Eagles travelling to night roosting areas were observed crossing the eastern portion of the site. Turbine strings that bald eagles could encounter on their way to and from these night roosts would include strings Z, Y, AA, BB, and CC. While construction activity at strings Z and Y may cause bald eagles to abandon a nearby roost site and therefore reduce their long-term vulnerability to collision, bald eagles would likely continue to cross the ridge to Luna Gulch, an area where between two and four bald eagles were determined to roost during winter field studies.

Although bald eagle foraging behavior (flying slowly and methodically) would not make this species particularly vulnerable to collisions with wind turbines, they were observed flying at critical altitudes and some mortality could occur. The site does not appear to be a particularly important bald eagle habitat in relation to other areas, and available evidence indicates that Klickitat County provides only a small percent of the wintering bald eagle habitat in eastern Washington. When viewed from this perspective, impacts to wintering bald eagle would be localized and would not likely affect overall eastern Washington population levels. Although bald eagle continues to be listed as a threatened species, it has greatly recovered from previously low population levels. Therefore, within a regional context, the Project's effects on bald eagles would not result in a significant decline in regional breeding or wintering populations.

Other Special-status Species

Special-status species that would be most vulnerable to collisions with turbines due to the risk factors described in Table 2.5.4, include golden eagle, Swainson's hawk, and western bluebird. Although golden eagle most frequently use areas of the Project site that would not be developed with wind turbines, the foraging behavior of golden eagles makes them relatively susceptible to collisions with wind turbines. Golden eagle mortality at the Applicant's windplant in Altamont Pass in California was the third-highest of all species (Biosystems Analysis, 1992). Because golden eagles breed at low densities and only one active nest has been verified in the primary study area (two in the extended study area), any mortality that did occur could affect the local breeding population. In 1990, golden eagle populations in Washington were estimated at 80 breeding pairs (Rodrick and Milner, 1991).

Because of its foraging habitat preferences and foraging flight behavior, Swainson's hawk would be vulnerable to collisions with turbines. Eighteen individuals were observed on site. Two hundred and twenty-eight Swainson's hawk territories have been documented in Washington.

Western bluebirds were observed to migrate through the site and also breed on and near the site, and the Project could cause mortality and localized population impacts. However, as a passerine, western bluebirds are less likely to be vulnerable to collisions than are raptors (Biosystems Analysis, 1992). Site observations were not at a level that would suggest that a significant portion of the County population moves through the Project site during migration. In addition, it would be highly unusual for these birds to follow such a defined migration route. Western bluebirds are believed to move through the County in a relatively broad front, which includes the Project site. Bluebirds have been observed in other locations in Klickitat County such as Lyle, 35 km (21 miles) west of the Project site (Wahl and Paulson, 1991).

TABLE 2.54
COLLISION RISK FACTORS FOR KEY SPECIAL-STATUS AVIAN SPECIES PRESENT AT THE PROJECT SITE

Species and Status	Risk Factors	
	Behavioral Factors	**Abundance and Distribution Factors Based on Field Studies**
Peregrine falcon (Federal and State Endangered)	Most frequent foraging behaviors are aerial pursuit, soar and search, and perching. Only two sightings, but both were in critical altitude. Peregrines are known to forage in upland areas in the Columbia Gorge although they prefer cliff areas near bodies of water.	Low abundance during all seasons. Only two sightings made on or near the Project site in the northern plateau study unit in an area where turbines are not proposed. One pair documented within a 16-km (10-mile) radius of the site, at Rock Creek although nest site was not located. Sightings in study area are probably birds travelling between foraging areas. Species likely to spend most time near cliffs above the Columbia River, where they hunt waterfowl and other birds.
Bald eagle (Federal and State Threatened)	Regularly flies within areas of site proposed for turbines, but vulnerability may be reduced by (1) slow, methodical behavior (2) keen eyesight, and (3) infrequency of diving.	Wintering only. Three to 10 individuals (different birds) observed in study area at any one time. Peak use may be up to about 20 individuals. Tended to be sighted in ridge face, ridge top, and eastern hills. Nighttime roost area identified north of site near Oak Flat Road and eagles observed flying between the Columbia River and this roost across the site. Carrion and chukar are potential food sources on Project site.
Golden eagle (State Candidate)	Often observed flying perpendicular to ridgetop within critical altitude. Contouring close to the ground was the most frequently observed foraging behavior. Often make low and fast final approach on prey.	37 sightings. Greatest number of observations were south of areas proposed for wind turbines (ridge face study unit). Occasional but regular use of western hills, eastern hills, and ridgetop study units. One active nest was located 1 mile south of nearest Project turbine string. A second nest was located on Miller Island within the extended study area.
Red-tailed hawk	Flies at critical altitude and often dives on prey from above. Forages in open habitats. Perching most common foraging behavior.	Most common large raptor on the Project site. 186 sightings made. 12 breeding pairs estimated on site. Five nests observed within the extended study area.
Rough-legged hawk	Perching, soar and search, and flapping close to ground most frequently observed foraging. Also contouring close to ground.	Nearly as common as red-tailed hawks, but only in winter.
Swainson's hawk (State Candidate)	Soar and search, perching, and flapping close to ground observed. Rarely observed to fly low (200 feet off the ground) at high speeds. Flies at critical altitude.	Two breeding resident within primary study area. Observations in eastern hills, ridgetop, and northern plateau.
Northern goshawk (Federal candidate)	Perching and aerial pursuit foraging behaviors.	One sighting.
Ferruginous hawk (Federal candidate)	Flies at critical altitude.	Study area is generally outside of this species range; 3 sightings made.

Species and Status	Risk Factors	
	Behavioral Factors	Abundance and Distribution Factors Based on Field Studies
Northern harrier	Flies within areas proposed for wind turbines but typically flies below critical altitude. Flapping close to ground is the most frequently observed foraging behavior.	Common on site, 45 sightings from fixed-point observations stations. Most frequent in the western hills and in the northern plateau study units.
American kestrel	Perching and aerial pursuit most commonly observed foraging behaviors.	Common on site, 125 sightings made.
Prairie falcon (State Monitor)	Flapping close to ground most frequently observed foraging behavior. All other behaviors also observed.	One breeding pair south of Project site just outside of primary study area was observed. Three nests observed within the extended study area.
Turkey vulture (State monitor)	Vulnerability reduced due to slow, methodical flight; however, flies at critical altitude.	Moderately common in area (59 sightings made from fixed-point observations) and across all study units.
Sharp-shinned hawk	Flies within critical altitude. Perching and foraging close to ground most common foraging behaviors.	32 sightings made from fixed-point stations. Does not nest or forage in open habitats. Possible nest located 0.6 km (0.4 miles) from nearest turbine string.

Note: "critical altitude" refers to vertical area occupied by wind turbines.

Other Raptors. Other raptors that would be most vulnerable to collision include red-tailed hawk, rough-legged hawk, and American kestral. These raptor species would be most vulnerable because they are relatively abundant on the site and because of their flight and foraging behaviors. Although the behavior, flight characteristics, and abundance of red-tailed hawks, rough-legged hawks, and American kestral make them relatively vulnerable to collision, these species are regionally abundant. Thus, while Project development would likely result in mortality to these species and could reduce local populations (those using the Project site), they are not likely to significantly affect regional populations.

Waterfowl. Waterfowl mortality from collisions with wind turbines are expected to be infrequent and at a level that would not affect local wintering populations. Few flocks of waterfowl cross the Project site on a regular basis. In addition, very limited wetland habitat exists in or around the Project site to support breeding or wintering waterfowl. Croplands present near the Project site were not observed to be used as waterfowl foraging areas although this behavior has been reported.

Shorebirds, ducks, geese, and other waterbirds are prone to collision with utility wires and guy wires, primarily in low visibility conditions (Arend, 1970; Anderson, 1978; Avery et al., 1980; Brown et al., 1985; Fannes 1987). Because field studies determined that use of the Project site by such species is minor, the associated risk of collisions with overhead lines is also estimated to be minor.

Other Passerines. The Project would not result in a significant regional reduction in other passerine species. This conclusion is based on the expected low vulnerability of migratory passerines to collisions with wind turbines, and the results of studies indicating the Project site is not within a major regional migratory flyway.

Thus, while mortality of passerines and other birds from collision with Project wind turbines is expected to occur at proposed turbine locations; losses are not expected to be sufficient to affect regional breeding, wintering, or migrating populations.

2.5.4.2 Mitigation Measures

Although studies are currently being conducted to determine the underlying causes and circumstances of avian collisions with wind turbines, there are currently no known scientifically supportable measures to prevent incidental mortality altogether. In addition to the mitigation measures proposed by the Applicant and outlined in Section 1.4.5.1, the following mitigation measures for bird species, if implemented by the Applicant, could reduce construction impacts:

- Avoid construction activities within 400 meters (1,300 feet) of bald eagle roosts during October through March.
- Avoid construction activity within 400 meters (1,300 feet) of red-tailed hawk nests from April through July.

Post-construction monitoring activities of avian impacts may be considered by USFWS and BPA pursuant to the consultation process under Section 7 of the Endangered Species Act.

2.5.5 Alternative Powerline Route

2.5.5.1 Environmental Impacts

This alternative would result in a slightly longer overhead powerline than the Proposed Action; however, because of the raptor protection measures incorporated as part of the Project, impacts to birds would be substantially the same as expected for the Proposed Action.

2.5.5.2 Mitigation Measures

Mitigation measures would be the same as for the Proposed Action (see Section 2.5.4.2).

2.5.6 Restricted Areas Alternative

This environmental review has not revealed any turbine strings that, if restricted from development, would substantially reduce expected Project impacts.

2.5.7 Subarea Development Alternative

2.5.7.1 Environmental Impacts

This alternative would restrict Phase 1 development to either the western (Option 1) or the east-central (Option 2) portion of the site. Option 1 would avoid development in turbine strings along the flight path between the Columbia River and a night roost area used by wintering bald eagles. In addition, the two peregrine falcon sightings during the avian study occurred in the eastern portion of the Project site, and a pair of peregrine falcons was frequently observed near Rock Creek. Although peregrine falcons are wide ranging, available information indicates that peregrines may cross the site more frequently in the eastern area. Thus, Option 1 could potentially reduce risk factors to the peregrine falcons sighted in the general Project vicinity until full buildout of subsequent phases of the Project. Both options would provide the opportunity to monitor partial development of the site and actual avian impacts prior to full Project development.

2.5.7.2 Mitigation Measures

Mitigation measures would generally be the same as for the Proposed Action.

2.5.8 No Action

Impacts to bird species from Project construction and operation would be avoided if the agencies do not issue the required permits and approvals.

2.5.9 Significant Unavoidable Adverse Impacts

Year-long Project avian studies suggest the Project site is used by resident raptor populations and by migrating raptors and passerines such as the western bluebird. However, the Project site does not appear to be in a major migratory flyway. The Applicant has incorporated several mitigation measures into its Proposed Action, including: raptor protection of powerlines and power poles; use of tubular rather than lattice towers; and eliminating the use of guy wires. Nonetheless, some incidental avian mortality would be unavoidable.

Peregrine falcon, a federally listed endangered species, use the site infrequently, but their foraging preferences do not make them particularly susceptible to collision with wind turbines although they are known to forage in upland areas of the Columbia Gorge. Nonetheless, one pair was observed frequenting an area approximately 8 km (5 miles) to the east of the Project site. Although unlikely, if a peregrine falcon collision did occur, it would reduce the population of the peregrines in the Columbia Gorge Management Unit. Even in the event of a single peregrine collision, the Project is not expected to significantly affect the viability of the species in the Columbia Gorge Management Unit since the population is estimated at up to seven breeding pairs, which likely exceeds the management goal of three breeding pairs for the Management Unit. Bald eagle, a federal threatened species, winter in the vicinity of the site and some mortality due to collision would be possible. Klickitat County provides only minor bald eagle wintering habitat relative to eastern Washington as a whole. Therefore, regional population levels are unlikely to be significantly affected by the proposed Project.

2.6 Cultural Resources

2.6.1 Studies and Coordination

This section discusses impacts to cultural resources and focuses on those resources that are listed in or potentially eligible for listing in the National Register of Historic Places (National Register). The primary source of information for this section is a technical report entitled *Draft Cultural Resource Assessment of KENETECH Windpower Washington Windplant No. 1,* (HRA, 1995). The *Cultural Resources Assessment* included an overview of history and prehistory, Native American consultation, review of oral history interview tapes prepared by the Yakama Indian Nation, and a cultural resource survey of proposed turbine strings.

Several other cultural resources studies have also focused on the Columbia Hills area. Northwest Archaeological Associates, Inc. (1993) completed cultural resources background research for the Applicant. In addition, the Applicant commissioned an overview ethnohistory study of the Columbia Hills (Boxberger, 1993). These studies, as well as past studies of Klickitat County and Columbia Basin prehistory, ethnography, and history, provided information on previous land use patterns and types of cultural resources that might be found on the Project site.

Both the office of Archaeology and Historic Preservation and the U.S. Forest Service expressed concerns about potential impacts to cultural resources during scoping for this EIS. Prior to field surveys, a detailed study plan was developed and reviewed by the State Office of Archaeology and Historic Preservation.

Consultation with Native American groups focused on the Yakama Indian Nation and also included the Confederated Tribes of the Umatilla Indian Reservation. Although neither the Yakama Nation nor the Umatilla provided comments during EIS scoping or on the cultural resources study plan, Yakama tribal staff subsequently expressed concerns about Project impacts to a range of environmental resources including cultural sites, traditional cultural properties, habitat and native plants that have traditionally provided food and medicine, degradation of surface water quality and impacts to fish habitat, aesthetic impacts, and noise and air pollution. The lead agencies have corresponded and held meetings with Yakama staff and members of the Yakama Culture Committee to discuss these concerns. In addition, the Yakama Cultural Resources Program has been conducting oral history interviews of tribal elders regarding traditional cultural use in the Columbia Hills area. Information gained to date from reviewing tapes of these oral history interviews is summarized in this EIS.

2.6.2 Regulations, Standards, and Guidelines

Klickitat County has adopted a substantive SEPA policy to preserve important historic, cultural, and natural aspects of our national heritage. In addition, several federal and state laws, regulations, and guidelines address the protection and management of cultural resources. Section 106 of the National Historic Preservation Act, as amended, directs that officials responsible for projects requiring federal permits take into account each project's effects on cultural resources that are eligible for listing in the National Register. Properties that are eligible for the National Register are not necessarily protected from disturbance or damage. Rather, the eligibility must be considered in planning federally assisted or licensed projects. The Section 106 process assists agencies to identify and, if feasible, adopt measures to protect eligible properties (36 CFR Part 800; Parker and King, 1990).

To be eligible for listing in the National Register, a cultural property must have definable boundaries (must be a discreet location rather than a general resource) and meet one of four significance criteria. Specifically, as outlined in 36 C.F.R. 60.4, "districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association" are eligible for listing if they meet one of the following:

A. They are associated with *events* that have made a significant contribution to the broad patterns of history.

B. They are associated with the lives of *persons* significant in the past.

C. They embody the *distinctive characteristics* of a type, period, or method of construction or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.

D. They have yielded, or may be likely to yield, *information* important in prehistory or history.

The Section 106 process is guided by regulations entitled "Protection of Historic Properties" (36 C.F.R. Part 800) as well as 36 C.F.R. Part 60 (the National Register) and Part 63 (Determination of Eligibility). The Section 106 process starts with background research and field surveys to inventory cultural resources and to determine which ones are potentially eligible for listing using available information. (Archaeological sites most often qualify for the National Register under Criterion D.) Unless a site clearly contains only limited surface remains, its integrity has been compromised by previous disturbance, or some other disqualifying condition is obvious, archaeological sites are typically assumed to be potentially eligible under Criterion D pending additional study. If impacts to a potentially eligible site cannot be avoided, additional work is conducted to determine eligibility by digging test excavations to determine the nature and integrity of archaeological deposits or by conducting more research to determine the association of historical sites with important individuals, events, or architectural or engineering styles. Mitigation plans are then typically developed for eligible resources.

Traditional cultural properties, in addition to historic and archaeological properties, can also be eligible for listing. The National Park Service has prepared National Register Bulletin 38 "Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King, 1990). Traditional cultural properties include places that are important to the cultural practices, customs, or beliefs of a living community of people and that have been passed down over generations. Examples include locations associated with traditional beliefs of a Native American group about its origins or cultural history and places where Native American religious practitioners conduct traditional ceremonial activities.

The American Indian Religious Freedom Act of 1978 (AIRFA) also provides guidance that potentially affects development proposals. Specifically, AIRFA directs federal agencies to take into account the effects of their programs on places and materials important to Indians' traditional religious practices. However, the law does not prevent the implementation of projects that might affect such practices.

The State Office of Archaeology and Historic Preservation includes the State Historic Preservation Officer (SHPO), who participates in federal and state cultural resource processes. The State's cultural resources review process generally follows that of the federal government. Other applicable Washington state regulations protect Indian graves and some other types of sites (RCW 27.44) and prohibit the disturbance of subsurface archaeological remains and sites without a permit from the office of Archaeology and Historic Preservation (RCW 27.53).

2.6.3 Affected Environment

Prehistory

The prehistory of the Columbia Hills area is not well known. However, it may be similar to the prehistory of the larger Mid-Columbia Region. It is generally believed that human occupation and use of the Mid-Columbia area dates to at least 10,500 years ago and has continued without hiatus to the historic period. The basic chronology of Mid-Columbia prehistory is summarized in Table 2.6.1.

Mid-Columbia archaeological sites have tended to include habitation sites, where remains indicate that multiple activities were carried out; resource procurement/processing sites, such as quarrying stone materials or roasting roots; and ritual sites that may include burials, rock art, or cairns (conical piles of rocks) (Galm et al., 1985). Most of the sites in the Mid-Columbia region have been recorded on irregular plains or high relief tablelands.

In Klickitat County, 70 habitation sites, 70 ritual sites, one resource procurement/processing location, and 42 combination sites had been identified by 1985 (Galm, 1985). More than 500 sites have been recorded in the county to date. Almost 70 percent of the sites in Klickitat County have been recorded in riverine environments.

TABLE 2.6.1
CHRONOLOGICAL SEQUENCE FOR THE MID-COLUMBIA REGION AND THE COLUMBIA PLATEAU

Years B.P.	Description of Culture Historical Phases
250-	**Historic Period.** Introduction of Euroamerican technology and non-indigenous diseases lead to culture change. Diseases bring about population reduction. Euroamericans settle in the region.
2500-250	**Cayuse.** Population concentrated in large, nucleated winter villages of 50+ housepits. People dispersed to gather roots in the spring and to hunt in the fall and winter. This seasonal round became increasingly diverse and well organized over time. Trade with coastal groups was common.
4500-2500	**Frenchman Springs.** Introduction of semi-subterranean houses and more specialized camps for hunting, root collecting, and plant processing. Several styles of contracting-stemmed points predominate. Many have argued that the ethnographically-observed "Plateau Culture" had emerged by the end of the phase.
8000-4500	**Vantage.** Inhabitants were highly mobile, opportunistic foragers adapted mainly to riverine environments (Chatters 1986; Galm et al., 1985). Increasing reliance on fish with less use of game. Sites are located along stream margins and points are similar to those of the Windust Phase.
10,500-8000	**Windust.** Characterized by small, highly mobile bands of foragers/collectors who exploited plant and animal resources using a seasonal settlement system (Chatters 1986). Sites are generally small and exhibit low artifact densities. Large, shouldered or basal notched lanceolate projectile points are diagnostic (Rice, 1972).
11,500-10,500	**Clovis.** Characterized by small, highly mobile bands of hunter/gatherers that exploited a wide range of subsistence resources, including bison and elk. Sites are usually small, exhibit low artifact densities, and are associated with early landforms, especially upland plateaus. Large lanceolate, fluted projectile points (Clovis points) are diagnostic.

Ethnography

Ethnographic bands that included the Columbia Hills within their territory and that spoke the Sahaptin language may have included Skin, Wayampam, and Umatilla groups. These groups generally shared the same culture. In the vicinity of the Project site, villages were located along the Columbia River just west of Wishram, at Wishram, and at the mouth of Rock Creek, where a longhouse group is located today. The aboriginal settlement-subsistence system of these groups focused on the area's river systems because of the abundance of high-quality salmon and other fish resources, the protection for winter settlements, and the prehistoric importance of water transportation. Salmon and other fish provided from one-third to one-half of the diet and were the subject of the First Salmon Ceremony. Plant resources, the subject of seasonal thanksgiving feasts, provided a similar portion of the food supply and consisted primarily of roots and bulbs supplemented by berries, nuts, and greens.

These groups depended on stores of dried foods throughout the winter and hunted game animals for fresh meat. Spring activities included digging roots, gathering greens, and harvesting salmon. Fishing was also an important summer activity, and women gathered and dried berries (Hunn, 1990). In the fall, groups gathered huckleberries in the Cascade Mountains and hunted deer and elk. The groups then returned to the rivers to harvest the fall Chinook salmon run which provided much of the winter supply. Thus, groups using the Columbia Hills visited a number of environmental settings during the year's subsistence activities; however, they maintained permanent winter settlements along protected tributaries of the Columbia and other rivers. Living in substantial structures, extended families used the winter months to make and repair tools and other items. Burials of various types were associated primarily with the winter settlements.

The Columbia Hills form part of the land ceded by the Yakama Indian Nation in their treaty with the United States, which was signed on June 9, 1855. Article III of the Treaty of June 9, 1855, reserves for the Indians the right to take fish at all usual and accustomed places along with the privilege of hunting, gathering roots and berries, and pasturing stock on federal land until it passed into private ownership. Following the signing of the Treaty many of the Native Americans who had been using the Columbia Hills moved to the Yakama, Umatilla, or Warm Springs Reservations.

History

Early settlers in Klickitat County—many of whom migrated from the Oregon Territory in the 1860s and 1870s—settled near the Columbia River, Goldendale, and other places (Ballou, 1938). Most of the earliest settlers raised livestock. In 1870, dry-land farming was introduced to the County, and by 1880-1881, wheat farming surpassed stock raising (Ballou, 1938).

Farmers carried wheat by wagon across the Columbia Hills to the Columbia River where it was shipped to coastal markets. In 1884, the arrival of the Northern Pacific Railroad to the Columbia River provided a second means of transport and encouraged immigration to the County. In 1903, the Columbia River and Northern (CR & N) constructed a rail line from Lyle to Goldendale, enabling Klickitat County farmers to ship their wheat through Goldendale to the Columbia River. By 1903, most of the arable land within Klickitat County had been claimed (Ballou, 1938). Infrastructure associated with early dry-land wheat farming of the Columbia River plateau included large barns, grain warehouses, and bunkhouses and cookhouses for the seasonal harvest crew. Small whipsaw plants, established along Mill Creek and Klickitat Creek by the 1860s, supplied settlers with rough-cut lumber for construction.

By the 1930s, agriculture within Klickitat County diversified, in part due to soil erosion and loss of soil fertility after decades of intensive wheat production. Agricultural products included wheat, irrigated alfalfa, cattle, hogs, and other livestock, hay, poultry products, dairy products, and truck garden/fruit products. This move away from a reliance upon dry-land crops also resulted in development of deep-well irrigation in the central and eastern parts of the county. Additional changes included a trend toward fewer and larger farms with the emergence of gasoline and diesel-powered farm equipment in the 1930s.

Archaeological and Historical Resources

Cultural resources surveys were conducted along a 120-meter (400-foot) corridor centered along the staked centerline of each proposed turbine string. Survey transects were spaced at 30-meter (100-foot) intervals and cultural resources identified during the field survey were recorded either as sites or isolated artifacts (isolates), depending on whether more or fewer than 10 artifacts occurred per 10 m^2. Turbine string locations were sited by the Applicant based on wind characteristics at various locations on the site. Generally, about a 30-meter-wide (100-foot-wide) area would be disturbed during construction; however, a wider corridor was surveyed in order to identify minor adjustments to turbine and road locations within each turbine string that

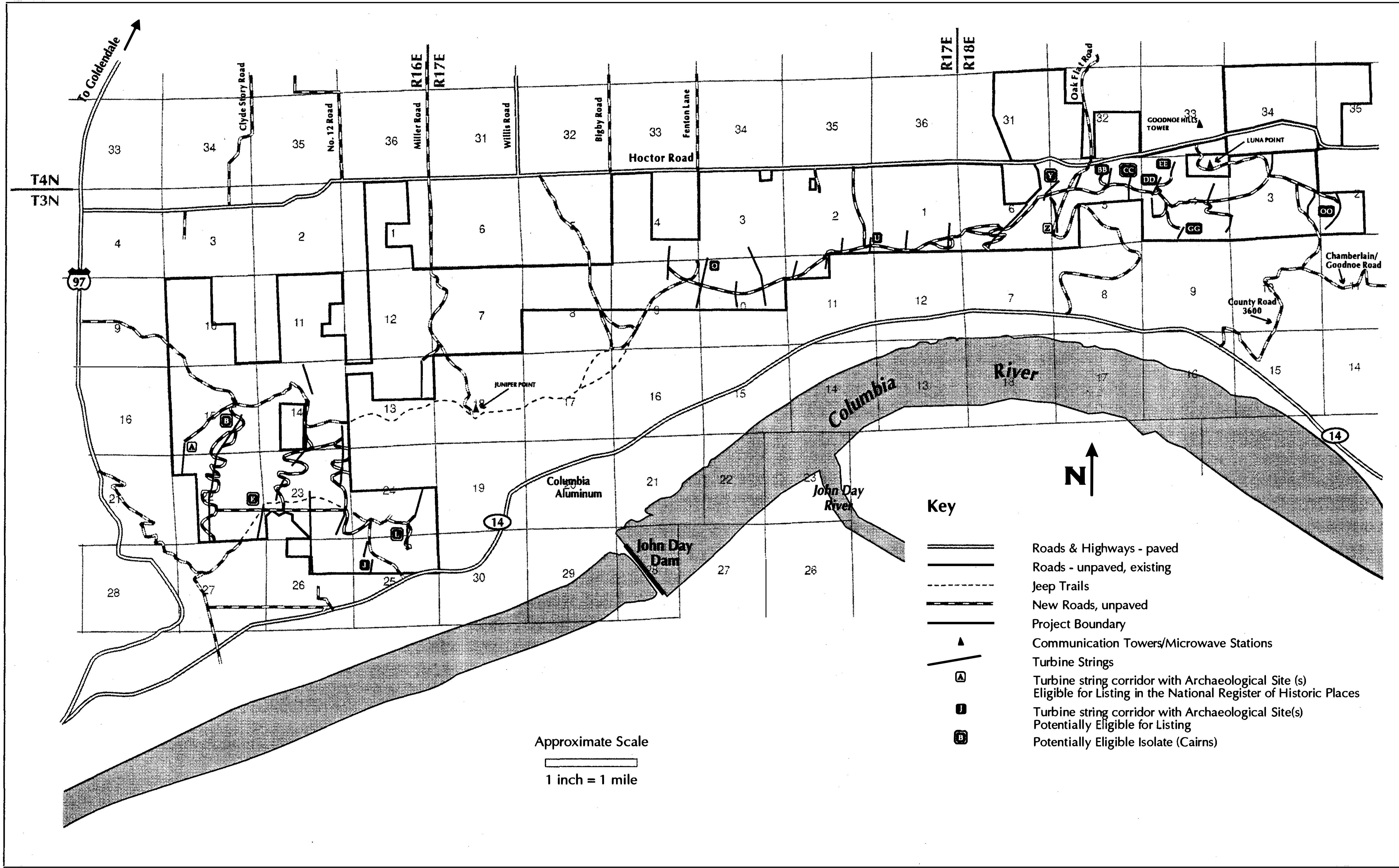

Figure 2.6.1 — Cultural Resources

would allow cultural resource properties to be avoided during construction. Project features that have not been precisely located by the Applicant, or that might be shifted based on the results of the overall environmental review for the Project, were not surveyed.

Background research and cultural resources fieldwork identified 60 cultural resource properties on the Project site. Fourteen of the properties are sites, while the remaining 46 are isolates. Two of the 14 sites are considered likely to be eligible for listing in the National Register under Criterion D, and nine sites are considered potentially eligible under Criterion D. Five of the isolates (prehistoric or historic basalt rock cairns) could be eligible for listing in the National Register if they proved to be associated with important Indian ritual activities. Table 2.6.2 and Figure 2.6.1 show the general location of these potentially eligible cultural properties.

TABLE 2.6.2
SITE LOCATIONS, TYPES, AND POTENTIAL ELIGIBILITY FOR LISTING IN THE NATIONAL REGISTER

Site# [1]	Turbine String	Description	National Register Eligibility Recommendation (Criterion D)
A-1	String A	Basalt hunting blind, with CCS[2] flakes and a modified flake	Potentially Eligible
E-1	String E	Historic development - line of trees, rock piles and cleared field, spring	Not Eligible
H-1	String H	Series of rock cairns	Not Eligible
J-1	String J	Scatter of CCS flakes, 2 cores, and a modified flake	Potentially Eligible
O-1	String O	CCS flakes	Potentially Eligible
O-2	String O	Scatter of CCS flakes, 3 cores, biface, and spokeshave	Potentially Eligible
U-1	String U	Scatter of CCS flakes, core, projectile point, and biface	Potentially Eligible
Z-1	String Z	10 CCS flakes, a basalt chopper, exhausted CCS core, and CCS projectile point	Potentially Eligible
AA-1	String AA	Historic dump	Not Eligible
BB-1	String BB	CCS flakes in plowed field	Potentially Eligible
DD-1	String DD	CCS lithic scatter, with modified flakes, uniface, and scraper	Potentially Eligible
EE-1	String EE	Scatter of CCS flakes, core, and uniface	Potentially Eligible
GG-1	String GG	Scatter of CCS and petrified wood flakes	Potentially Eligible
OO-1	String OO	4 CCS flakes and 1 basalt ground cobble (in plowed field)	Potentially Eligible

1 Cairns recorded as isolates located along turbine strings B, E, L, Y, and CC may also be eligible if they prove to be associated with Native American use.

Traditional Cultural Properties

Traditional cultural properties, including cultural landscapes, may be listed in the National Register if they have defined boundaries and meet other requirements for listing. Klickitat County and BPA contacted both the Yakama Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation during Project scoping but received no scoping comments. Klickitat County and BPA have also sought oral history information from the Yakama Indian Nation that might indicate if any National Register-eligible traditional cultural properties are present in the Columbia Hills area. (Such information includes site location, type of use, and its cultural importance.) As of January 11, 1995, Yakama staff had conducted and taped oral history interviews with five elders who have ties to and knowledge of the Columbia Hills area. Some concerns about the oral history data should be noted. Yakama staff did not include the lead agencies' cultural resource specialist in the design or implementation of the oral history interviews, precluding any participation in the framing of interview questions as well as any requests for clarification of the elders' statements. In addition, most of the interviews were conducted in the Native language with brief summaries of questions and statements in English. Thus, the protocol for collecting the data from which the following information is derived accords with Yakama cultural practice rather than with anthropological methods.

Information on the Columbia Hills area available from consultation with the Yakama Indian Nation to date and on review of oral history tapes indicates the area's ethnographic uses included plant gathering and hunting, travel, and camping. The Columbia Hills landform appears to hold cultural heritage importance to those Yakama people who trace their ancestry to the vicinity. Elders stated that the ridge connects the area of the Rock Creek longhouse on the east to the Lyle area on the west. Along the ridge are such legend-associated features as Juniper and Skinpum Points (Juniper Point is located on the CARES Project site; Skinpum Point is located east of US-97 (see Figure 2.6-1)). In Luna Gulch, north of Hoctor Road, is a rock that represents a woman who was turned to stone in the legend time. A cinder cone that the Yakama elders call "Tick" lies to the north of the Columbia Hills. In the legendary flood, animals and people sheltered high on the ridge, particularly at Skinpum Point, and elders say they have seen the remains of logs that washed up on the high slopes of the ridge. The height of the ridge gives it a spiritual quality. Eagles frequent the ridge, and eagle feathers figure into Yakama religious ceremonies. Spirit quests took place along the ridge, where songs for ceremonial use came to people. Springs that issue from the sides of the ridge remind the elders of stars in the sky. The Yakama have gathered traditional subsistence and medicinal plants at places along the ridge, and unmarked burials may occur there. Elders have stated that they believe spirits still reside in the Columbia Hills area. In addition, the Rock Creek Canyon, located east of the Columbia Hills, has religious value for the Yakama. The original Rock Creek Village site is considered sacred by the Yakama because it was associated with an Indian prophet. The longhouse at Rock Creek is currently used for religious practices.

It is unclear from the elders' statements whether some of the qualities they mentioned apply to the entire Columbia Hills or are limited to specific places. Based on information gathered to date, Juniper Point might qualify for listing in the National Register of Historic Places as a traditional cultural property for its value as a legend site and a place where the Yakama collected juniper for medicinal uses. Juniper Point is the only location in the immediate vicinity of the KENETECH Project that has been specifically and consistently identified by the Yakama elders interviewed. The information reviewed to date does not suggest a distinctly bounded traditional cultural landscape that would include the Project site and that would be eligible for listing in the National Register. The Yakama, however, likely consider all of the aboriginal territory as a traditional cultural landscape.

Ethnobotany

Botanical surveys (see Section 2.3) identified a number of plant species that were potentially used by Native Americans based on a list of plant species in the Hanford area provided by a botanist employed by the Yakama Indian Nation (Robson, 1994). Table 2.6.3 shows the traditional uses of the plants and their occurrence along surveyed turbine strings. These plant resources were likely gathered in the Columbia Hills prior to the land passing into private ownership. Owners of property in the Project area were interviewed and stated that they do not have arrangements or agreements with Native American individuals or groups to allow access to private lands for gathering.

Views of Yakama Elders about the Project Area

Yakama Cultural Resources Program staff and elders believe that they have a vested interest in the Project area because some of them come from families that have been associated with the area since the beginning of time as counted by the Yakama, were born there, or have lived nearby for their entire lives. Yakama people who have traditional knowledge of the Columbia Hills area have driven through it with their children and grandchildren, pointing out places and teaching their culture. Yakama people cannot conduct activities in the Project area at present because it is in private ownership and fenced. They feel that the Project would not help this situation. The elders do no like the way the area is being used today, believing livestock grazing and other uses destroy the natural environment.

Yakama Cultural Resources Program staff and elders have stated a preference to avoid development because of the risk of environmental damage (for example, the destruction of the wild salmon runs) that has contributed to the loss of the subsistence lifestyle and for which they feel they have never been compensated. The Yakama are generally concerned about air, noise, and soil pollution. Their concerns include, for example, the use of tracked vehicles, spillage of hazardous materials, potential degradation to surface water quality that could hurt fish habitat in the Columbia River and tributary streams, and damage to wildlife habitat and birds such as eagles. A specific concern is that the wind turbines may dry out the air, cause the native plants to wither and prevent them from reseeding the land. Yakama people are also concerned that the turbines will drive away wildlife including deer, rabbits, and birds. They also wonder about potential impacts on allotments in the Columbia Hills vicinity; some Yakama tribal members own land in the Goodnoe Hills area. In addition, Yakama staff believe that the windpower project could affect the area's aesthetics, and create noise and air pollution.

Yakama staff and elders see potential impacts from the proposed project and question what value the project could bring to them. These concerns have led staff and some elders to state a preference that the project not be built, although the Tribal Council has not yet stated its position. Although the concept of mitigation is not accepted by the Yakama, they believe that they should be compensated for impacts on natural and cultural resources, including those incurred by past projects. There is a strong feeling that the Project should consider the views of the elders and the needs of the Yakama people and that it should contribute toward righting past wrongs they have suffered. Tribal members are concerned about the enforceability of agreements with government agencies and private companies.

Table 2.6.3
PLANT RESOURCES, USES, AND ABUNDANCE

Linnean Name	Common Name	Ethnographic Use	Abundance in Survey Corridors
Achillea millefolium	Western yarrow	medicinal: cure diarrhea and barrenness, eye wash, reduce swelling	light to moderate
Agropyron spicatum	Bluebunch wheatgrass		light to moderate, heavy in discrete areas
Allium spp.	Wild onion	food: root	light, scattered
Apocynum androsaemifolium	Spreading dogbane		light, very scattered
Artemisia rigida	Big sagebrush	technological: firewood	light to moderate, scattered; heavy in discrete areas
Astragalus spp.	Milk-vetch	medicinal: stop hemorrhage	light to moderate
Balsamorhiza careyana	Carey's balsamroot	food: root	light to moderate, scattered
Balsamorhiza hookeri	Hooker's balsamroot	food: root	light to moderate, scattered
Brodiaea howellii	Howell's brodiaea	food: root	light, very scattered
Castilleja hispida	Harsh paintbrush	mythological: "Thunder's flower"	light, very scattered
Chaenactis douglasii	Hoary false-yarrow	medicinal: treat burns, wounds, sores, rash, pimples, spider bite	light, very scattered
Chrysothamnus nauseosus	Gray rabbitbrush		light to moderate, heavy in discrete areas
Claytonia lanceolata	Western springbeauty	food: root	light, very scattered
Comandra umbellata	Bastard toad-flax		light, very scattered
Crocidium multicaule	Spring-gold	mythological: "Coyote's eyes"	light
Dodecatheon pulchellum	Few-flowered shooting star	mythological: "Curlew's beak"	light, very scattered
Eriogonum spp.	Wild buckwheat	technological: basketry	light to moderate, heavy in discrete areas
Erigeron spp.	Fleabane	medicinal: treat sores	light to moderate, very scattered
Fritillaria pudica	Yellow bell	food: root	light, very scattered
Hydrophyllum capitatum	Ballhead waterleaf	medicinal: tonic, appetite	light, very scattered
Juniperus occidentalis	Western juniper	medicinal: treat colds, sore throat, flu, venereal disease, kidney problems	light, scattered
Lewisia rediviva	Bitterroot	food: root	light, very scattered
Lomatium spp.	Desert-parsley	food: root religious: protect ceremonial regalia from insects	light to moderate
Lupinus spp.	Lupine	medicinal: treat skin rash	light to moderate, heavy in discrete area
Phlox spp.	Phlox	medicinal: stop itching	light to moderate
Pinus ponderosa	Ponderosa pine	medicinal: treat boils, flu	light, very scattered
Purshia tridentata	Antelope bitterbrush	medicinal: emetic, laxative; treat flu, fever, itching	light to moderate, very scattered
Quercus garryana	Oregon white oak	medicinal: cure diarrhea	moderate to light, very scattered
Ribes cereum	Wax currant	food: berries	light, very scattered

2.6.4 Proposed Action

2.6.4.1 Impacts

Archaeological and Historic Properties

Project construction along turbine strings A, B, E, J, L, O, U, Y, Z, AA, BB, CC, DD, EE, GG, and OO could adversely affect the 11 sites and five isolates that have been identified as eligible or potentially eligible for listing in the National Register. Direct impacts could include soil disturbance during Project construction, while indirect impacts could include soil erosion and unauthorized artifact collection by individuals attracted to the area to view the turbine units. It appears that sites along all but turbine strings J and EE could be avoided, however, through minor shifting of Project features.

As the results of the cultural resources survey show, the Project area has a relatively high potential for archaeological sites. Turbine strings in steep areas may require access roads with a number of switchbacks, and some of these roads may extend beyond previously surveyed corridors. In addition, a number of Project features, including primary access roads, the overhead powerline, and construction laydown areas, have not yet been precisely located. Construction of these features could disturb unidentified cultural properties. Yakama elders have indicated that burial sites may be located in the Columbia Hills. There is a risk that Project construction could disrupt Indian graves or other unidentified subsurface archaeological sites.

Traditional Cultural Properties

As discussed in Section 2.6.3, Juniper Point, located south of the Project site, might be eligible for listing as a traditional cultural property. Consultation with the Yakama Indian Nation is ongoing, and there is some potential that the occurrence of other traditional cultural properties could be revealed through this ongoing consultation process with the Yakama Indian Nation. Some of the closer KENETECH wind turbine strings would be visible from Juniper Point. Specifically, turbine string M would be located roughly 1 km (0.6 miles) to the west/northwest of the top of Juniper Point. Turbine string K would be located about 1.6 km (1 mile) to the southwest of the top of Juniper Point. The remainder of turbine strings in the western portion of the KENETECH site would be located about 2.4 to 4.8 km (1.5 to 3 miles) from the top of Juniper Point. The closest turbine string to the northeast would be located more than 3.2 km (2 miles) away. Consultation is ongoing with the Yakama Nation to assist in determining whether the turbine strings would adversely affect the traditional cultural qualities of Juniper Point if it proves to be eligible for the National Register, and if so what measures might be taken to avoid, minimize, or mitigate impacts.

Ethnobotany

Development of the Project, as proposed by the Applicant, would result in temporary disruption of plants and habitat during construction. Shrub-steppe, juniper, and oak-pine habitats (see Section 2.3), contain plant species and varieties that have traditionally been used by Native Americans. However, access to site properties, which are all privately owned, is not currently provided to Native Americans by the present property owners, and Project development would not alter the status of access agreements. Therefore, the Project is not expected to change the current availability of these plant resources to Native American groups.

2.6.4.2 Mitigation

Mitigation measures for National Register-eligible cultural properties include avoidance of impacts, minimization of impacts, and scientific data recovery for properties eligible under Criterion D. Avoidance is generally the preferred mitigation strategy because cultural properties are fragile and cannot be replaced. For archaeological deposits, avoidance is preferred over scientific data recovery because it is impractical to recover all possible data from such sites.

For the Proposed Action, the following mitigation measures could be implemented by the Applicant to avoid or reduce impacts:

- Precisely locate sites and isolates along turbine strings A, B, E, L, O, U, Y, Z, AA, BB, CC, DD, GG, and OO using property surveys or other means so that the final design of roads along the turbine strings and placement of the turbines can avoid the identified sites and isolates where feasible. Sites located along these corridors occupy limited portions of the surveyed corridors and avoidance appears to be feasible. The isolates occupy a very limited area and could be easily avoided during construction.
- During construction, flag and avoid potentially eligible sites and isolates located along turbine strings A, B, E, L, O, U, Y, Z, AA, BB, DD, GG and OO if final Project design confirms that they can be avoided.
- Complete further testing of the two sites located along turbine strings J and EE, and of any other potentially eligible sites that prove to be unavoidable during final design, to determine their eligibility for listing in the National Register.
- Design and implement scientific data recovery where further testing confirms eligibility and avoidance is not feasible.
- Conduct additional cultural resources surveys of the Project powerline, primary access roads, and construction staging areas, once these areas are more precisely identified, and adjust their locations to avoid any potentially eligible cultural properties where feasible.
- Monitor construction activities to ensure that flagged cultural properties are avoided.
- Train construction workers on the need to avoid cultural properties and procedures to follow if previously unidentified cultural properties, including Indian graves, are encountered during construction.
- If any previously unidentified cultural resource properties are encountered during construction, cease construction activities in the immediate vicinity of the site pending evaluation by a qualified archaeologist and consultation with the State Office of Archaeology and Historic Preservation to identify appropriate mitigation measures such as avoidance or scientific data recovery.

2.6.5 Alternative Powerline Route

This alternative would create the same potential for impacts to cultural resources as the Proposed Action. Any sites identified along the powerline corridor could be avoided with minor adjustments to the corridor or placement of power poles. Mitigation would also be the same as those recommended for the Proposed Action. Once a final powerline route is selected, a cultural resources survey of the alignment is recommended.

2.6.6 Restricted Areas Alternative

2.6.6.1 Environmental Impacts

As discussed in Section 2.6.4.1 above, the proposed Project would adversely affect two archaeological sites, located on turbine strings J and EE, that are potentially eligible for listing in the National Register. This alternative would restrict development of turbine strings J and EE should further testing confirm those sites' eligibility.

2.6.6.2 Mitigation Measures

Mitigation measures would generally be the same as recommended for the Proposed Action except that development would not occur on turbine strings J and EE, and scientific data recovery would therefore not be required if further testing confirms their eligibility for listing.

2.6.7 Subarea Development Alternative

2.6.7.1 Environmental Impacts

Option 1 would restrict Phase 1 development to the western portion of the site as shown in Figure 1.8. This alternative would avoid impacts to sites and isolates located along turbine strings O, U, Y, Z, AA, BB, CC, DD, EE, GG, and OO during Phase 1 construction. Option 1 could, however, result in impacts to potentially eligible sites and isolates along turbine strings A, B, E, J, and L. As discussed under Section 2.6.4.2, impacts to sites and isolates located along turbine strings A, B, E, and L appear to be avoidable. One site, located along turbine string J, appears to be unavoidable.

Option 2 would restrict Phase 1 development to the central and eastern portion of the site as shown in Figure 1.8. This alternative would avoid impacts to sites and isolates located along turbine strings A, B, E, J, and L during Phase 1 construction. Option 2 could, however, result in impacts to potentially eligible sites and isolates along turbine strings O, U, Y, Z, AA, BB, CC, DD, GG, and OO. Only one of these properties, located along turbine string EE, appears to be unavoidable.

The cultural resources survey located a greater number of sites in the east-central portion of the site than in the western portion of the site. Therefore, future surveys of Project features that have not yet been precisely located might yield more sites in the east-central subarea than in the western subarea.

2.6.7.2 Mitigation Measures

Mitigation measures would generally be the same as identified for the Proposed Action, located in Section 2.6.4.2.

2.6.8 No Action

Potential impacts to cultural resources from Project development would be avoided if the agencies do not issue the required permits and approvals. However, cultural properties located on the site could potentially be disrupted by ongoing agricultural and grazing practices on these lands.

2.6.9 Significant Unavoidable Adverse Impacts

With the possible exception of a potentially eligible traditional cultural property at Juniper Point, significant unavoidable adverse impacts would not be expected to result from development of the Proposed Action or alternatives if the mitigation identified above (avoidance, further testing, and scientific data recovery) is implemented.

2.7 Aesthetics

2.7.1 Studies and Coordination

This section discusses the expected aesthetic impacts resulting from construction and operation of Washington Windplant #1. Because the Project would extend over a wide area, all Project features could not be viewed from a single vantage point. Conversely, portions of the Project would be visible from many locations. Therefore, this EIS discusses visual changes from several potential viewing areas surrounding the Project site. In addition, photosimulations from five viewpoints are included to illustrate how certain views would change with development of the proposed Project. The five viewpoints were selected based on concerns raised during scoping and on the current land use of the viewpoint locations. (For example, viewpoints visited by large numbers of people or representative of views from residences were selected.) In addition, viewpoints were selected to provide example views of all portions of the Project site. Other viewing areas discussed in this EIS were evaluated based on field visits and three-dimensional computer simulations showing the Project site with the proposed wind turbines.

The issue of aesthetics is somewhat subjective, since the degree of impact depends on viewers' responses to changes in the landscape as well as the changes themselves. Specifically, the activity a person is engaged in, the physical location of the viewer, the length of time the view is visible, local land use policies, and individual values can all influence what an individual experiences as aesthetically pleasing or displeasing.

Nonetheless, several methods have been developed by federal agencies to systematically evaluate aesthetic impacts involving large tracts of land (Smardon et. al., 1986). The assessment of aesthetic impacts included in this EIS generally follows these methods, which involve assessing baseline conditions and changes to the visual landscape in terms of: 1) relevant local land use policies addressing visual resources; 2) the character and quality of visual resources in the immediate project area and surrounding region; and 3) the number of people who would be exposed to a given view as well as their sensitivity to changes in that view. Viewer sensitivity is influenced by viewer proximity to the landscape, viewer orientation and elevation with respect to the landscape, the frequency and duration of viewing time, and viewers' personal values and expectations. Generally, homeowners, persons engaged in recreational activities, and sightseers tend to be most sensitive to visual changes while workers and commuters tend to be less sensitive (U.S. Forest Service, 1974; Federal Highway Administration, 1983; U.S. Soil Conservation Service, 1978).

2.7.2 Regulations, Standards, and Guidelines

2.7.2.1 Klickitat County

As discussed in Section 2.8, there are no regulations in Klickitat County that specifically address the aesthetic impacts of wind power development. Nonetheless, the County's Comprehensive Plan, sets a goal of "preserving open space for its community-shaping, recreational, and ecological value." The County's zoning ordinance establishes two secondary or overlay zones related to aesthetics: 1) a Scenic Design Area overlay, and 2) a View Protection District (VP) overlay. The Project site is not located within either of these secondary zones.

2.7.2.2 Columbia River Gorge National Scenic Area

The proposed Project site lies outside the Columbia River Gorge National Scenic Area (Scenic Area) as shown in Figure 2.7.1.; therefore, land use policies contained in the Management Plan for the Scenic Area would not apply. Nonetheless, the Project site is visible from some portions of the Scenic Area, and the assessment of impacts included in Section 2.7.4 assesses changes in views from within the Scenic Area that would result from development of the proposed Project.

2.7.3 Affected Environment

2.7.3.1 Overall Setting

The landscape of south central Washington and north central Oregon is generally rural in character and consists of expansive views of rugged and rolling terrain rising dramatically above the Columbia River. Some areas near the Project site afford views of Cascade Range volcanoes, such as Mt. Hood, Mt. Rainier, Mt. St. Helens, and Mt. Adams. Most land is open range or agricultural. At higher elevations, land is forested.

The largest community near the Project site is Goldendale, located in a bowl-shaped valley that is in part defined by the crest of the Columbia Hills. Small communities and larger cities, such as The Dalles in Oregon, are located along the Columbia River. Views of the Columbia River often include barge traffic, windsurfers, and other vessels travelling the river. At certain locations, views of the Columbia River also include large hydroelectric projects and associated facilities. John Day Dam and its associated substations and powerlines is located on the Columbia River below the Project site. Columbia Aluminum, a large industrial facility, is located adjacent to the facilities at John Day Dam.

Visually, the Project site is typically of the rolling rangeland found in much of south central Washington and north central Oregon. In the eastern and central portions of the site, the ridge crest of the Columbia Hills forms the most dramatic feature of the landscape. South of the crest, the Columbia Hills form cliffs or steep slopes to the bottomlands along the Columbia River. North of the crest, the Columbia Hills slope more gently toward Hoctor Road (see Figure 2.1.1). Most of the site is rangeland interspersed with occasional areas of oak, pine, and juniper woodland. Occasional dirt and gravel roads and jeep trails, barbwire fencing, and scattered stock ponds are located on the site. On-site traffic is limited to occasional use, usually by farm vehicles and equipment. Three high-voltage transmission lines cross portions of the Project site and are partially visible from off-site locations. Pumping stations for a natural gas pipeline are somewhat visible from Hoctor Road. When looking at the site from the Oregon side of the Columbia River, John Day Dam, portions of SR-14 and a nearby railroad line are also visible. There are currently no significant light or glare sources located on the Project site.

The Project site lies more than 10 km (more than 6 miles) east of the eastern boundary of the Columbia River Gorge National Scenic Area at its nearest point. SR-14 in Washington and I-84 in Oregon are highly used by recreationists travelling through the Scenic Area and to other

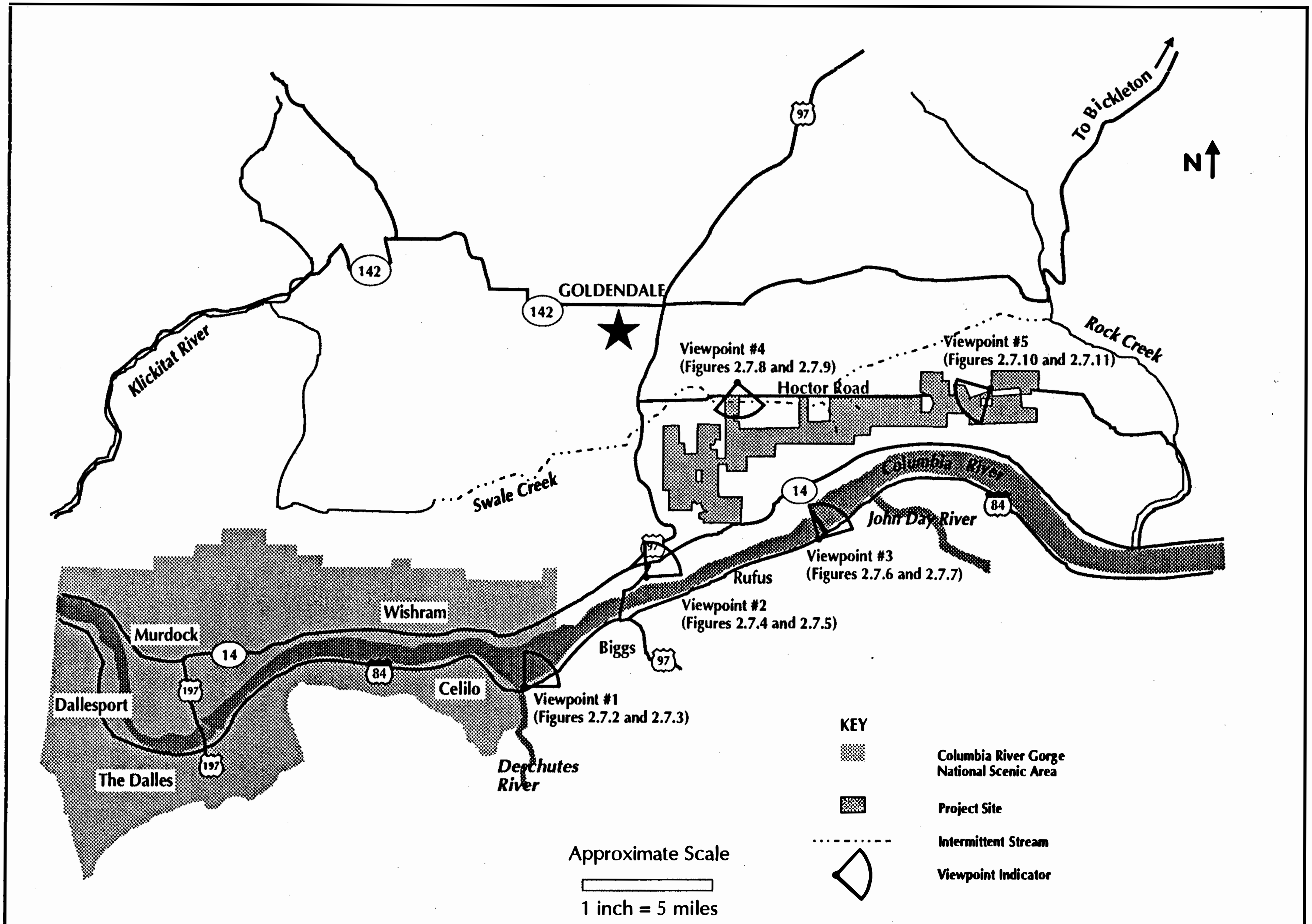

Figure 2.7.1 - Viewpoint Locations

recreational sites (see Section 2.8.3). US-97 forms the major north-south transportation route through Klickitat County and is also used by recreationists. East of US-97, SR-14 is also used to access several farms and ranches located in the southwestern portion of the Columbia Hills and in the Goodnoe Hills, further to the east. Hoctor Road is primarily used to access local farms and ranches in the Columbia Hills area. Residences are located along both sides of Hoctor Road.

2.7.3.2 Viewing Areas and Viewpoints

Portions of the Project site can be viewed from five general areas:

- From within the Columbia River Gorge National Scenic Area.
- From the general vicinity of Maryhill Museum and Maryhill State Park.
- From SR-14 and I-84 east of the Scenic Area.
- From the Goldendale Valley and US-97.
- From Hoctor Road.

The following paragraphs describe these general areas in more detail. Photographs of views from five locations are provided as representative examples of various views from areas surrounding the Project site. For the purpose of describing these views, the following terms are used: foreground (within 0.4 to 0.8 km (0.25 to 0.5 miles) of the viewer); middleground (from the foreground to about 8 km (5 miles) of the viewer); and background (over 8 km (5 miles) from the viewer).

Columbia River Gorge National Scenic Area
On the north side of the Columbia River, within the Columbia River Gorge National Scenic Area, only occasional glimpses of the Project site can be seen by those travelling east on SR-14 because twists and turns in the highway and intervening topographic features generally block the site from view. The site is not seen from the most eastern turnout within the Scenic Area along SR-14, nor can it be seen from the turnout marking Celilo Falls or from the town of Wishram. The closest glimpse of the site from SR-14 is slightly less than 1 km (about one-half mile) west of the eastern boundary of the Scenic Area; the closest open view of the site is located about 1.6 km (1 mile) west of the eastern Scenic Area boundary.

On the southern side of the Columbia River, clear views of the Project site occur more frequently. A long (approximately 5-km or 3-mile), clear view of the Project site occurs for drivers travelling east on I-84 near the Deschutes River. The view eastward from Viewpoint #1, located on Figure 2.7.1, is typical of views of the Project site from this area. Viewpoint #1 is located about 16 km (10 miles) from the Project site. The existing landscape seen from Viewpoint #1, consists of roadside vegetation and embankment, and powerlines in the foreground, steep bluffs and portions of the Columbia River in the middleground, and rolling hills in the background (see Figure 2.7.2). The Columbia Hills ridge and Juniper Point are visible in the background. SR-14 is slightly visible in the background. Viewers travelling eastward along I-84 include recreationists, sightseers travelling through the Scenic Area, and general commercial traffic linking the communities that lie along the southern bank of the Columbia River.

Vicinity of Maryhill Museum and Maryhill State Park

The general area including Maryhill Museum, Maryhill State Park, and the "Stonehenge" war memorial is located east of the Scenic Area and attracts large numbers of visitors annually. Maryhill Museum is estimated to attract 86,000 visitors annually, while Maryhill State Park attracted over 430,000 visitors in 1993; no data are available on visits to the "Stonehenge" memorial (see Table 2.8.2.) Views of the western portion of the Project site and Juniper Point can be seen from portions of the grounds at Maryhill Museum and at Maryhill State Park; however, large trees obstruct the view in certain locations.

The most open and expansive view of the Project site in the general area of Maryhill Museum and Maryhill State Park is from the "Stonehenge" memorial (see Viewpoint #2, located on Figure 2.7.1). Viewpoint #2 is located approximately 5.6 km (3.5 miles) from the Project site. This location includes a full-scale replica of England's Stonehenge. Although views from "Stonehenge" are generally oriented toward the Columbia River, the rolling hills in the western portion of the Project site are clearly visible and dominant in the middleground of the view oriented toward the Columbia Hills as shown in Figure 2.7.4. The foreground from this viewpoint includes the "Stonehenge" parking lot and gift store. The background is limited to sky above the crest of the Columbia Hills. High-voltage transmission towers are visible at the base of the middleground view as are portions of SR-14; however, there is little encroachment by man-made facilities on the remainder of the middleground view.

SR-14 and I-84 East of the Scenic Area

Portions of the Project site are visible from several locations along SR-14 and I-84 east of the scenic area. On the Washington side of the Columbia River, the western portion of the Project site can be viewed from a gas station (Pat's Ranch Mart) located at the intersection of SR-14 and US-97. Further east, portions of the western area of the site are visible from several rural residences located west and east of John Day Dam. On the Oregon side of the Columbia River, extensive portions of the western and central areas of the Project site are visible from the unincorporated towns of Biggs and Rufus. Further east, portions of the central and eastern areas of the Project site can be viewed from Giles French Park at John Day Dam and from Lepage Park at the John Day River Recreational Area.

Viewpoint #3, located about 5 km (3 miles) from the Project site, typifies these views and was taken from Giles French Park at John Day Dam (see Figure 2.7.1). Viewpoint #3 is oriented to the northeast and includes portions of the Columbia Hills located east of Juniper Point (see Figure 2.7.6). The Columbia River forms the foreground view, while the Columbia Hills form the middleground view and recede into the distance further east. Views from this located have been substantially modified by man-made features near and along the river. Columbia Aluminum, high-voltage transmission towers, and portions of SR-14 and a railroad line are visible in the foreground view. A large, orange and white high-voltage tower adjacent to John Day Dam is also visible from this viewpoint.

Goldendale and US-97

Although portions of the crest of the Columbia Hills are visible from areas around Goldendale, much of the Project site is obscured from view when travelling south on US-97 by topographic features, including two cinder cones formed by ancient volcanoes. A small portion of the northeast area of the Project site, where it is traversed by two high-voltage powerlines, would be visible from an existing viewpoint off US-97 just south of Hoctor Road; however, the orientation of the viewpoint and viewpoint marker is to the west toward the Cascade Mountain volcanoes (Mount Adams, Mount Rainier, Mount St. Helens, and Mount Hood) that can be viewed across the Goldendale valley. A few rural residences are located south of Hoctor Road and east of US-97. Portions of the western area of the site are also visible from these residences. The clearest view of the Project site from US-97 is experienced by drivers travelling north on the steep portion of the roadway as it makes 1.5 km (about 1 mile) a sweeping turn to the left. At this point, the lower portion of the western Project area comes into view. Views from this location would be similar to those from "Stonehenge" but are at a closer range and have a more due-east orientation. However, this view is only visible for a short period of time due to the winding character and deep road cuts along this portion of US-97. In addition, drivers travelling at 55 mph along this roadway may not be focused on the surrounding scenery.

Hoctor Road

The northern portion of the site is visible from many locations and rural residences along Hoctor Road; however, because the site extends for nearly 22.4 km (14 miles), the entire northern area of the site would not be visible from any single viewpoint. Viewpoint #4 is located at the intersection of Hoctor Road and No. 12 Road (see Figure 2.7.1). This view consists of roadside vegetation, barb-wire fencing, and relatively flat cropland and pasture in the foreground view (see Figure 2.7.8). Rolling hills consisting of rangeland and scattered woodlands form the middleground view, and sky forms the background view. The view from this location is expansive and extends beyond the limits of the photograph included in Figure 2.7.8.

Viewpoint #5 is located near the eastern portion of the Project site on Hoctor Road just east of Oak Flat Road (see Figure 2.7.10). The viewpoint is oriented to the west. Foreground views include the roadway, powerlines, and cropland; middleground views include portions of the Columbia Hills rising toward the Columbia Crest; and background views include the sky and, at the left margin, the Columbia River gorge. The number of viewers passing this location would be relatively small since most residences along Hoctor Road are located further west. However, roads serving the Goodnoe Hills area, located east of the Project site, intersect with Hoctor Road east of this viewpoint, and travellers to the Goodnoe Hills may use Hoctor Road for access.

2.7.4 Proposed Action

2.7.4.1 Environmental Impacts

Construction

Construction activities associated with Project development would create temporary but visible aesthetic impacts because of the size of the site and activities associated with grading and road construction. Construction of switchbacks would be required to access some turbine strings, especially in the western portion of the site. This area would be visible from portions of I-84, SR-14, and US-97; from the Maryhill Museum and Maryhill State Park area; and from small towns along the Columbia River in Oregon including Biggs and Rufus. Construction activities and equipment would generally be more visible at closer range; however, soil disturbances and road cuts would contrast with areas that remain vegetated, and these contrasting areas would be visible at a greater distance. Construction staging areas and material and equipment stockpiles could also create temporary aesthetic impacts. To the extent that construction activities are delayed beyond the expected 8- to 11-month construction period for each phase of Project development, construction-related aesthetic impacts would also continue.

Operation

Public Perceptions of Wind Project Aesthetics. As discussed in Section 2.7.1, aesthetic impacts are related to both changes in the landscape and the reactions of individuals experiencing those changes. Although large-scale windpower projects are new to Washington State, several of these projects have been in place in California for several years in areas such as Altamont Pass. Research conducted on viewer reaction to those California projects indicates that nearly all viewers perceive large wind power projects as conspicuous, man-made features in the landscape. Those who advocate renewable energy resources or who receive a direct economic benefit tend to view wind power projects as visually interesting and positive symbols of appropriate technology and economic development while other viewers tend to view windfarm aesthetics in terms of visual clutter and as inappropriate changes to the natural landscape (Thayer, 1988).

In spite of this disparity in perception, California viewers with both positive and negative reactions to wind power project aesthetics tended to hold similar views of design features that improved the overall appearance of the projects. Viewers tended to favor: 1) neutral colors; 2) turbines arranged in uniform orderly patterns; and 3) fewer, larger turbines. Inoperative turbines invoked strong negative reactions from viewers because they are viewed as evidence of unreliability (Thayer, 1988; Bosley and Bosley, 1990).

Regional Impacts. Overall, the proposed Project would introduce another man-made feature into the overall landscape of south central Klickitat County. Although the area is largely rural/agricultural in character, large man-made features currently exist in the landscape, especially along the Columbia River. These man-made features include dams, high-voltage transmission lines, roads, bridges, and railroad lines. Because other large-scale wind projects have not yet been developed in eastern Washington, the Project would, at least temporarily, create a distinct and unique "landmark" in the regional landscape. Because of its visibility and distinctive character, indirect impacts such as increased sightseeing and recreational use near the Project site could result. Although the Project would create obvious changes to the Columbia Hills area and some viewers would likely view those changes negatively, other areas with similar aesthetic characteristics exist along the Columbia River. The Project, therefore, would not alter a unique type of landscape. Although the Project could be seen from portions of I-84 within the Columbia River Gorge National Scenic Area, it would only be seen from a relatively great distance and for a relatively short period of time. This would greatly reduce impacts to viewers within the Scenic Area.

Local Impacts. The Project site currently consists of rural rangeland and scattered woodlands crossed occasionally by high-voltage transmission lines and other utilities. Project development would place approximately 345 wind turbines and associated facilities into this landscape. Certain measures to reduce aesthetic impacts have been incorporated into the proposed Project design. For example, turbines would generally be arranged in regular rows or "strings." Existing roads would be upgraded to reduce the amount of new road construction required, and new roads would follow existing ridgelines where feasible to minimize the amount of cut and fill required. During Project operation, materials and equipment would be stored off site. Non-reflective paint is proposed to reduce glare and flash caused by spinning turbine rotors.

Nevertheless, from various locations surrounding the Project site, views would change. The following discussions assess visual impacts from the five general viewing areas discussed in Section 2.7.3.2. Photosimulations are included as examples of changes to selected views after the Project is operating. It should be noted that turbines may contrast more against the landscape than is depicted in the black and white reproductions included in this document. It should also be noted that movement of turbine blades would attract the eye and cause the turbines to stand out more in the overall landscape than can be depicted in the photosimulations. Small roads leading to individual turbines are not shown in these photosimulations but could be slightly visible from some locations. In addition, during the first few years following construction of new roads, road cuts and disturbed areas would be more visible than depicted until vegetation is reestablished over disturbed areas.

- **Columbia River Gorge National Scenic Area.** Viewers travelling west within the scenic area would be unaffected by the proposed Project. Some viewers travelling east in the eastern portion of the scenic area may notice the Project; however their attention may be more focused on the river. Thus, a relatively small portion of sightseers in the scenic area would be potentially affected by the proposed Project. From within the Scenic Area, the Project would only be slightly visible to drivers travelling east on SR-14 because the Project would be located a relatively great distance away from the viewer and few clear views of the Project site exist. Drivers travelling east on I-84 in Oregon would have longer, clear views of the Project site in the distance. Figure 2.7.3 depicts the view from I-84 near the Deschutes River with the proposed Project. This viewpoint is located approximately 16 km (10 miles) from the site. Only the western area of the Project site would be slightly visible in the background of this view, and the Project would appear as a series of long white lines running down the distant hillside. At this distance, individual turbines would be slightly visible, but the viewer may not be able to distinguish them as turbines.

- **Maryhill Museum and Maryhill State Park Area.** From areas in the vicinity of Maryhill Museum and Maryhill State Park, the western portion of the site would clearly be visible in the background and middleground of the view. Figure 2.7.5 illustrates the view from "Stonehenge" with the Project in place. From this viewpoint, rows of turbines would be visible running down the hillside that dominates the middleground of the view. Individual turbines and roads, including switchbacks, would be clearly visible. Although the existing view includes some man-made elements, including high voltage transmission lines at the base of the middleground view, the turbines would be more dominant in the landscape because of their number, color, and orientation on the hillside. Because the Maryhill Museum and State Park areas attract large numbers of visitors, the western portion of the Project would be visible to many who visit the area for vacationing and recreation. The primary focus for these visitors is, however, toward the Columbia River.

- **SR-14 and I-84 East of the Columbia River Gorge National Scenic Area.** Outside the Scenic Area, the Project site would be visible from a number of locations. Along I-84 in Oregon, long views of the western portion of the Project site would occur between the eastern boundary of the Scenic Area and the town of Rufus. Views from the towns of Biggs and Rufus would generally be similar to the view from "Stonehenge" but the site would be viewed from a slightly greater distance. Views from these towns would, however, be more oriented toward the Columbia Hills than would the views from "Stonehenge." Further east along I-84, portions of the central and eastern areas of the Project site would be visible. From Giles French Park at John Day Dam, viewers looking eastward up the Columbia River gorge would see, in the distance, portions of turbine strings that cross the crest of the Columbia Hills (see Figure 2.7.7). Changes to the Project site would be more obvious from some locations along SR-14, relative to I-84, because of SR-14's proximity to the site; however, changes would be less conspicuous from other locations along SR-14, where the viewing angle is obscured.

Visual changes to the landscape resulting from the proposed Project would be visible to a relatively large number and diverse range of viewers. Affected viewers would include rural residents along SR-14, residents of the small towns of Biggs and Rufus, recreational travellers and sightseers, recreationists at the parks at John Day Dam and the John Day River, commuters, and general commercial traffic. Of these groups, residents and recreationists would be most sensitive to the visual changes caused by the proposed Project. Many recreationists would be engaged in activities oriented toward the Columbia River, and the Columbia Hills would not dominate their views.

- **Goldendale Valley and US-97.** Portions of the Project site north of the crest of the Columbia Hills would be visible from several locations in the Goldendale Valley including the town of Centerville. In most locations, northern portions of the Project site would be visible in the background view; however, views from areas around Goldendale would be at least partially obscured by two cindercones. The most striking view of the Project would occur travelling northbound on US-97 through the Columbia Hills where the road makes a sweeping turn to the left. This view would be similar to that from "Stonehenge," but at a much closer range. However, this view would only be visible for a few moments.

- **Hoctor Road.** Portions of the Project would be visible from most locations along Hoctor Road, primarily in the middleground view. Rural residences are located along both sides of Hoctor Road. From Clyde Story Road to Range 18E, turbine strings would be as close as 0.4 km (0.25-mile) and as far as 3.2 km (2 miles) from Hoctor Road. Figure 2.7.9 illustrates a portion of the view from Hoctor Road at its intersection with No. 12 Road. Most travellers along Hoctor Road would drive by this location. From this viewpoint, turbine towers would be visible in the middleground view along the crest of the hill. Roads along turbine strings would also be partially visible. On clear days, the turbine towers would contrast with the blue sky background. Other man-made elements, including high-voltage transmission lines, are currently visible from locations along Hoctor Road.

  Further east, in Township 3N, Range 18E (the vicinity of Oak Flat Road), turbine strings would be located closer to the roadway (as close as 33 meters (100 feet)). Figure 2.7.11 illustrates the view from Hoctor Road east of Oak Flat Road looking westward. From this location, turbines would be clearly visible in the foreground and middleground view. In addition, the arrangement of turbines in strings would be less obvious, especially in the foreground, because strings would be located closer to each other and because of the viewing angle. Although other man-made elements, including powerpoles, are visible in the foreground, the turbines would be very evident because of their movement and color, and because viewers are unaccustomed to seeing them in the landscape. Relatively few

Figure 2.7.2 – Viewpoint 1 From I-84 inside the Columbia River Gorge National Scenic Area (Existing Conditions)

Figure 2.7.3 – Viewpoint 1 From I-84 inside the Columbia River Gorge National Scenic Area (With Project)

Figure 2.7.4 – Viewpoint 2 From "Stonehenge" (Existing Conditions)

Figure 2.7.5 – Viewpoint 2 From "Stonehenge" (With Project)

Figure 2.7.6 – Viewpoint 3 From Giles French Park at John Day Dam (Existing Conditions)

Figure 2.7.7 – Viewpoint 3 From Giles French Park at John Day Dam (With Project)

Figure 2.7.8 – Viewpoint 4 From Hoctor Road at Intersection With No. 12 Road (Existing Conditions)

Figure 2.7.9 – Viewpoint 4 From Hoctor Road at Intersection With No. 12 Road (With Project)

Figure 2.7.10 – Viewpoint 5 From Hoctor Road East of Oak Flat Road (Existing Conditions)

Figure 2.7.11 – Viewpoint 5 From Hoctor Road East of Oak Flat Road (With Project)

viewers would experience this view, however, since most rural residences along Hoctor Road are located west of this location.

Residential viewers are among the most sensitive to changes in the visual environment. Although those viewers along Hoctor Road who are leasing land to the proposed Project may view the visual changes positively, other residents may view the changes negatively. Visual changes would be most pronounced in the vicinity of Oak Flat Road; however, relatively few residents would view these changes on a regular basis.

Indirect Impacts

Because the Project would be visible from major roadways and recreational destinations in Washington and Oregon, it could attract viewers driving along those highways. Without designated viewing locations, this could result in sightseers travelling along Hoctor Road or attempting to pull off busy highways such as US-97, SR-14, or I-84 in undesignated locations (see Section 2.11).

Decommissioning

After the useful life of the Project, features would continue to be visible until turbines are removed and efforts are made to restore and revegetate areas occupied by Project features. As noted above, viewers have been found to have strong negative reactions to non-functioning turbines.

2.7.4.2 Mitigation Measures

Section 1.4.5.4 describes mitigation that the Applicant has included in the proposed Project to reduce aesthetic impacts. The following mitigation measures would further reduce direct and indirect impacts resulting from the proposed Project:

- Locate all construction staging and storage areas away from locations that would be clearly visible from US-97, SR-14, and I-84.
- Restore temporary roads and staging areas to preconstruction grades and revegetate those areas to reduce the amount of visual contrast.
- Provide a clean looking facility free of debris and unused or broken down equipment by: storing equipment and supplies off site, promptly removing any damaged or unusable equipment from the site, and promptly repairing or decommissioning turbines that are not functioning or prove to be uneconomically sited. This would also reduce the perception of unreliability that has been found to result from viewers seeing non-functioning turbines.
- Prepare a decommissioning plan outlining the circumstances under which individual turbines will be removed from the site, methods used to restore areas previously containing turbines, and methods for decommissioning the overall Project and restoring the overall Project site.
- Coordinate with Washington, Oregon, and federal recreational facilities and areas, as well as Washington and Oregon State Highway Departments, to provide signs directing sightseers along I-84, SR-14, and US-97 to existing public facilities that provide safe viewing areas of the Project site.

2.7.5 Alternative Powerline Route

The alternative powerline route would locate certain portions of the Project powerline closer to Hoctor Road but would not affect the location of turbine strings. Since the primary visual impact of the proposed Project would result from placement of turbines, the aesthetic impact of this alternative would essentially be the same as the Proposed Action, and mitigation measures would also be the same.

2.7.6 Restricted Areas Alternative

Wind power projects are, to some extent, inherently visible on the landscape because turbines are located in areas with the greatest wind, which tends to be located along ridgetops. In addition, as discussed above, perceptions of wind power aesthetics vary substantially. Therefore, this environmental review identified no specific areas of the site that should be restricted from development based on aesthetic impacts.

2.7.7 Subarea Development Alternative

2.7.7.1 Environmental Impacts

The subarea development alternative would restrict Phase 1 Project development to either the western (Option 1) or eastern and central (Option 2) portions of the Project site. Option 1 would be visible to the greatest number of viewers and would essentially result in impacts similar to those described for the proposed Project from viewing areas in the following locations: the Scenic Area; the vicinity of Maryhill Museum and Maryhill State Park; the towns of Biggs and Rufus; along SR-14, I-84, and US-97; and along the western portion of Hoctor Road.

Option 2 would avoid development in the western hills area of the Project site during Phase 1 and would therefore substantially reduce the number of viewers who would experience the visual changes resulting from Phase 1 Project development. Impacts to travellers and recreationists from John Day Dam eastward would be similar to those shown in Figure 2.7.9. Visual changes along Hoctor Road in the eastern area of the site, where turbine strings would be located near the roadway, would be the same as those shown in Figure 2.7.11.

2.7.7.2 Mitigation Measures

Mitigation measures would be the same as those identified for the proposed Project except that providing signs to designated viewing areas may not be appropriate until subsequent phases of the Project are developed.

2.7.8 No Action

Aesthetic impacts associated with development of the proposed Project would not occur if the agencies do not issue the required permits and approvals. Aesthetic impacts associated with ongoing farming and ranching activities and with existing communication and utility facilities in the Columbia Hills would continue.

2.7.9 Significant Unavoidable Adverse Impacts

Even with the mitigation measures discussed in Section 2.7.4.2 and included in the Applicant's proposal, the proposed Project would create changes to the landscape that would be visible to a relatively large number of viewers, especially in the western portion of the Project site. Changes would not be highly visible from within the Scenic Area, nor would they block important views or alter unique landscapes. However, changes would be visible to rural residents along Hoctor Road, US-97, and SR-14; to residents of the towns of Rufus and Biggs; to visitors at the recreational facilities at Maryhill; and to drivers travelling major roadways running along the Columbia River. Research at other windfarm projects indicates that some residents would likely view the visual changes resulting from the Project as adverse impacts while others would view the visual changes favorably.

2.8 Land Use (including Recreation and Socioeconomics)

2.8.1 Studies and Coordination

The primary sources of information for this section are the amended Klickitat County Comprehensive Plan, adopted in 1979; the 1983 Klickitat County Long Range Resources Plan, the January 1994 Klickitat County Central Area Zoning Map; the amended Klickitat County Zoning Ordinance; the amended Klickitat County Environmental Ordinance; the Klickitat County Illumination Ordinance; and interviews with the Klickitat County Planning Director.

2.8.2 Regulations, Standards, and Guidelines

Klickitat County has not adopted specific policies or zoning requirements that designate wind power development as a permitted use in specific areas of the County. Instead, the County evaluates individual wind power development proposals based on their ability to meet general land use goals and policies, their consistency with zoning district purpose/intent and standards, and their compatibility with other permitted land uses on the site and adjacent lands. A Conditional Use Permit, setting forth specific conditions that would be required to assure compatibility, will be required for Washington Windplant #1. Pursuant to RCW 43.21C.060 and WAC 197-11-660, the County also exercises substantive authority under SEPA to condition or deny project proposals based on identified significant adverse environmental impacts disclosed in an EIS. The Klickitat County Environmental Ordinance specifies policies, codes, ordinances, resolutions, and plans that are the basis for exercising this authority under SEPA.

The following discussions summarize specific goals, policies, and standards outlined in Klickitat County's Comprehensive Plan and Zoning Ordinance. The Project site does not fall under the Washington State Shorelines Management Act or under the Klickitat County Shoreline Master Plan. Because the Project lies outside the Columbia River Gorge National Scenic Area, land use policies contained in the management plan for the scenic area do not apply to this Project.

2.8.2.1 Klickitat County Comprehensive Plan

The County's Comprehensive Plan, prepared in 1977 and amended in 1979, identifies goals to protect and enhance the County's natural resource and agricultural base and to strengthen and diversify the County's economy. Goals that are potentially applicable to development of Washington Windplant #1 include:

- Preserving the environmental quality of Klickitat County.
- Guiding development to areas where soils and geology pose the fewest limitations to quality growth.
- Maintaining high water quality by ensuring that adjacent land uses are compatible with water uses.

- Preserving the County's clean air and minimizing noise and odors.
- Maintaining and enhancing the County's natural resource base.
- Supporting and protecting agriculture.
- Strengthening and diversifying the County's economic base and promoting employment.
- Identifying and preserving wildlife.
- Encouraging tourism.
- Providing essential public services at the lowest possible cost.
- Promoting provision of utilities sufficient to protect the public health and welfare.
- Supporting adequate and effective police and fire services.
- Preserving open space for its community-shaping, recreational, and ecological value.
- Promoting regional awareness and cooperation.

These goals are supported by specific policies set forth in the Comprehensive Plan.

The County Comprehensive Plan also contains a General Land Use Map, updated in 1982, which also guides land use decisions in the County. The Project site and adjacent lands are located on lands designated as "Agriculture/Forest" (A/F) on the County's Land Use Map. The purpose and intent of the A/F land use designation is to "retain or conserve, insofar as practicable or desirable, prime agricultural and forest lands for the continued economic welfare of the farm and forest industry and residents of the County."

2.8.2.2 Klickitat County Zoning Ordinance

Primary Zoning Districts
The Klickitat County Zoning Ordinance, as amended June 1994, creates uniform districts in which compatible uses are allowed and sets forth standards and density controls for those districts.

Adjacent lands and most land within the Project is zoned "Extensive Agriculture" (EA) (see Figure 2.8.1). The purpose of EA zoning is to "encourage the continued practice of farming on lands best suited for agriculture and to prevent or minimize conflicts between common agricultural practices and various non-farm uses." Uses that are permitted outright in EA zones include farming, farm dwellings and buildings, homes, and commercial or industrial activities directly serving agricultural operations. Eight categories of conditional uses are also allowed in EA zones. Wind power development would fall potentially under two of these categories: "utility facilities necessary for public service" and "other uses determined by the Board of Adjustment to be in keeping with the intent of this district." The County Zoning Ordinance also sets forth density standards (8- or 16-hectare (20- or 40-acre) minimum lot sizes), limiting the size of signs and prohibiting flashing signs, and requirements that adequate off-street parking be provided for accessory or conditional uses. Any uses that existed in an EA zone at the time the zoning ordinance was adopted (April 30, 1979) are not to be treated as non-conforming uses.

A relatively small portion of the Project site and adjacent lands near the southwest portion of the site are zoned "Open Space" (OS) (see Figure 2.8.1). The purpose and intent of OS zoning is to "retain or conserve insofar as practicable or desirable, the open character of OS designated land" and to "safeguard the health, safety and welfare of the people by limiting development in areas where police and fire protection, protection against flooding by stormwaters, danger from excessive erosion and protection from possible health hazards created by sewage or septic tank drainfields are not possible without excessive costs to the community." Uses that are permitted outright in OS-zoned lands include single family dwellings; agriculture, grazing, and supporting facilities; recreation; conservation; and, under certain conditions, planned unit developments. Ten categories of conditional uses are also allowed in OS zones. Project development would fall under two conditions: "franchised and public utility and communication facilities..., provided there are no service or storage buildings or yards in connection therewith," or "other uses determined by the Board of Adjustment to be in keeping with the purpose and intent of this District." Only turbine strings I, J, and a portion of turbine string L would be located in the OS zone.

Secondary or Overlay Zones

The Klickitat County Zoning Ordinance also establishes several secondary or overlay zones which may be superimposed over the primary zoning districts. These secondary zones include:

- Airport Approach Zone (AA)
- Aggregate Resource (AR)
- Flood Hazard Area (FA)
- Scenic Design Area (DA)
- View Protection District (VP)
- Illuminating Control District (IC)
- Cluster Development

The Project site does not lie within any Airport Approach Zones, Aggregate Resource Areas, Flood Hazard Areas, Scenic Design Areas, View Protection, or Cluster Development Districts.

A portion of the site (roughly the western two-thirds of the site from the crest of the Columbia Hills north) is located within the Illumination Control District. The Illumination Control District is intended to prevent excessive lighting, glare, and reflection in areas adjacent to astronomical research facilities, such as the Goldendale observatory (see Figure 2.8.2). Within the designated Illumination Control District, Klickitat County requires that all outdoor lights, including light-directing refractors, must be shielded so that direct light emitted in a horizontal direction is minimized. The Illumination Control Ordinance also prohibits: the use of quartz or metal halide lamps for outdoor illumination; the use of outdoor flood or search lighting between midnight and sunrise except for emergency lighting required by public agencies; and illumination of outdoor public recreation facilities after midnight unless specific activity is in progress.

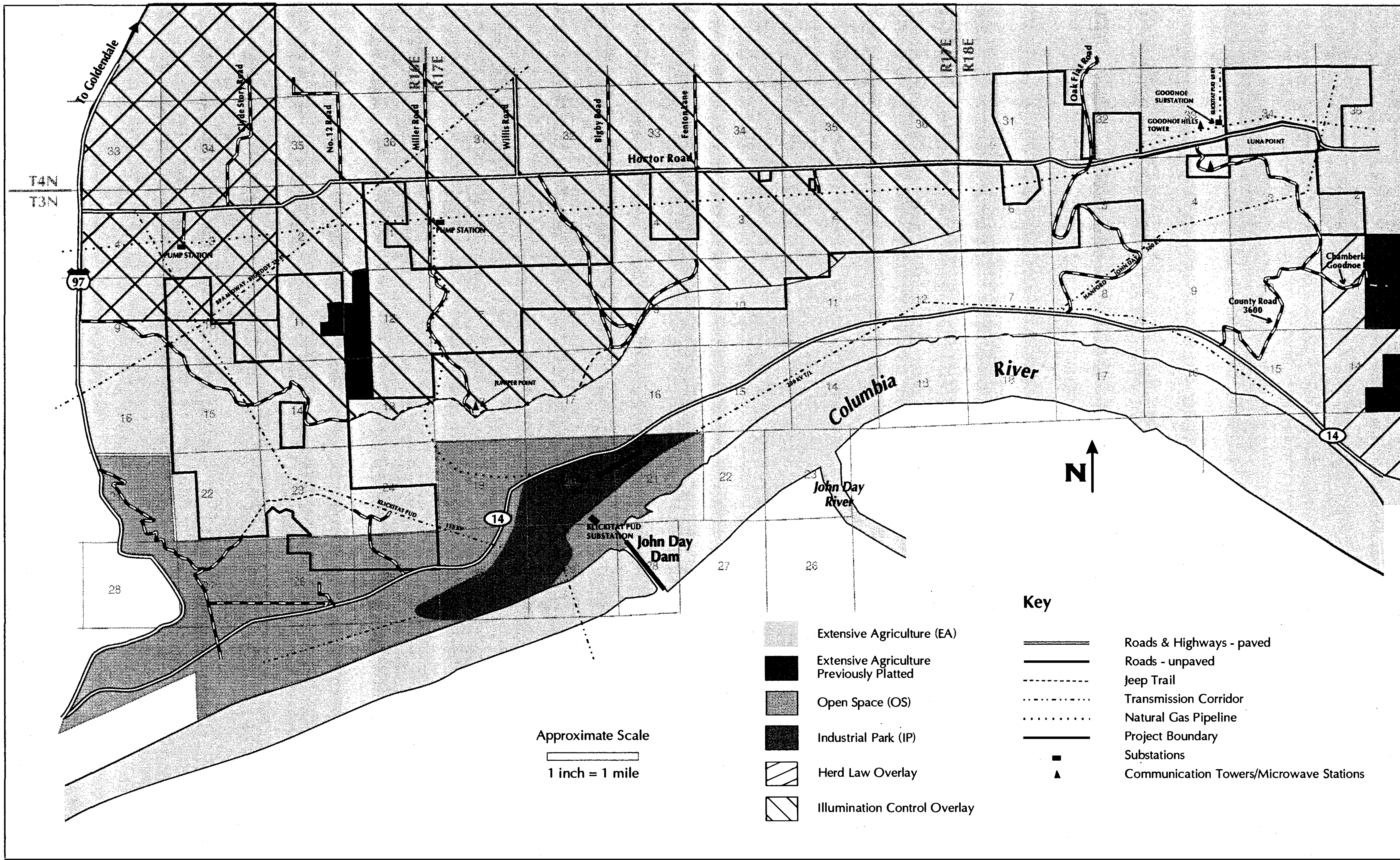

Figure 2.8.1 — Zoning Designations and Plats

2.8.2.3 Stock Restricted Areas

Under the authority of state law (RCW 16.24.010), Klickitat County has designated stock restricted areas where it is unlawful to permit livestock to run at large. Under state law, any area not designated as a stock restricted area is defined as a range where it is lawful to allow livestock to run at large. A small amount of the Project site is located in Stock Restricted areas (see Figure 2.8.1).

2.8.3 Affected Environment

2.8.3.1 Population and Employment Trends

The Project site is located southeast of Goldendale, the County seat, which had an estimated population of 3,730 in 1993. In 1993, the estimated population of the entire county was 17,500. Approximately 34 percent of the population reside in Goldendale, White Salmon, and Bingen. The remainder of the population is widely dispersed and rural in character. The population density is 8.7 persons per square mile, with an average of 2.2 people per housing unit. These statistics place Klickitat County in the bottom 25 percent of Washington state counties ranked by population density.

Since 1990, the population of Klickitat County has increased by approximately 1.7 percent per year. Goldendale's population has increased at a lower rate of about one-half percent per year. Population growth in the County is largely the result of the birth rate being slightly higher than the death rate. However, a small net increase in-migration to the County has occurred since 1990.

Employment in Klickitat County includes: government; manufacturing (primarily lumber, wood products, and aluminum); wholesale-retail trade; services; agriculture; transportation and utilities; mining/construction; and finance/insurance/real estate. Table 2.8.1 illustrates the distribution of jobs across these employment sectors.

TABLE 2.8.1
KLICKITAT COUNTY EMPLOYMENT

Sector	Average Full-Time Jobs
Government	1,560
Manufacturing	1,460
Wholesale/Retail	840
Services	600
Agriculture	485[1,2]
Transportation Utilities	300
Mining/Construction	180
Finance/Real Estate/Insurance	140

1 Peak monthly agricultural employment was 955 in July.
2 Does not include agricultural employees not covered by Employment Security.

In 1992, average annual agricultural employment accounted for about 9 percent of County jobs. During peak months, 16 percent (on average) of the County's workforce was employed in agriculture. Since 1980, total employment in manufacturing has fallen by about eight percent. Employment in government, services, wholesale/retail trade, transportation/utilities, and finance/insurance/real estate has increased over the same period. The largest increases have been in wholesale/retail trade, where employment increased by 53 percent (4.4 percent per year) between 1980 and 1992, and services, where employment increased by 33 percent (2.8 percent per year) between 1980 and 1992.

2.8.3.2 Current Land Use and Trends

Project site lands are all privately owned (see Table 2.8.2) and are currently used for range, and to a lesser degree, dryland agriculture, primarily wheat cultivation. Grazing on native rangelands and seeded pastures occur in areas not used for crop land. Approximately 18 percent of the Project site is in cultivation and 62 percent has been or is used for grazing on a relatively intensive basis. About 10 percent of the site is woodland. The remaining 10 percent is shrub-steppe and riparian habitat that may also be used for grazing and watering livestock, respectively. Residential density in the general vicinity of the site is very low and consists primarily of homes associated with existing farms and ranches. Three high-voltage transmission lines and a natural-gas pipeline currently traverse portions of the site. Agricultural use continues to occur in the vicinity of these facilities.

TABLE 2.8.2
PROJECT SITE LANDOWNERS

Ruth H. Davenport	Marvin H. Norris
Calvin G. Linden	Raymond S. Willis
Quentin J. Jaekel	Joanne Van Hoy
James L. Lefever	Walker Wayne Hoctor
Glenn M. Claussen	Charles M. Hoctor
Wythea M. Strom	Nellie M. Hoctor
Louis H. Cosner	Calvin G. Linden
Clinton S. Cosner	Richard McCarter
William F. Young	

2.8.3.3 Recreation

Recreation sites and resources in the general vicinity of the proposed Project are shown on Figure 2.8.2. Table 2.8.3 summarizes activities offered at the locations and the number of visitors in 1993.

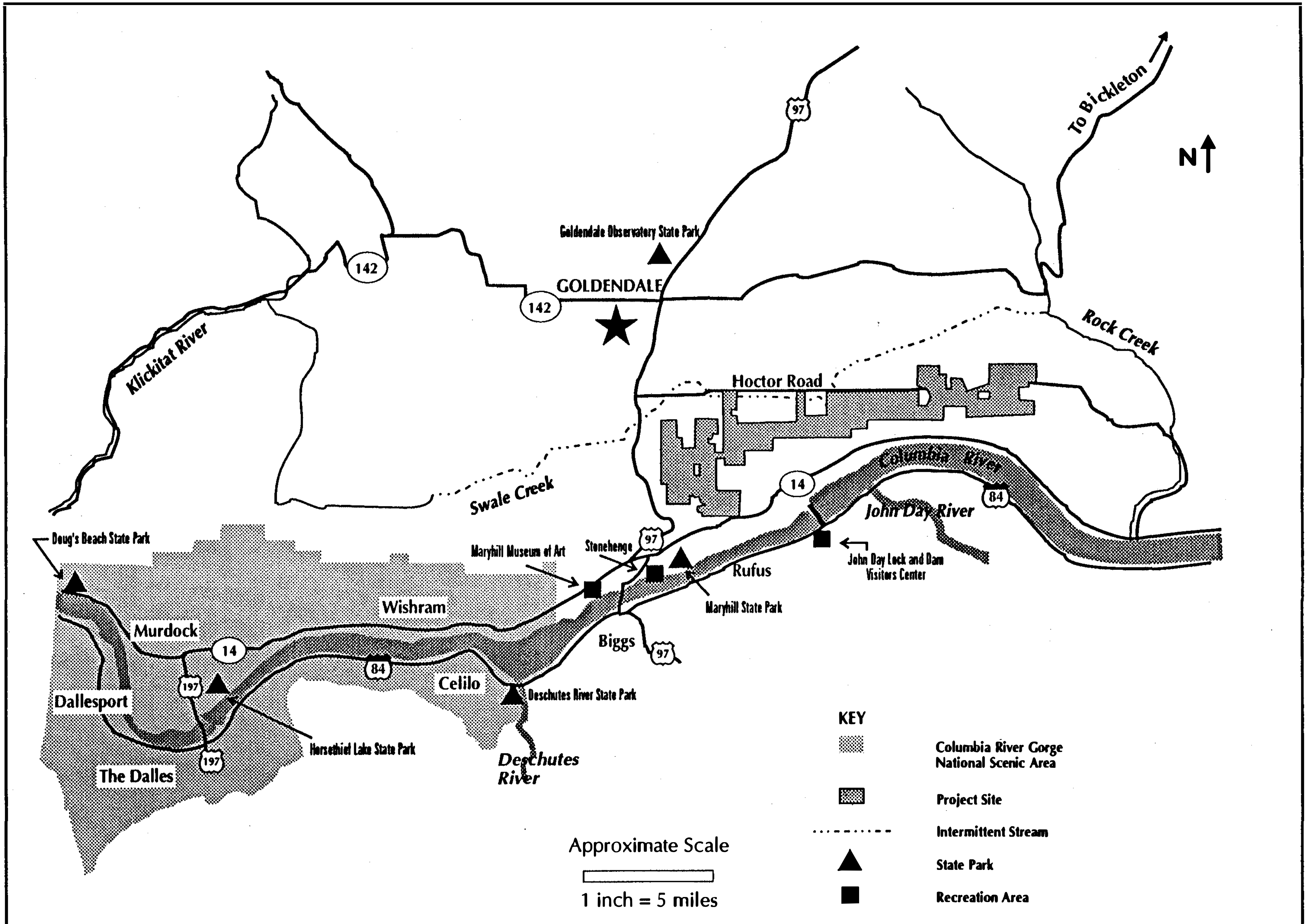

Figure 2.8.2 - Recreation Areas

TABLE 2.8.3
RECREATION OPPORTUNITIES IN CENTRAL KLICKITAT COUNTY

Name	Description	Hours	No. of visitors in 1993
Doug's Beach State Park (Washington)	Offers intermediate and advanced windsurfing. Located off Highway 14 near Lyle, Washington	Day use only	50,000 +
Horsethief Lake State Park (Washington)	Offers hiking, camping, picnicking, and other water activities.	Sept. 30 to April 1, 6:30 a.m. to dusk; Oct. 1-31, 8 a.m. to dusk; Closed Nov. to Mar. 31.	105,000 +
Deschutes River State Park (Oregon)	Offers hiking, camping, fishing and a variety of winter activities.	Office hours 8-4:30 p.m.	116,000 +
Maryhill Museum of Art (Washington State Museum)	Contains permanent collections and special exhibitions.	9 a.m. to 5:30 p.m. March 15 to Nov. 15	86,000
Maryhill State Park (Washington)	Offers boating, swimming, fishing, camping, and windsurfing.	April 1 to Sept. 30, 6:30 a.m. to dusk; Oct. 1 to Mar. 31, 8 a.m. to dusk	430,000 +
Stonehenge	A replica of Stonehenge built by Sam Hill as a memorial to veterans of WWI.	All hours	No data available.
Goldendale Observatory State Park (Washington)	Offers tours, programs, and use of its 24-1/2-inch reflecting telescope to the general public and students of astronomy.	Oct. 1 to March 31, 1-5 p.m. 7-9 p.m. Saturday 1-5 p.m. Sunday; April 1 to Sept. 1, 2-5 p.m., 8-midnight, Wednesday to Sunday	30,000 +

2.8.4 Proposed Action

2.8.4.1 Environmental Impacts

Land Use and Zoning

Development of the Project would add a system of wind turbines and associated facilities to existing land uses (grazing, dryland farming, cultivation, and utilities). Less than two percent of the land would be unavailable for permitted agricultural uses following construction.

Overall, the Project would not be inconsistent with the purpose and intent of the Extensive Agriculture Zone. During construction, approximately 148 hectares (365 acres) of the site, excluding existing roads, would be disturbed. Disturbed lands that are currently used directly for range or agriculture include about 97 hectares (240 acres) of range, 10 hectares (24 acres) of land currently under cultivation, and 22 hectares (54 acres) of shrub-steppe habitat that may be intermittently used for grazing. During construction, additional land area may be temporarily restricted from livestock grazing because of the need to restrict the overall limits of construction and avoid conflicts between livestock and construction equipment. These effects would generally be temporary except that soil disturbances could create a longer-term potential for some shrub-steppe areas to become dominated by invasive weeds (see Section 2.3).

Following construction, permanent Project features (excluding existing access roads) would occupy about 71 hectares (176 acres) or about 1.5 percent of the overall site area. The Project would not alter existing fencing around the site except at gates to access roads, which would be locked. Turbines would not require guy wires, thereby avoiding any potential for livestock injury that could result from their use.

Although off-site storage and operations building is proposed by the Applicant, adverse land use impacts could result from any maintenance materials or individual decommissioned turbines stored on site, which could conflict with grazing or cultivation of such areas. Mitigation, in the form of a decommissioning plan, is suggested in Section 2.7, Aesthetics.

Only a few turbine strings (turbine strings I, J, and a portion of L) would be located on lands zoned Open Space. The development of turbine strings I, J, and L would alter the open-space character of the area somewhat and would not fully "retain or conserve, insofar as is practicable and desirable, the open character of so designated land." However portions of the open-space zoned area between the Columbia River and SR-14, which are contiguous with that area of the Project site that are also zoned Open Space, currently contain high-voltage powerlines. Development of turbine strings I, J, and L. would not entail excessive risks of flooding or erosion or construction on excessively steep slopes. No sewage disposed would be required, and the area can be accessed by police and fire protection personnel and vehicles. Thus, development in the area would not cause an excessive risk to public health, safety, or welfare.

Maximum turbine heights would fall below the 61-meter (200-foot) requirement for lighting established by the Federal Aviation Administration (FAA). No other evening lighting sources from the Project have been identified. Therefore, Project operation would not result in lighting impacts to the Goldendale observatory or conflict with County requirements in its Illumination Control overlay zone.

Socioeconomics

During construction, socioeconomic impacts and benefits of the Project would result from hiring of construction workers, purchase of goods and services in Klickitat County during the construction period, increased personal income, property and other taxes, and landowner fees. Average construction employment is anticipated to be approximately 40 workers compared with average full-time employment in the County of approximately 5,600. Goods and services purchased in the Project area will be limited primarily to gravel, concrete, equipment rental, fuel, overnight accommodations, and meals. Nearly all of the major pieces of equipment such as turbines, support structures, transmission line components, and transformers will be brought to the Project site from out of the County. This situation is reflected in the estimated total value-added income in Klickitat County resulting from construction ($4.7 million) relative to the total estimated spending related to construction ($98 million) (Business Development Concepts, 1994).

During operation, employment will include nine full-time staff in Klickitat County and additional employees in KENETECH'S Portland regional office. Goods and services purchased locally during operation would include miscellaneous supplies, and maintenance equipment. Increased personal income, payment of fees and royalties to landowners, and payment of taxes would also result. Over 30 years, the value-added income in Klickitat County resulting from Project operation (including royalty payments and taxes) is estimated to total $15.8 million in 1991 dollars (Business Development Concepts, 1994).

Recreation

The primary recreational use of the Project site is hunting during certain times of the year. Hunting is generally allowed only by permission of the property owner and, therefore, access is limited. Interviews with property owners indicate most hunters are the local residents in the Columbia Hills area. Project development is not expected to affect hunting use of the site, except during construction and to the extent that game animals, such as Columbia black-tail deer, avoid areas with turbines during operation. As discussed in Section 2.4, deer tend to become habituated to man-made features and human activity.

The Goldendale-central Klickitat County area offers many recreational opportunities for tourists. The Project could attract tourists or others passing through the Goldendale area. Impacts associated with these additional visitors could include increased traffic on Hoctor Road, vehicles stopping on US-97 to observe the Project, and possibly unauthorized entry onto Project lands. However, unauthorized access would be discouraged by several factors, including the size, steepness, and general inaccessibility of the site and locked gates at access points.

Compatibility with Land Use Policies

Table 2.8.4 summarizes Project compatibility with applicable land use goals and objectives established in the County's Comprehensive Plan. With the mitigation identified in other sections of this EIS, the proposed Project would generally be compatible with those goals.

TABLE 2.8.4
COMPATIBILITY WITH COMPREHENSIVE PLAN GOALS AND OBJECTIVES

Goals	Discussion
Goal: To preserve the environmental quality of Klickitat County.	
■ The capability of the land, water, and air to sustain human activities should be a determining factor in making land use decisions. Land capability maps should be prepared and referred to when decisions on land subdivisions, development, or zoning must be made.	Project not expected to conflict with ongoing grazing and agricultural uses.
■ Buildings should be located on sites that minimize the need for cutting, grading, or the removal of native vegetation. – Land surface modifications should be compatible with natural features and processes. – As much natural vegetation as possible, especially large trees, should be preserved as development occurs.	By following ridgelines and using existing roads to the maximum extent possible, cutting and grazing would be minimized. Switchbacks could be required along certain turbine strings in western portion of the site. Large trees would generally be maintained. Alternative powerline route reduces need to remove oak.
■ Rural areas should be developed at low densities.	Project would not conflict with this objective.

Goals	Discussion
Goal: To guide development of areas where soils and geology pose the fewest limitations to quality growth.	
■ Generally, unsewered areas with severe soil limitations for development should not be developed at a density greater than one unit per five acres.	On-site septic disposal would not be required. Temporary facilities would be required during construction.
■ Where severe soil limitations coincide with other limiting factors such as geologic instability or surface flooding, development should be discouraged.	Major soil limitation is erosion, which can be controlled through Best Management Practices under NPDES General Permit requirements (see Section 2.1 and 2.2).
■ On-site geological engineering studies should be required before development is allowed in areas with potential slope instability or soil settling problems.	Geotechnical investigations to support design are identified as mitigation (see Section 2.1)
Goal: To maintain high water quality by insuring that adjacent land uses are compatible with water uses.	
■ Shoreline and upland development should not impair fishing activities.	On-site intermittent streams not used for fishing. Erosion and sediment control measures required under NPDES General Permit.
■ Proposed subdivisions and large site plans should include provisions to protect the natural drainage system. Where the natural system is not adequate, supplemental drainage facilities should be required.	Culverts across drainages and other controls to maintain site drainage patterns are identified as mitigation in Section 2.2.
■ The shorelines of the rivers and streams of Klickitat County are a specialized resource to be protected and enhanced. The Shoreline Master Program for Klickitat County shall serve as the policy governing shoreline use.	Not applicable to this Project.
Goal: To preserve the County's clean air and minimize noise and odors.	
■ Buffers between noise-generating and odor-generating uses and other uses should be provided through zoning and subdivision ordinances.	The closest turbine string would be within several hundred feet from the nearest residence or area platted for residential use. Measures to keep noise levels consistent with state noise standards are identified as mitigation in Section 2.9.
■ Greenbelts between residential subdivisions and between communities should be preserved.	Most site vegetation would be maintained.
Goal: To maintain and enhance Klickitat County's natural resource base.	
■ Conserve the natural resources required for agriculture, forestry, extractive mining, etc., in order to protect the basic economy of the County.	Project would minimally reduce the amount of land available for agricultural production. Easement agreements provide financial benefit to agricultural property owners.
Goal: To support and protect agriculture.	
■ A plan for preserving prime agricultural land should be developed and land use regulations enforced.	More than 98% of Project lands could remain in current use. Payments to landowners from Project revenues would supplement farm and ranch income and assist the viability of existing agriculture.
■ Buffers should be provided between agricultural areas and residential areas,......it is important that buffer strips not become neglected, weed-infested areas that will result in the infestation of grazing and cropland with potential danger to livestock and crops.	A restoration and weed management plan is identified as mitigation for the Project.

Goals	Discussion
■ Mechanisms should be developed to protect agriculture land still in production from suburban growth, costs such as development or improvement assessments, increased property taxes, or zoning limitations.	Not applicable. Land would remain in agricultural and grazing use. Non-agricultural land uses inconsistent with wind turbines and transmission lines are prohibited under wind easement agreements with landowners.
■ Range land should be protected against encroachment by residential development.	Not applicable. Land would remain in agricultural and grazing use. Non-agricultural land uses inconsistent with wind turbines and transmission lines are prohibited under wind easement agreements with landowners.
Goal: To identify and preserve wildlife in Klickitat County.	
■ A fish and wildlife habitat inventory and management plan should be developed.	A year-long avian/wildlife study has been conducted to determine the impacts to wildlife from the proposed Project.
■ Significant habitats should be protected and managed.	Mitigation for impacts to habitat and native plant communities is identified in Section 2.3.
■ All projects should be evaluated for their impact on fish, fowl, and mammals.	See Sections 2.3, 2.4, and 2.5 of this EIS.
■ Full compliance with environmental protection laws should be required prior to issuing permits.	This EIS is being prepared in compliance with both NEPA and SEPA.
Goal: To strengthen and diversify Klickitat County's economic base and promote employment.	
■ Economic development in Klickitat County should take place in a manner that will enhance regional economic goals.	Development of the proposed Project will provide a clean, efficient source of energy for the region and a small number of local jobs. It will also provide financial support to current property owners.
■ Action programs to improve utilities and services for industrial parks whose development is under way should be supported.	Not applicable to this Project.
■ The Overall Economic Development Plan shall be an important tool for industrial development efforts.	Not applicable to this Project.
■ The Overall Economic Development Plan (OEDP) Committee and the Rural Development Committee (RDC) shall be advisory on all economic development projects and issues.	Not applicable to this Project.
Goal: To provide an efficient transportation network in Klickitat County.	
■ Maintenance and improvement of existing roads should have priority over creation of new roads.	Existing roads related on the site would be improved and new roads would be constructed only as needed.
■ Land use decisions should consider their impact on adjacent roads. Similarly, road improvements should be consistent with proposed land use densities.	Road impacts would occur during construction. Mitigation measures are identified in Section 2.11.
■ Development should, as much as possible, pay for itself.	Permit fees would be required for Project development.
■ Development patterns should be consistent with availability of services and utilities as well as with land capability and neighborhood goals.	Significant public service demands are not expected. Mitigation is identified in Section 2.12.

Goals	Discussion
Goal: To promote provision of utilities sufficient to protect the public health and welfare.	
■ Utilities should be placed underground whenever possible.	Communication lines would be placed underground and power/collection lines would be placed underground where feasible along turbine strings.
■ Consolidation of power transmission lines with other utility corridors and transportation rights-of-way should be encouraged.	The substation location would be at an interconnection point to the BPA Midway-Big Eddy transmission line.
■ Power substations should be screened with mature plantings or be designed to blend visually with their surroundings.	See land use mitigation in this section.
■ Proposed power-generation facilities should study socioeconomic impacts upon the County.	An analysis of the economic impact to the County has been completed by the Applicant (*Business Development Concepts*, 1994).
■ A "utilities coordination council" should be created to insure coordination of planning and development of utilities and prevent costly construction delays.	Not applicable to this Project.
■ Energy conservation and production should be encouraged in Klickitat County.	The proposed development would generate new energy production in the County using a renewable resource.
Goal: To support adequate and effective police and fire services to all residents and land owners.	
■ All proposed development should be reviewed for adequacy of access and circulation by emergency law enforcement and fire vehicles and adequacy of water provision for fire.	Review is included in this EIS. Having water trucks on site during construction and other mitigation measures are identified in Sections 2.12 and 2.13.
Goal: To coordinate land use and comprehensive health planning.	
■ Land use projects should be evaluated with impact on community health in mind.	The proposed Project would not have any significant impacts on public health.
Goal: To preserve open space for its community-shaping, recreational, and ecological value.	
■ As much land as possible should be left in its natural condition.	All remaining Project land, in excess of 98% of the total area under easement, would continue to be available for agricultural or other open space use. Some native plant communities and priority habitats would be disturbed and displaced.
■ Clustered development should be encouraged and greenbelts between communities and neighborhoods should be preserved.	This approach is evaluated in the Subarea Development Alternative.
■ Standards for open space preservation should be specified in all (subdivision) plans.	Not applicable.
■ Utility rights-of-way on publicly owned land should be reserved for future use as part of a trail system.	Not applicable.
Goal: To promote regional awareness and cooperation.	
■ The regional interest should be given full consideration when conflicts arise between jurisdictions.	Traditional cultural use of the area, which is in Yakama Nation ceded lands, is discussed in Section 2.6.

2.8.4.2 Mitigation Measures

Mitigation for impacts to other elements of the environment are discussed in other sections of this EIS. These measures would also reduce potential land use conflicts. For example, revegetation and weed control mitigation measures are identified in Section 2.3. Section 2.7, Aesthetics, identifies measures related to on-site storage, decommissioning of facilities, and providing for safe viewing by sightseers. Section 2.9 identifies mitigation for noise impacts. Section 2.12 identifies mitigation related to public services, including measures to address vandalism and unauthorized entry. In addition, requiring landscaping and fencing around the Project substation to screen it from view would reduce impacts from development of the substation.

2.8.5 Alternative Powerline Route

This alternative would have the same impacts as the Proposed Action. Mitigation would also be the same.

2.8.6 Restricted Areas Alternative

This environmental review revealed no areas of the site that should be restricted from development based on significant land use impacts.

2.8.7 Subarea Development Alternative

The subarea development alternative would restrict Phase 1 development to either the western (Option 1) or eastern-central (Option 2) area of the site. Land use impacts would generally be the same as for the Proposed Action but would be confined to a smaller area in Phase 1. Mitigation would be the same as for the Proposed Action.

2.8.8 No Action

Existing agricultural, grazing, and utility land uses at the site would continue if the agencies did not issue the required permits and approvals, and an additional utility facility would not be located in Extensive Agriculture or Open Space zoning districts. Economic benefits of the Project, including construction and permanent employment and payments to agricultural landowners, would not be obtained under the No Action alternative.

2.8.9 Significant Unavoidable Adverse Impacts

With mitigation identified in this EIS, significant unavoidable adverse land use impacts are not expected for the proposed Project or alternatives. Development of turbine strings I, J, and the southern portion of turbine string L would somewhat alter the open-space character of that area but would not cause excessive risks to public health, safety, or welfare. During the conditional use permitting process, the County will consider the benefits of retaining that area as open space versus the benefit of developing turbine strings.

2.9 Noise

2.9.1 Studies and Coordination

This section addresses noise impacts that could result from construction and operation of Washington Windplant #1. Estimates of noise impacts are based on published information on noise characteristics typically associated with construction activities and on site-specific modelling of noise resulting from Project operation. Published information on sound characteristics of wind turbines is also summarized.

2.9.2 Regulations, Standards, and Guidelines

2.9.2.1 Noise Characteristics

Sound travels through the air as waves of minute air pressure fluctuations caused by some type of vibration. Because energy contained in a sound wave is spread over an increasing area as it travels away from its source, loudness decreases with distance. Sound is measured in decibels. Because the human ear does not respond equally to all sound frequencies, an "A-weighted" scale (the dBA scale) is generally used to assess the effects of noise on people. A-weighting reduces the measured sound pressure level for low-frequency sounds while slightly increasing the measured pressure level for some high-frequency sounds. All sound levels in this section are provided in dBA.

People generally perceive a 10-dBA increase in a noise source as a doubling of loudness. For example, a 70-dBA sound level will be perceived by an average person as twice as loud as a 60-dBA sound. People cannot generally detect differences of 1 dBA between noise sources; a difference of 3 dBA is usually the smallest perceptible change in sound level. Table 2.9.1 shows some common noise sources and the sound levels they produce.

The dBA scale is logarithmic. Therefore, individual dBA ratings for different sources cannot be added directly to give the sound level for a combined source. For example, two sources, each producing 50 dBA, will, when added logarithmically, produce a combined noise level of 53 dBA. Federal regulatory agencies often use the "equivalent sound level" (known as the L_{eq}) to evaluate noise impacts. The L_{eq}, which is roughly equivalent to the average sound level, is the level of a constant sound with the same sound energy as the actual fluctuating sound. Unless otherwise noted, all sound levels provided in this EIS are expressed as an L_{eq}.

TABLE 2.9.1
WEIGHTED SOUND LEVELS AND HUMAN RESPONSE

Sound Source	dB(A)[1]	Response Criteria
	150	
Carrier deck jet operation	140	
	130	Painfully loud, limit amplified speech
Jet takeoff, 61 meters (200 feet) Discotheque Auto horn, 1 meter (3 feet)	120	Maximum vocal effort
Riveting machine Jet takeoff, 610 meters (2,000 feet)	110	
Shout, 0.2 meter (0.5 feet) New York subway station	100	Very annoying
Heavy truck, 15 meters (50 feet) Pneumatic drill, 15 meters (50 feet)	90	Hearing damage (8 hours)
Passenger train, 30 meters (100 feet) Helicopter, 152 meters (500 feet) Freight train, 15 meters (50 feet)	80	Annoying
Freeway traffic, 15 meters (50 feet)	70	Telephone use difficult, intrusive
Air conditioning unit, 5 meters (20 feet) Light auto traffic, 15 meters (50 feet)	60	
	50	Quiet
Living room Bedroom Library	40	
Soft whisper, 5 meters (15 feet)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

[1] Typical A-weighted sound levels taken with a sound-level meter and expressed as decibels on the scale. The "A" scale approximates the frequency response of the human ear.

Source: U.S. Council on Environmental Quality, 1970.

2.9.2.2 Noise Standards

Applicable noise standards in Klickitat County are the noise limitation criteria established under the Washington Administrative Code (Chapter 173-60 WAC). These criteria are shown in Table 2.9.2.

These criteria limit both the level and duration of noise from a source measured at any point within a receiving property (Table 2.9.2). The maximum permissible environmental noise levels depend on the land use of the property containing the noise source and the land use of the property receiving that noise. Land uses are categorized as follows:

- Class A includes lands where people reside and sleep. This includes residential areas, parks, camps, health and correctional facilities.

- Class B includes lands not used for human habitation where protection against noise interference with speech is required, including commercial and retail areas; theaters, stadiums, and fairgrounds; and facilities for educational, religious, and government use.
- Class C includes lands used for economic activities where higher noise levels than experienced in other areas are normally anticipated, including industrial and agricultural areas.

TABLE 2.9.2
MAXIMUM PERMISSIBLE SOUND LEVELS BY RECEIVING PROPERTY

EDNA[1] of Noise Source	EDNA[1] of Receiving Property			
	Class A (dBA)		Class B (dBA)	Class C (dBA)
	Day	Night[2]		
Class A	55	45	57	60
Class B	57	47	60	65
Class C	60	50	65	70

1 EDNA – Environmental Designation for Noise Abatement.
2 Between the hours of 10 p.m. and 7 a.m. the daytime noise limitations are reduced by 10 dBA for Class A land uses.

Sources: Chapter 173-60 WAC

Noise limits for Class A receiving properties are reduced by 10 dBA between the hours of 10 p.m. and 7 a.m. At any hour of the day or night, the applicable noise limitation for any receiving property may be exceeded in any 1-hour period by no more than:

- 5 dBA for a total of 15 minutes,
- 10 dBA for a total of 5 minutes, and
- 15 dBA for a total of 1.5 minutes.

Noise resulting from construction activity at temporary construction sites between the hours of 7:00 a.m. and 10:00 p.m. is exempt from the provisions of 173-60 WAC.

2.9.3 Affected Environment

There are few noise sources in the vicinity of the Project site. The primary noise sources are traffic traveling on US-97 west of the site, and I-84 (see Figure 1.1). Noise from I-84 can be heard from some locations on the site. Other noise sources include trains, off-road vehicles, farm equipment, and vehicles traveling on Hoctor Road.

Because the Project site and surrounding area are rural and sparsely populated, background noise levels at locations distant from traveled roadways are likely to be about 40 dBA under calm wind conditions. These noise levels are similar to those experienced in libraries or residential living rooms and are characterized as being very quiet. Noise levels at locations near roadways such as Hoctor Road are likely to be somewhat higher. Field observations indicate that wind is the dominant noise source on the Project site and drowns out most background noises.

2.9.4 Proposed Action

2.9.4.1 Environmental Impacts

Factors Affecting Noise Impacts

For a given noise source, factors affecting the noise impact at a receiver include the distance from the noise source, the frequency of the sound, the absorbency of the intervening terrain, the presence or absence of obstructions, and the duration of the noise event. The degree of impact also depends on who is listening, existing sound levels, and when the noise event takes place.

When distance is the only factor considered, sound levels from isolated point sources such as single wind turbines, typically decrease by about 6 decibels (dB) for every doubling of distance from the noise source, beginning at a point from the source approximately three times the largest dimension of that source. For example, if the largest dimension of the noise source is 37 meters (120 feet) and produces a sound level of 60 dB, then beginning from a point approximately 110 meters (360 feet) from the source, the sound level would attenuate at a rate of 6 dB per doubling of distance. At a distance of 219 meters (720 feet) from the source, the noise level would be 54 dB, at 439 meters (1,440 feet) the noise level would be 48 dB.

Noise levels at different distances can also be affected by a number of factors other than distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can result in increased or decreased noise levels. Atmospheric conditions (e.g., wind speed and direction, humidity level, and temperature) can also affect the degree to which sound is attenuated over distance. Echoes off topographical features or buildings can sometimes result in higher sound levels (i.e., lower sound attenuation rates) than normally expected. Temperature inversions and changes in wind conditions can at times diffract and focus sound waves to a location at considerable distance from the noise source. However, focusing effects are usually noticeable only for intense noise sources such as blasting operations.

Construction

The primary source of construction noise would be the operation of heavy equipment and support vehicles. Table 2.9.3 illustrates noise levels produced by various types of construction equipment. Properly maintained equipment will produce noise levels near the middle of the indicated ranges. The types of equipment used for this Project (e.g., bulldozers, cranes, and trucks) typically generate noise levels between 80 and 90 dBA at a distance of 15 meters (50 feet) while the equipment is operating (U.S. Environmental Protection Agency, 1971; Toth, 1979; Gharabegian et al., 1985). Construction equipment can operate intermittently or fairly continuously. Assuming that two trucks (90 dBA), a scraper-grader (87 dBA), a moveable crane (82 dBA), a compactor/roller (73 dBA), and a tractor (85 dBA) are operating in the same area, peak construction-period noise would generally be about 93 dBA at 15 meters (50 feet) from the area of construction activity. Locations within 457 meters (1,500 feet) of a construction area would experience periods when noise levels exceed 60 dBA. Locations within 183 meters (600 feet) of a construction area would experience periods when noise levels exceed 70 dBA.

These noise levels would not be continuous throughout the day and would generally be restricted to daytime hours.

TABLE 2.9.3
TYPICAL CONSTRUCTION EQUIPMENT NOISE (dBA)

	Estimated L_{eq} at Distance from Source					
Activity	**15 meters (50')**	**30 meters (100')**	**46 meters (150')**	**61 meters (200')**	**76 meters (250')**	**91 meters (300')**
Clearing	83	77	73	71	69	67
Grading	75-88	69-82	65-78	63-76	61-74	59-72
Paving	72-88	66-82	62-78	60-76	58-74	56-72
Erection	72-84	66-78	62-74	60-72	58-70	56-68
Types of Equipment						
Bulldozer	77-96	71-90	67-86	65-84	63-82	61-80
Dump Truck	82-94	76-88	72-84	70-82	68-80	66-78
Scraper	80-93	74-87	70-83	68-81	66-79	64-77
Bulldozer	77-96	71-90	67-86	65-84	63-82	61-80
Paver	86-88	80-82	76-78	74-76	72-74	70-72
Dump Truck	82-94	76-88	72-84	70-82	68-80	66-78
Crane	75-85	69-79	65-75	63-73	61-71	59-69

Source: EPA, 1971.

The closest residences to construction activities are located along Hoctor Road near the intersection with Oak Flat Road and near Miller Road in the vicinity of the Project substation. Residents in the area would likely hear construction activities; however, construction noise would be short term and is exempt from regulation under WAC 173-60.

Operation

Wind Turbine Sound Characteristics. Sound generated by turbine operation comes from two sources: mechanical noise is produced by the movement of gears and generator components housed within the nacelle. Aerodynamic noise is produced as the turbine blades produce small, isolated variations in the speed or pressure of air flowing over the blades or by air disturbances caused as the air moves around the turbine tower (tower wake). Mechanical noise is dominated by high-frequency sounds and is most distinguishable within 152 meters (500 feet) of the wind turbine (Jones & Stokes Associates, 1985). Aerodynamic noise is dominated by lower frequency sounds and generally masks mechanical noise at distances beyond 152 meters (500 feet) from the wind turbine (Jones & Stokes Associates, 1985).

Under certain conditions, the aerodynamic noise from wind turbines can include low-frequency impulse noise produced by the interaction of the rotor blades with small-scale air turbulence patterns. Low-frequency impulse noise that is most often associated with wind turbines in a downwind configuration (see Figures 1.5 and 1.6) is where turbulence created by the tower results in a low-frequency impulse that is often below the normally audible range. These frequencies would be experienced more as a vibrational impulse than as a noise (Jones & Stokes Associates, 1985).

Methodology. Noise levels resulting from Project operation were calculated using a computer program that calculates noise levels at receptors by attenuating the sound energy from each source over the distance between the source and the receptor.

The model provides a conservative estimate of noise levels at receivers for several reasons. First, barrier effects caused by the location of hills between some sources and receivers and additional attenuation resulting from vegetation or other objects between the source and receiver were not included. Most importantly, about 345 turbines would be required to generate 115 MW as discussed in Part 1 of this EIS. However, because the precise number of turbines in each turbine string has not yet been determined by the Applicant, the noise modelling assumed, as a worst-case, the maximum number of turbines that could be developed in each string. This results in a total of 481 turbines and overestimates the actual noise impacts resulting from Project operation.

Receivers selected for this analysis include single-family residences located near the Project site identified from aerial photographs and field observations. These receivers are located along SR 14, US-97, and Hoctor Road and are identified in Table 2.9.4 and shown in Figure 2.9.1. An additional receiver (receiver 16), located in Section 12, T3N, R16E, is on property platted for residential development (see Figure 2.8.1), which does not currently include residences and for which there is currently no road access, drinking water, or wastewater service that would be required for residential construction. Therefore, it is not certain whether this receiver would qualify as a residential property for purposes of its environmental designation for noise abatement.

TABLE 2.9.4
LOCATION OF SENSITIVE RECEIVERS

Site	Location
1.	Along US-97 just south of Davies Pass
2.	Along SR 14 west of Columbia Aluminum Plant
3.	Along SR 14 east of John Day River
4.	Along SR 14 east of the Hanford-John Day 500 KV Transmission Line
5.	Along Hoctor Road southeast of intersection with Clyde Story Road
6.	Along Hoctor Road southeast of intersection with No. 12 Road
7.	Along Hoctor Road southeast of intersection with Miller Road
8.	Along Hoctor Road southeast of intersection with Willis Road
9.	Along Hoctor Road southeast of intersection with Willis Road
10.	Along Hoctor Road southwest of intersection with Fenton Lane
11.	South of Hoctor Road between Fenton Lane and Oak Flat Road
12.	South of Hoctor Road between Fenton Lane and Oak Flat Road east of Receiver 11
13.	Along Hoctor Road approximately 2.3 kilometers (1.4 miles) west of Oak Flat Road east of Receiver 12
14.	North of Hoctor Road approximately 4.2 kilometers (2.5 mile) east of Oak Flat Road
15.	Along County Road 3600 at intersection with Chamberlain/Goodnoe Road
16.	Walker property located south of Hoctor Road on platted property

Results. Calculated noise levels (see Table 2.9.5) indicate that Project operations could exceed applicable nighttime noise standards of 50 dBA at residential receivers outside Project boundaries.

The Project would be considered an industrial noise source. Table 2.9.5 shows estimated noise levels resulting from Project operation calculated for each receiver site. As shown, projected noise levels range from 38 dBA at Receiver 7 to 56 dBA at Receiver 10. Projected noise levels at Receivers 1, 3 through 9, and 12 are equal to or below the daytime and nighttime noise standards. Noise levels at Receivers 2, 10, 11, and 13 through 16 would range from 51 to 56 dBA. At these locations, turbine noise could be heard above background noise; however, noise levels would not exceed the 60-dBA threshold standard for daytime and evening hours, and Project operation would not cause a significant noise impact between 7:00 a.m. and 10:00 p.m. However, assuming all wind turbines were operating between 10:00 p.m. and 7:00 a.m., the 50-dBA night-time noise threshold could be exceeded at those properties that qualify as residential receivers.

TABLE 2.9.5
CALCULATED NOISE LEVELS AT RECEIVER SITES FROM WIND TURBINES

Receiver	Noise Level (dBA)
1	50
2	55
3	49
4	45
5	42
6	40
7	38
8	40
9	41
10	56
11	54
12	50
13	53
14	55
15	52
16	55

It is important to note that sound from the wind turbines could be somewhat masked by wind noise. In addition, as stated previously, the noise modelling conducted for this EIS likely results in estimated impacts that would exceed those that would actually occur because the modelling incorporated "worst-case" assumptions about the number of turbines. Because the calculated noise levels are based on a modelling of worst-case assumptions, the Applicant may be able to avoid violations of the noise standards by reducing the number of turbines near residential

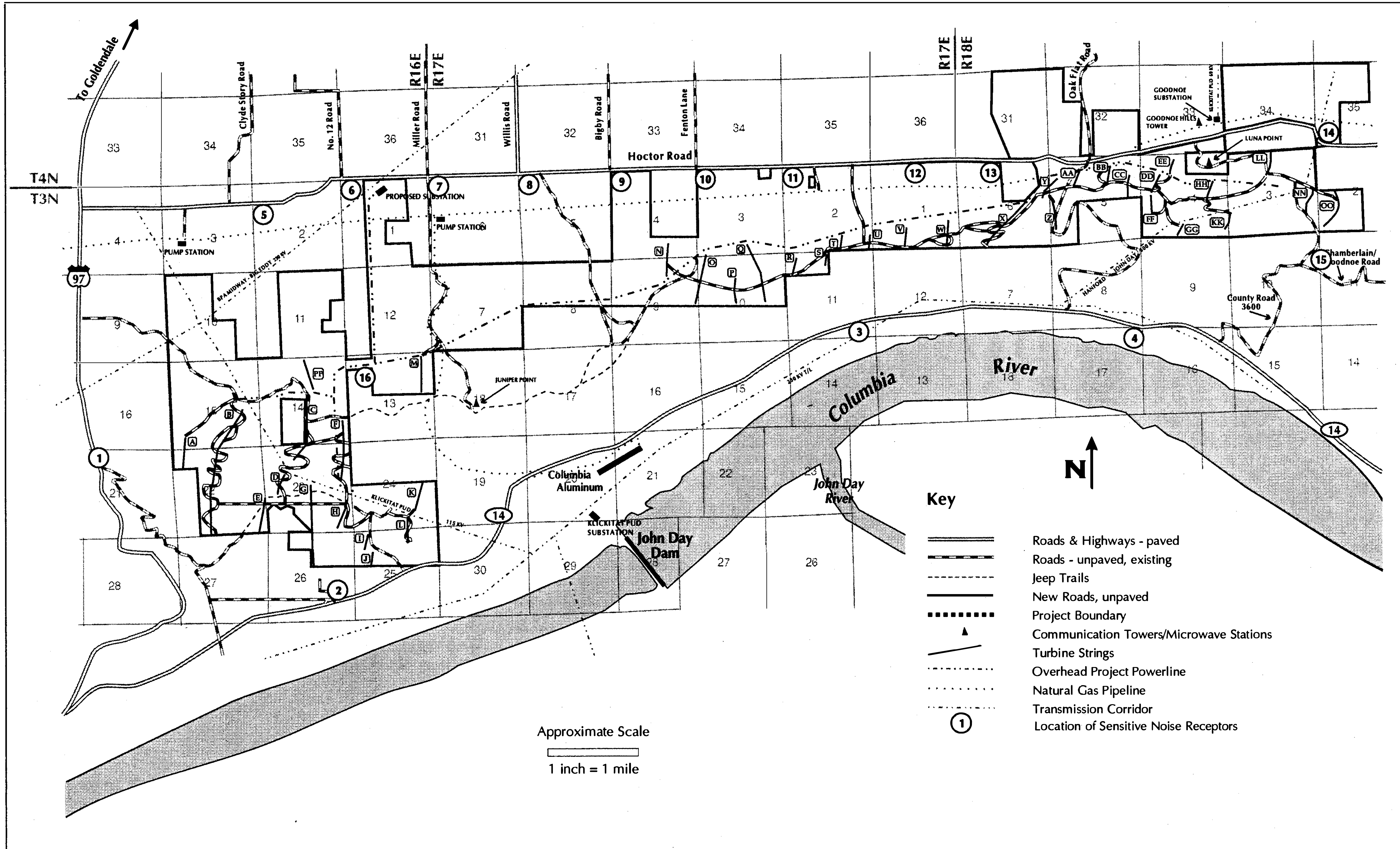

Figure 2.9.1 — Noise Receptor Locations

receptors, by increasing the amount of insulation inside turbine nacelles, or by other means. The Klickitat County Prosecuting Attorney has discretionary authority to prosecute violations of the noise standards set forth in Table 2.9.2. It would be the responsibility of the Applicant to remedy any violation of these standards.

Low Frequency Impulse Noise
The Project wind turbine design involves an upwind configuration (i.e., wind passes by the rotor blades before reaching the tower) that minimizes low-frequency impulse noise from the rotors.

2.9.4.2 Mitigation Measures

In addition to measures incorporated into the Project design, the following measures, if implemented by the Applicant, would reduce noise levels and assure that noise standards of WAC 173-60 would not be exceeded:

- Maintain sound levels at the Project boundary that are under the maximum levels for adjacent receiving properties based on the receiving properties' environmental designation for noise abatement (EDNA) at WAC 173-62 subject to the temporary exceedances allowed in state regulations.
- In the event of a complaint to the County that noise standards may be exceeded due to Project turbines, require the Applicant to provide appropriate sound level measurements on the complaintant's property.
- Reduce noise levels during construction by employing the following types of measures:
  - Turn off idling equipment.
  - Select the quietest effective setting for back-up alarms.
  - Confine construction activities to daytime hours in proximity to homes.

2.9.5 Alternative Overhead Powerline Route

This alternative would not affect the number or location of wind turbines in operation. Therefore, noise levels and mitigation would be the same as for the Proposed Action.

2.9.6 Restricted Areas Alternative

The environmental review conducted for this EIS identified no specific areas that should not be developed because of expected noise impacts. If this Project is implemented, compliance with noise standards would be the responsibility of the Applicant and turbine operations, if not in compliance, would be subject to noise abatement through County enforcement actions.

2.9.7 Sub-area Development Alternative

2.9.7.1 Environmental Impacts

This alternative would limit Phase 1 of the Project to either the western (Option 1) or east-central (Option 2) areas of the site. Table 2.9.6 illustrates the expected noise levels resulting from Project operation at sensitive receivers associated with each option. Neither option would exceed the daytime and evening noise standard (60 dBA) during Phase 1. Under the worst-case modelling scenario for Option 1, Receivers 2 and 16 could exceed 50 dBA between 10:00 p.m. and 7:00 a.m.; for Option 2, Receivers 10, 11, 13, 14, and 15 could exceed this level.

TABLE 2.9.6
CALCULATED NOISE LEVELS SUB-AREA DEVELOPMENT ALTERNATIVE

Receiver	Sub-Area Option 1	Sub-Area Option 2
1	50	30
2	55	29
3	26	49
4	20	45
5	39	34
6	38	34
7	36	34
8	36	37
9	33	40
10	29	56
11	25	54
12	23	50
13	21	53
14	21	55
15	16	52
16	55	46

2.9.7.2 Mitigation Measures

Mitigation measures would be the same as those described for the Proposed Action in Section 2.9.4.2.

2.9.8 No Action

Noise impacts resulting from construction and operation of the Project would be avoided if the agencies did not issue the required permits and approvals. Existing noise sources associated with agricultural activities on nearby roads would continue. Overall, the Project area would remain relatively quiet.

2.9.9 Significant Unavoidable Adverse Impacts

With the mitigation described in Section 2.9.4.2, significant unavoidable adverse noise impacts would not be expected from construction or operation of the proposed Project and alternatives. Violations of applicable noise standards can be remedied through County enforcement actions, if necessary.

2.10 Air Quality

2.10.1 Studies and Coordination

This section describes air quality impacts that could result from construction and operation of the proposed Project and alternatives. Because wind power projects do not involve the combustion of fuels to generate electricity, air-quality impacts would primarily be related to dust emissions associated with Project construction activities. During Project operation, dust emissions could result from windborne erosion of exposed soils that are not revegetated.

2.10.2 Regulations, Standards, and Guidelines

Particulate emissions are the most significant form of air contaminants in the Project vicinity and are also the most likely type of pollutant to be generated by the proposed Project. No federal standards for total suspended particulates have been established. Washington State standards limit total suspended particulates to an annual average of $60\mu g/m^3$/day and to $150\mu g/m^3$ in any 24-hour period. PM_{10} (particulates less than 10 microns in diameter) are those particulates associated with adverse health effects from inhalation. Federal and state standards limit PM_{10} to $50\mu g/m^3$/day on an annual average basis and to $150\mu g/m^3$ in any 24-hour period.

Air quality in Klickitat County is regulated by the Washington Department of Ecology under WAC 173-400-100. These regulations require registration of grain handling facilities, fertilizer and chemical plants, woodwaste incinerators, petroleum refineries, and any source that would emit or have the potential to emit 90 or more metric tons (100 or more tons) per year of a criteria pollutant. Because the proposed Project would not emit 90 metric tons (100 tons) or more of PM_{10}, it would not have to be registered under WAC 173-400-100 and would be exempt from New Source review requirements contained in WAC 173-400-110.

2.10.3 Affected Environment

Currently, the air quality attainment status of Klickitat County is not classified because air quality in the county is not monitored (Billings pers. communication, 1994.) The primary stationary sources of particulate emissions are scattered industrial facilities located in the County. Wind-blown dust is prevalent in non-irrigated agricultural areas because soils are often composed of fine-grain silt loams. Wood stove smoke also contributes to air emissions countywide (Billings pers. communication, 1994.) In addition, dust is generated from agricultural activities, vehicles traveling on dirt roads, construction and other activities that cause soil disturbance. In the Columbia Hills area, wind-blown erosion of soils occurs as discussed in Section 2.1. Certain areas of the site have been mapped as critical erosion areas capable of sustaining net soil losses of 1.8 to 9 metric tons (2 to 10 tons) per year from wind and water erosion.

2.10.4 Proposed Action

2.10.4.1 Environmental Impacts

Wind Generated Particulates

Fugitive dust would be the main source of PM_{10} emissions during Project construction. Soil would be prone to wind erosion when the vegetative cover was removed or when the soil was disturbed during construction of access roads; installation of underground power and communication lines; and construction of the Project substation. Of the 5,110-hectare (12,630-acre) site, approximately 155 hectares (382 acres) would be temporarily disturbed during Project construction.

The amount of PM_{10} generated during construction was estimated assuming 2.2 hectares (5 acres) were disturbed daily and that the soil contained 55 percent PM_{10}. Based on these assumptions, approximately 0.12 metric tons (303 pounds) of PM_{10} would be generated daily. Assuming a total of 155 hectares (382 acres) were disturbed during construction, approximately 9 metric tons (23,000 pounds) of PM_{10} would be generated.

After construction, just under one-half of the disturbed area would be restored, leaving approximately 79 hectares (193 acres) of the site permanently occupied by Project features. Roads and foundation areas would be covered with a gravel surface, which would help control fugitive dust during Project operation.

Traffic Generated Particulates

Truck and heavy equipment traffic on dirt and gravel roads would produce PM_{10} during dry weather. However, when the soil is wet, very little fugitive dust would be generated. During construction, there would be approximately 100 employee trips each day (one employee is assumed to generate 2.5 trips per day, on average, with a round-trip to the site counting as two trips) and up to 170 daily trips associated with heavy construction vehicles, primarily gravel trucks. During operation, the Project would generate only a few employee trips each day. In addition, maintenance vehicles would traverse the project site daily. It is not anticipated that vehicle traffic would generate significant quantities of PM_{10} during Project operation.

2.10.4.2 Mitigation Measures

Mitigation measures to control erosion are proposed by the Applicant (see Section 1.4.5.3). Additional erosion control measures would be required under the NPDES General Permit discussed in Section 2.1.2 and are also identified in Section 1.4.5.3. These erosion control measures would also control PM_{10} and are consistent with measures suggested by Ecology staff and outlined in *Control of Fugitive Dust Sources (U.S. EPA, 1988).*

2.10.5 Alternative Powerline Route

This alternative would result in only minimal additional construction disturbance relative to the Proposed Action and, therefore, fugitive dust impacts and mitigation would be comparable.

2.10.6 Restricted Areas Alternative

This environmental review revealed no areas that should be completely avoided to reduce air quality impacts.

2.10.7 Subarea Development Alternative

2.10.7.1 Environmental Impacts

Under this alternative, Phase 1 Project development would be limited to either the western (Option 1) or east-central (Option 2) areas of the site, thereby reducing the amount of construction disturbance during Phase 1 and the potential for generating fugitive dust. Option 1 would disturb approximately 65 hectares (162 acres) during Phase 1 and would generate an estimated 3.8 metric tons (10,000 lbs) of fugitive dust. Option 2 would disturb approximately 81 hectares (200 acres) during Phase 1 and would generate an estimated 4.7 metric tons (12,000 lbs) of fugitive dust.

2.10.7.2 Mitigation

Mitigation measures would the same as those identified in Section 2.10.4.2.

2.10.8 No Action

Potential air quality impacts resulting from construction and operation of the proposed Project would be avoided if the agencies do not issue the required permits and approvals. Dust would continue to be generated from farming activities, vehicle travel on dirt roads, and other sources in the Project vicinity.

In scoping meetings for this Project, it was suggested that windpower can displace the need for additional fossil fuel generating plants in the region. To the extent that the No Action alternative would lead to additional fossil fuel generation, it would lead to substantially greater air quality impacts at some undefined locations in the region. Section 1.5.4 contains a discussion of air quality impacts from operation of national gas-combustion turbines, including increased emissions of carbon monoxide, nitrogen oxides, and carbon dioxide, that could result from the No Action alternative.

2.10.9 Significant Unavoidable Adverse Impacts

With the mitigation measures identified in Section 1.4.5.3 and Section 2.1.3.2 and requirements under the NPDES General Permit described in Section 2.1.2, significant unavoidable air quality impacts are not expected.

2.11 Transportation

2.11.1 Studies and Coordination

This section discusses potential transportation impacts that would occur during Project construction and operation, including increased traffic, impacts to local roadways due to heavy construction vehicles, and traffic safety. Information used in this section includes traffic count data developed by the Washington State Department of Transportation (WashDOT), the Oregon Department of Transportation (ODOT), and the Klickitat County Department of Public Services.

2.11.2 Regulations, Standards, and Guidelines

Klickitat County classifies roads according to their purpose, the volume of traffic they carry, and their geometric design features. General purposes and design standards for rural County roads are summarized in Table 2.11.1. County roads are subject to weight limits during thaws because of the potential for heavy vehicles to damage the road beds. When weight restrictions are in effect, the maximum loads are 1,360 kg (3,000 pounds) per tire for conventional tires 28 cm (11 inches) and over in width and for 1200 X 22.5-sized tubeless tires. Under these restrictions, a dump truck with a 4-wheel rear axle would have a maximum allowable axle loading of 5.4 metric tons (6 tons). Vehicles which exceed weight limits would be prohibited from using County roads during thaws.

2.11.3 Affected Environment

2.11.3.1 Existing Public Road System

U.S. Highway 97 (US-97), Washington State Route 14 (SR-14) and Interstate 84 (I-84) form the regional transportation network serving the Goldendale area and the Project site. Access to the site would be provided off US-97, SR-14, and Hoctor Road. Hoctor Road runs along the north boundary of the site and serves the local residences and farms in the site area. A network of other paved and gravel roads serve the site area and adjacent properties (see Figures 1.1 and 1.2). The following discussions describe these roadways in more detail.

- **US-97** is the main regional north/south route running from Yakima south to Goldendale and south from Goldendale into Oregon. US-97 is classified as a two-lane Principal Arterial. Near Goldendale, pavement conditions are excellent and wide shoulders are provided.

- **SR-14** runs east-west from Vancouver, Washington to I-82 at McNay Dam. SR-14 intersects US-97 approximately 13 km (8 miles) south of Goldendale. SR-14 provides for travel between the cities, towns, and industries along the Washington side of the Columbia River. SR-14 is classified as a two-lane Rural Principal Arterial by WashDOT.

TABLE 2.11.1
DESIGN STANDARDS - RURAL KLICKITAT COUNTY ROADS

CLASSIFICATION		MAJOR ARTERIAL		SECONDARY & COLLECTOR ARTERIAL		LOCAL ACCESS		CUL-DE-SAC	
		max.	min. R[1]	max. D°	min. R[1]	max. D°	min. R[1]	max. D°	min. R[1]
General Purpose		To link major destinations within the County and to provide the principal tie between rural areas and the state and federal highway system.		To collect and distribute traffic from groups of residents and link the traffic with County arterials and state and federal highways.		To provide access to individual residences and property, and to link these with the County arterial and collection network.		"Dead-end" roads which provide access to individual residences and property and to link these with the County arterial and collection network.	
Curvature	Flat	8.5	694	8.5	694	8.5	694	8.5	694
	Rolling	13.5	427	13.5	427	13.5	427	13.5	427
	Mountainous	25.0	231	25.0	731	25.0	231	25.0	231
Min. Stopping Sight Distance (ft.)	Flat	350		350		350		350	
	Rolling	275		275		275		275	
	Mountainous	200		200		200		200	
Maximum Grade[1] (%)	Flat	6		6		6		6	
	Rolling	8		8		8		8	
	Mountainous	11		11		11		11	
New Bridges[2]	Width (curb to curb (ft)	26		20		26		20	
	Design Load (AASHO)	H-20		H-20		H-20		H-20	
	Vertical Clearance (ft)	14.5		14.5		14.5		14.5	
Min. Pavement Width (ft.)		20		20					
Roadway Width [3] (ft.		28		28		24		24	
Number of Lanes		2		2		2		2	
Right-of-Way Width (ft)		80		60		60		60	
Maximum Length (ft)								2,500′	
Turn-around radius (min. R/W) (ft)								60′	
Turn-around radius (Roadway) (ft)								40′	

1. May be steeper for short distances.
2. All bridge curbs to meet State standards. Sidewalks to be determined on an individual basis.
3. For guardrail installation, width of shoulder to be an additional two feet.

- **I-84** is a four-lane interstate highway running from Portland, Oregon, on into Idaho. I-84 serves as the primary travel route for trucks, cars, and other vehicles along the Columbia River. It intersects US-97 just south of the Sam Hill Memorial Bridge, about 16 km (10 miles) south of Goldendale.

- **Hoctor Road** is a two-lane rural County road which runs along the north boundary of the site, extending from US-97 east to Rock Creek Road. Hoctor Road is classified as a Minor Collector Arterial by the Klickitat County Department of Public Services. Hoctor Road is subject to weight limits during thaw periods.

The County has been upgrading and repairing Hoctor Road over the past several years. Two sections, which are currently in poor condition, are programmed for repairs during the 1995 construction period (May through September). These two areas include a 1.3-km (0.8-mile) section immediately east of US-97 and a 3.2-km (2.0-mile) section extending from No. 12 Road to Willis Road. The reconstruction of these two sections is anticipated to take three to four months during which time delays and/or rerouting of traffic around the construction area will be required (Klickitat County Department of Public Services, 1994).

2.11.3.2 Traffic Volumes

Table 2.11.2 shows 1993 average daily traffic (ADT) volumes for key roadways in the general Project vicinity. Traffic volumes along SR-14 and US-97 in Washington are based on traffic counts conducted by WashDOT in 1993. Traffic volumes on I-84 and US-97 in Oregon are based on traffic counts conducted by ODOT in 1992. Volumes were escalated to 1993 using the straight-line annual growth rate that occurred between 1990 and 1992. Traffic volumes along Hoctor Road are based on 1994 ADT counts by the Klickitat County Roads Division. 1994 volumes on Hoctor Road were assumed to be roughly equal to 1993 volumes.

WashDOT operates a weigh station on US-97 just north of Goldendale. Counts conducted at this weigh station in 1993 indicated that traffic volumes along US-97 in the Goldendale area include approximately 26 percent heavy vehicles.

Traffic volumes on roadways can vary considerably from month to month reflecting the effects of tourism in the summer and poor weather in the winter. Based on data from the WashDOT weigh station on US-97 north of Goldendale, peak summer traffic (July and August) is about 15 percent above the annual average while winter traffic (January) is about 35 percent below the annual average.

2.11.3.3 Site Access and On-Site Roads

Existing access to the Project site is provided by regional and local access roads. From the north, access is provided off of Hoctor Road at the Miller Road intersection, approximately 0.4 km (0.25 miles) west and approximately 4 km (2.5 miles) east of the Oak Flat Road intersection. Access from the west is provided off of US-97 approximately 2 km (1.25 miles) south of Hoctor Road. Access to the southern portion of the site is provided off of SR-14 approximately 7.2 km (4.5 miles) east of the SR-14 and US-97 junction (see Figure 1.2).

TABLE 2.11.2
EXISTING AVERAGE DAILY TRAFFIC (ADT)[1] VOLUMES IN PROJECT VICINITY

Location	Existing (1993)
US-97 north of Hoctor Road	3300
US-97 south of Hoctor Road	4500
I-84 west of US-97	11475
I-84 east of US-97	10000
SR-14 west of US-97	1500
SR-14 east of US-97	1700
SR-14 east of Stonehenge Drive	1400
SR-14 near Roosevelt	962
Hoctor Road just east of US-97	202
Hoctor Road west of Willis Road	120
Hoctor Road east of Willis Road	135
Hoctor Road just east of Oak Flat Road	121
Hoctor Road above Chamberlin-Goodnoe Road	86

[1] ADT = average daily traffic. One vehicle making a round-trip along a stretch of roadway results in two ADT.

Private roads on the site are gravel farm roads and jeep trails. These roads vary widely in terms of condition and regular maintenance provided. The roads are used to access local residences; moving farm vehicles, implements, supplies, and products; and for accessing communications stations on Juniper Point and Luna Point. On-site roads do not currently provide a continuous network across the site, and certain portions of the site are not currently served by any roadways.

2.11.4 Proposed Action

2.11.4.1 Environmental Impacts

Local transportation would be affected by both construction and operation of the proposed Project. However, impacts during operation would be minimal since fewer than 20 trips per day (ADT) would be associated with routine site inspections and maintenance activities. Increased use of Hoctor Road could also be associated with sightseers (See Section 2.7, Aesthetics). Construction activity would create the greatest impact from increased traffic and delivery of heavy equipment and construction materials to the site.

Construction Trip Generation
Project construction would result in both heavy and light vehicles accessing the site during each construction phase. Phase 1 Project construction would generate up to the traffic volumes shown

in Table 2.11.3. This table assumes that roads for the entire Project are constructed during the first phase, that all new roads and upgraded roads would require a 30-cm (12-inch) foundation and 6-inch gravel surface, and that gravel would be imported to the site. This is a "worst case" assumption because roads may not require that depth of foundation, because Phase 1 construction could involve constructing only a portion of Project roads, and because an on-site gravel source or crushing plant could potentially be developed. Table 2.11.3 also assumes that aggregate deliveries occur over a two-month period. It is assumed that gravel would come from near the Columbia River (via I-84 or SR-14). Based on these assumptions, up to 85 loads (170 ADT) of gravel would be hauled to the site each day during the two-month period. (One vehicle making a round trip along a stretch of highway is equivalent to two ADT).

TABLE 2.11.3
ESTIMATED PHASE 1 TRIP GENERATION

Vehicle Type	Construction ADT (average)
Light Cars/Trucks	100
Gravel Trucks[1]	170
Other Heavy Equipment	< 1 [2]

1 10,000 trips over a two-month period. This assumes that all on-site project-related roads are constructed and upgraded within this two-month period. Approximately 125,000 cy of gravel is required for road construction and upgrade. Twenty 15-cy dump trucks, with 10-cy trailers each, is assumed for hauling gravel.

2 Heavy equipment would be brought in infrequently so that on certain days the traffic would be higher. For example, if all equipment and vehicles associated with grading and road construction (except gravel trucks) arrived on the same day, up to an additional nine heavy vehicle trips would result.

Construction Trip Distribution and Traffic Volume Impacts

There are three principle roads serving the Project site: SR-14, US-97, and Hoctor Road. Five possible access points along the site boundary currently exist (one on SR-14, one on US-97, and three on Hoctor Road), and an additional access point on Hoctor Road would be constructed approximately 2.8 km (1.75 miles) east of Fenton Lane (see Figure 1.3). Project trip distribution to these access points assumes that all gravel trucks originate from the Columbia gorge and are routed to the site based on the relative amount of road construction that would occur in the vicinity of each access point. Based on these assumptions, approximately 17 percent of the gravel trucks would enter the site off SR-14 (east of US-97); 83 percent of the gravel trucks would travel on US-97 (north of SR-14) with 29 percent entering the site off US-97; and the remaining 54 percent would travel on Hoctor Road and enter at one of the four site access locations. Specifically, it is assumed that seven percent would enter the site at the Miller Road intersection, 17 percent would enter the site at the Fenton Lane intersection; 14 percent would enter the site at the entrance west of the Oak Flat Road intersection; and 16 percent would enter the site at the entrance east of the Oak Flat Road intersection. It was assumed that employee traffic would be similarly distributed on the roadway network.

Average daily traffic volume impacts during construction are shown in Table 2.11.4. Daily traffic volumes on US-97 and SR-14 would increase by approximately five and three percent, respectively, during construction. The largest impact would occur on Hoctor Road where volumes would increase by up to approximately 87 percent.

TABLE 2.11.4
TRAFFIC VOLUME IMPACTS

Location	Projected 1995 (Without Project)	Heavy Construction Vehicles	Light Construction Vehicles	Total	Percent Increase
US-97, south of Hoctor Road	4,700	142	83	4,925	5
SR-14, east of Stonehenge Drive	1,466	30	17	1,513	3
Hoctor Road, east of US-97	208	93	54	355	71
Hoctor Road, east of Willis Road	149	82	48	279	87
Hoctor Road, east of Oak Flat Road	128	28	16	172	34

1. Approximately 65 percent of the daily trips related to construction activity will be heavy vehicles.
2. The table represents the two-month period during on-site access road construction and upgrading. This period represents the highest traffic levels during Project construction, therefore, the period of time when the most transportation impacts will occur.

Impacts to Roadway Conditions

Hoctor Road was constructed over compacted native soils without an engineered subgrade. These soils contain a large proportion of fine particles causing the soil to be moisture-sensitive and difficult to compact under certain conditions, which makes the road susceptible to damage caused by failure of the subgrade to support vehicle loads resulting in lateral displacement of subgrade material. If this condition occurs, potholes, cracking, and structural failure of the road surface result. The severity of damage is related to traffic volume, vehicle axle weight, and whether or not the subgrade is undergoing freezing or thawing. This damage may not be evident until several years following the excessive traffic loading. Project construction traffic could result in or aggravate this type of damage to Hoctor Road. Approximately 5,000 one-way trips from gravel trucks and heavy equipment are anticipated on Hoctor Road during construction.

Schedule Conflict

Currently, Klickitat County has scheduled repairs to two sections of Hoctor Road just east of US-97. Periodic road closure and/or one-way traffic through the affected areas are anticipated. This could adversely affect the Project construction schedule since access to the eastern portion of the site could at times be restricted.

To avoid conflict with County repairs to Hoctor Road, the County could postpone work on Hoctor Road until 1996; however, portions of Hoctor Road may not currently be adequate for the projected volumes of heavy vehicle traffic associated with construction of the proposed Project.

Traffic Safety Conflicts

Due to the increase in traffic during Project construction, vehicles entering and leaving the Project site could pose a conflict to cross-flow traffic as Project vehicles (light and heavy) turn on or off Hoctor Road, US-97, or SR-14. Traffic conflicts on Hoctor Road could result from interference with slow-moving farm equipment entering and exiting properties along the road. At the intersection of Hoctor Road and US-97, potential conflicts could exist between northbound traffic on US-97 and heavy construction vehicles making left turns on to or off of Hoctor Road. A similar condition would exist on US-97 at the site access located 2 km (1.25 miles) south of Hoctor Road. However, sight distances appear to be adequate at these locations. On SR-14, potential traffic conflicts could exist between westbound vehicles on SR-14 and vehicles making left-hand turns into or out of the site.

2.11.4.2 Mitigation Measures

Section 2.7 discusses mitigation related to sight-seeing and traffic. Additional mitigation measures that would avoid or minimize transportation-related impacts if implemented by the Applicant include the following:

- Coordinate routing of Project construction traffic and travel times with the Department of Public Services to reduce conflicts with construction work on Hoctor Road scheduled for the summer of 1995.

- Use on-site materials to produce gravel for construction.

- Schedule Project construction activities to avoid use of Hoctor Road during likely periods of freeze/thaw cycles.

- Route construction traffic to the site in a manner that minimizes construction traffic on Hoctor Road.

- Employ traffic safety precautions such as traffic control flaggers and signs warning of construction activity and merging traffic.

- Provide support for a detailed assessment of the Hoctor Road roadway condition prior to commencement of Phase 1 construction to be conducted by the County and following completion of Phase 1 construction to determine the amount of road damage caused by construction vehicles and to allocate the appropriate costs to the Applicant.

2.11.5 Alternative Powerline Route

This alternative would have no effect on transportation impacts relative to the proposed action. Therefore, mitigation would be the same as identified in Section 2.11.4.2.

2.11.6 Restricted Areas Alternative

This environmental review revealed no areas that should be completely avoided due to traffic levels, conditions of existing roads, or other transportation impacts. However, schedule conflicts with planned County construction on Hoctor Road would not allow for ready access to the eastern portion of the Project site during certain portions of the construction season.

2.11.7 Subarea Development Alternative

The subarea development alternative would restrict Phase 1 to either the western area (Option 1) or the east-central area (Option 2) of the site. Both options would reduce the amount of road construction during Phase 1 relative to the Proposed Action since under this alternative only those roads serving the turbine strings developed in one or the other subarea would be constructed. Heavy construction vehicle traffic required to bring aggregate to the site for road construction during Phase 1 would also be lower than traffic expected for the Proposed Action. Traffic counts for Options 1 and 2 are shown in Tables 2.11.5 and 2.11.6.

TABLE 2.11.5
OPTION 1 - TRAFFIC VOLUME IMPACTS

Location	Projected 1995 (Without Project)	Heavy Construction Vehicles	Light Construction Vehicles	Total	Percent Increase
US-97, south of Hoctor Road	4,700	66	69	4,835	3
SR-14, east of Stonehenge Drive	1,466	30	31	1,527	4
Hoctor Road, east of US-97	208	13	14	235	13
Hoctor Road, east of Willis Road	149	NONE			
Hoctor Road, east of Oak Flat Road	128	NONE			

TABLE 2.11.6
OPTION 2 - TRAFFIC VOLUME IMPACTS

Location	Projected 1995 (Without Project)	Heavy Construction Vehicles	Light Construction Vehicles	Total	Percent Increase
US-97, south of Hoctor Road	4,700	95	100	4,895	4
SR-14, east of Stonehenge Drive	1,466	NONE			
Hoctor Road, east of US-97	208	95	100	403	94
Hoctor Road, east of Willis Road	149	82	86	317	113
Hoctor Road, east of Oak Flat Road	128	27	28	183	43

Both Option 1 and Option 2 would reduce the potential for traffic conflicts compared with the Proposed Action. Option 1 would minimize use of Hoctor Road for site access since most of the western portion of the site could be accessed off US-97 and SR-14. Option 2 would reduce traffic conflicts on SR-14 but would increase potential conflicts on Hoctor Road.

2.11.8 No Action

Potential impacts to traffic volumes and roads used to access the Project site would be avoided if the agencies do not issue the required permits and approvals set forth in the *EIS Fact Sheet*.

2.11.9 Significant Unavoidable Adverse Impacts

With the mitigation measures identified above, significant unavoidable transportation impacts are not expected.

2.12 Public Services and Utilities

2.12.1 Studies and Coordination

This section addresses impacts on public services and utilities resulting from the development of Washington Windplant #1. Specific issues include fire fighting services, medical aid, police, electrical utilities, water supply, sewer, natural gas pipelines, solid waste, and communication facilities. Most reference information in this section comes from personal communications with representatives of local public service agencies and utilities. They include the Klickitat County Rural Fire District #7; the Klickitat County Sheriff's Department; the Klickitat County Public Utility District; the Klickitat County Department of Public Services; the U.S. Army Corps of Engineers; and various operators of radio, television, microwave, and other communication facilities located in the general vicinity of the Project site.

2.12.2 Affected Environment

2.12.2.1 Public Services

Fire and Medical Aid

The Klickitat County Rural Fire District #7 (District #7) provides fire suppression and medical aid service to approximately 5,000 people residing within District #7's 71,000 hectare (273-square-mile) service area. The District manages 10 fire stations, employs three full-time staff, has 180 on-call volunteers, and owns and operates approximately 40 fire trucks. In 1993, District #7 answered a total of 300 calls, 100 of which were calls for fire service. Approximately 20 of the requests for fire service came from calls in the general vicinity of the proposed Project. Most of these fires were generated by sparks from the railroad track running parallel to and south of SR-14. These fires rarely cross to the north of SR-14. (Roberta Hoctor, pers. communication, 1994.)

Fire service to the Project site would be provided from the Maryhill, Bob Lee (near Juniper Point), Hoctorville, and/or Pleasant Valley fire stations. Additional support could be provided by the Roosevelt Fire Department if necessary. The estimated response time to the Project site is approximately 10 minutes or less.

Klickitat Valley Hospital is located in Goldendale, approximately 10 km (6 miles) northwest of the Project site at its closest point. This 30-bed hospital has a 24-hour emergency room and 4-bed intensive care unit.

Police Service

The Klickitat County Sheriff's Department (the Department) provides service to approximately 11,500 people residing in unincorporated Klickitat County. The Department employs 16 commissioned officers, including one sheriff, one lieutenant, two sergeants, 10 deputies, and 30 reserve officers. In 1993, the Department responded to 4,931 calls for service. Police service to the site would be provided from the Department's office in Goldendale. One lieutenant, one sergeant, and five deputies are assigned to that office.

2.12.2.2 Communication Services

Communication systems in the general project vicinity include microwave, television, radio, and navigation systems as listed in Table 2.12.1. Microwave signals are transmitted in either a direct "line of sight" path, from the transmitter to the receiving station, or in an omnidirectional manner in which the signal radiates in all directions. The path of the microwave signal is dependent on its frequency and the type and location of the receiver. Interference to both modes of microwave signal transmission could potentially occur due to disruptions caused by physical obstructions, electrostatic effects, or electromagnetic forces.

Television, radio, and navigation communications are generally transmitted at lower frequencies than microwave signals, and are broadcast in a radial manner (360°). Multiple communication signals at different frequencies can be transmitted from and received at the same location. Primary causes of interference to television, radio, and navigation communications are electrostatic effects or electromagnetic forces.

To support police, medical and fire dispatching, Klickitat County operates a main repeater station on Juniper Point. The repeater station relays messages, using an omnidirectional microwave signal, to emergency and support vehicles and other communication stations throughout the County. In addition to the Juniper Point Repeater Station, there are also repeater stations at Haystack Butte and Luna Point.

Communication facilities and signals are also associated with nearby dam and shipping vessel operations on the Columbia River. Government users associated with river or John Day Dam operations include the National Marine Fisheries Service (NMFS), the Corps of Engineers and the BPA. These agencies primarily transmit and receive signals from John Day Dam, but BPA also utilizes communications systems located at the Harvalum Substation. Vessels utilizing the river employ electronic navigation and radio communication systems. Approximately 7 to 27 vessels equipped with these systems pass the site each day. (Jim Williams, pers. communication, 1994.)

TABLE 2.12.1
COMMUNICATION SYSTEMS NEAR THE WASHINGTON WINDPLANT #1 SITE

Owner/Operator	Type	Location	Description/ Direction
Klickitat County Rural Fire District # 7	Microwave Repeater	Juniper Point	UHF, 2.3 GHz to Goldendale omnidirectional
Klickitat Valley Hospital	2 Radio Repeaters	Juniper Point	UHF repeater, VHF transmission, omnidirectional
Mid Columbia Medical Center	Radio Repeater	Juniper Point	VHF, 75 Mhz, omnidirectional
Klickitat County Sheriff's Department	2 Radio Repeaters	Juniper Point	VHF, omnidirectional and UHF, link to Goldendale
Klickitat County Roads Division	Radio Repeater	Juniper Point	VHF, omnidirectional
Klickitat County Public Utility District	Microwave Repeater and Radio Repeater	Juniper Point	VHA and microwave to Goldendale, omnidirectional

Owner/Operator	Type	Location	Description/ Direction
Intertribe Fisheries Department	Radio Repeater	Juniper Point	VHF, omnidirectional
Wheeler Communication	2 Radio Repeaters	Juniper Point	UHF, omnidirectional
Immigration Department	2 Radio Repeater possibly	Juniper Point	VHF, omnidirectional
Department of Natural Resources	2 Radio Repeaters, possibly	Juniper Point	VHF, omnidirectional
Army Corps of Engineers	Radio Repeaters	Juniper Point	VHF, omnidirectional
Columbia Aluminum	Radio Repeater	Juniper Point	UHF, omnidirectional
Not Known	Ham Repeater	Juniper Point	140 MHz
BATS Towing	2 Radio Repeaters	Juniper Point	VHF link to Biggs and UHF base to Pasco
Don Coats	Radio Repeater	Juniper Point	UHF, omnidirectional
Columbia Basin Cable	Microwave Repeater	Observatory Hill	To Goldendale
Cellular One	2 Microwave Repeaters	Luna Point and Haystack Butte	To Roosevelt and to Goldendale
Valley Communication	Radio Repeater	Haystack Butte	To Goldendale
KLCK Radio	Microwave Repeater	Haystack Butte	To Goldendale
KMCQ Radio	2 Microwave Repeaters	Haystack Butte and Stacker Butte	To Goldendale
KYYT Radio	Microwave Repeater	Haystack Butte	To Goldendale

2.12.2.3 Utilities

Three-phase electrical power is available near the Project site from a 12.5-kV overhead distribution line that runs along Hoctor Road. Electrical power is provided by the Klickitat County Public Utility District (Tom Swenson, pers. communication, 1994).

A number of existing utility corridors currently transverse portions of the Project site (see Figure 1.2). Two BPA high-voltage transmission lines are partially located on Project lands: the 230-kV Midway-Big Eddy line crosses the northwestern corner of the site; and the 500-kV Hanford-John Day line passes through the far eastern portion of the site. A 115-kV Klickitat County PUD transmission line crosses the western portion of the site enroute from John Day Dam to Goldendale. A natural gas pipeline runs east-west just south of Hoctor Road and passes through the northern portion of the Project site.

Potable water use by residents south of Hoctor Road in the general vicinity of the Project site is provided by individual domestic wells. There is currently no sewer system serving the Project site, and none is expected to be required for the Project.

Solid waste collection in the general vicinity of the Project is provided by a private collection company. In addition, a transfer station is located in Goldendale. Disposal service is provided by the Regional Disposal Company which operates three transfer stations and the Roosevelt Regional Landfill in the eastern part of the County.

2.12.3 Proposed Action

2.12.3.1 Environmental Impacts

Public Services

During Project construction, the installation of the turbines and turbine towers would require welding, which can generate sparks and temporarily increase the potential for fires on the Project site, especially during dry weather. An average of approximately 40 workers would be required for Project construction. Careless smoking could also temporarily increase the potential for fires in the area. The relatively high-risk nature of heavy construction and the number of construction workers involved may temporarily increase the likelihood of medical service being required at the Project site.

Approximately nine full-time staff would be required for Project operation. Operations staff would maintain and repair equipment and also monitor Project operation and site conditions from a remote location. Project operation could somewhat increase the chance of fire from human causes from mechanical or electrical equipment failure. In addition, any welding during ongoing equipment maintenance and repair could also increase the chance of fire at turbine locations. Because of the small number of operations staff, Project operation is not expected to create a significant new demand for medical services. However, Project security measures which may include installation of electronically controlled gates could delay access to the site in any emergency situations that did occur.

Section 2.8.4 discusses recreational impacts including the tendency for the Project to attract unauthorized visitors. Any increase in number of unauthorized visitors to the site would create the potential for increased demand for police services to the site.

By County Ordinance, the Klickitat County Department of Public Services issues permits and provides site inspections for buildings and structures in accordance with administrative requirements established in the Uniform Building Code, 1991 Edition. Chapter 3 of the Code sets requirements for permit application inspections and fees. Through its building permit process, the County will conduct plan reviews and inspections of certain construction activities including concrete reinforcing bar placement, structural welds, and bolting systems.

Communication Systems

Based on the location of the proposed turbine strings, the closest distance between an individual turbine and the communication facilities on Juniper Point is approximately 1 km (0.6 mile); for Luna Point and Haystack Butte, these distances are 0.4 and 6.4 km (0.25 and 4 miles), respectively. This is beyond the distance where electrostatic or electromagnetic field interference is expected and, therefore, no impact to omnidirectional communication signals are expected.

The potential for interference with communication systems also exists where turbines or other Project structures are located in the pathway of microwave signals from the transmitter to the receiver. Obstruction of microwave signals by turbine blades or towers could result in interrupting or weakening of these signals. This effect would depend on the specific location and height of turbine structures, the frequency of signal, and the location of the receiver. However, interference with directional microwave signals could potentially occur wherever the path of a directional signal intersects a turbine string. Table 2.12.2 lists communication stations and turbine string where this potential for impacts exists. Actual impacts would depend on the path and elevation of directional microwave signals and on the precise location and elevation of turbines.

TABLE 2.12.2
POTENTIALLY AFFECTED COMMUNICATION SYSTEMS

Owner/Operator	Location	Turbine Strings Potentially Affecting Station
Klickitat County Rural Fire District #7	Juniper Point	M
Klickitat County Sheriff's Department	Juniper Point	M
Klickitat County Public Utility District	Juniper Point	M
BATS Towing	Juniper Point	G, I, K
Cellular One	Luna Point	NN, OO

Utilities

The existing powerlines that traverse portions of the Project site are not expected to be affected by Project construction. Some Project construction activity would occur in the vicinity of the existing natural gas pipeline south of Hoctor Road, which traverses the Project site. Specifically, construction of turbine strings Y, AA, and BB; the access road from Hoctor Road to turbine string U; the overhead powerline in Section 5, T3N, R18E; and the new/upgraded road to turbine string M would occur in the general vicinity of the pipeline.

The Project site is not expected to require routine water, electrical, or sewer service since operations staff would be located at the off-site operations and maintenance facility. Portable sanitary facilities may be needed when operations or maintenance staff would be on site for more than a few hours. Demand for water at the site would result from firefighting activities. However, as much as 45,000 liters (12,000 gallons) over a 1-hour period could be provided by Fire District #7 tanker trucks (Roberta Hoctor, pers. communication, 1994).

It is not anticipated that a significant amount of construction-related debris would be generated over the construction period. Any construction debris that is generated could be disposed of at the Roosevelt Regional landfill. Workers could create the potential for littering during Project construction. Because only nine workers would be required for Project operation, they would create relatively small potential for generating litter. As discussed in Section 2.8, however, the Project could attract unauthorized visitors. Any unauthorized visitors to the site would create a relatively greater potential for litter than would Project operations staff. During Project operation, impacts could also result from broken or decommissioned equipment being stored on site.

2.12.3.2 Mitigation Measures

In addition to the decommissioning plan discussed in Section 2.7, the following mitigation measures could be employed by the Applicant to minimize or eliminate impacts to local public services and utilities due to the construction and operation of the Project:

- During Project construction and all Project welding operations, have a readily accessible water truck and chemical fire suppression materials available on site to allow immediate fire response.
- Minimize or restrict high fire-risk activities during extreme dry weather periods.
- Provide Project staff with cellular phones to enable timely communication with the Fire Department and other emergency services.
- Provide appropriate sanitation facilities and potable water on site during construction and, if needed, operation.
- Prohibit construction and operating personnel from smoking on the Project area except within designated areas.
- Provide all County emergency departments and vehicles with controls to electronic gates.
- Provide fire extinguishers on vehicles and equipment used during construction.
- Field locate and flag the existing natural gas pipeline and avoid construction in its immediate vicinity, if possible. Where avoidance is not feasible, use hand excavation methods.
- Precisely determine the location and frequency of potentially impacted communications transmitters and receivers when siting individual turbines in turbine strings M, G, I, K, NN, and OO to guard against potential signal interference.
- Remove all turbine structures and associated equipment that are permanently taken out of operation, and restore lands to a natural condition (see Section 2.7, Aesthetics).
- Monitor the site for evidence of unauthorized use and provide additional security as appropriate.

2.12.4 Alternative Powerline Route

This alternative would result in the same impacts to public services and utilities as the Proposed Action. Therefore, mitigation measures would be the same as those discussed in Section 2.12.3.2.

2.12.5 Restricted Areas Alternative

Provided that mitigation measures identified in Section 2.12.3.2 are implemented, this environmental review revealed no areas that should be completely avoided due to impacts on public services or utilities.

2.12.6 Subarea Development Alternative

2.12.6.1 Environmental Impacts

This alternative would restrict Phase 1 development to either the western (Option 1) or east-central (Option 2) portion of the site. Impacts to public services and utilities from either option would generally be the same as is expected for the Proposed Action. However, Option 1 would avoid potential impacts to communication systems associated with the construction of turbine strings NN and OO. Option 2 would avoid potential impacts to communication systems associated with the construction of turbine strings G, I, and K. Option 1 would also reduce the overall area where construction activities would be occurring in the vicinity of the natural gas pipeline that traverses the site.

2.12.6.2 Mitigation Measures

Mitigation measures would be the same as those identified in Section 2.12.3.2.

2.12.7 No Action

Potential impacts to public services and utilities would be avoided if the agencies do not issue the required permits and approvals. Existing demand for public and utility services would continue.

2.12.8 Significant Unavoidable Adverse Impacts

With the mitigation identified in Section 2.12.3.2, significant unavoidable adverse impacts would not be expected from development of the Proposed Action or alternatives.

2.13 Health and Safety Risks

2.13.1 Studies and Coordination

This section discusses potential health and safety risks associated with the construction and operation of Washington Windplant #1. Potential health and safety risks include those that could be experienced by the general public as well as construction and operations workers at the facility. Because health and safety risks would be the same for all Project alternatives, impacts and mitigation measures are discussed collectively rather than individually in this section. The primary sources of information for this section are published information and interviews with individuals having experience with construction safety and the types of health and safety risks associated with wind turbines and electrical power generation and transmission.

2.13.2 Regulations, Standards, and Guidelines

A variety of federal and Washington State safety regulations and guidelines would apply to Project design and construction. Federal safety regulations are issued under the authority of the Occupational Safety and Health Act (OSHA); state safety regulations are issued under the Washington Industrial Safety and Health Act (WISHA). In addition, the National Electrical Manufacturers Association (NEMA), and Institute of Electrical and Electronics Engineers (IEEE) issue standards for the design of electrical equipment and controls. The Uniform Building Code (UBC) sets standards for fire, life, and structural safety aspects of all buildings and related structures.

The Federal Aviation Administration (FAA) establishes requirements for towers and other tall structures that could potentially interfere with aircraft safety. The FAA generally regulates structures 61 meters (200 feet) or taller and requires that they be lighted for aircraft safety (Lambert, pers. communication, 1994).

2.13.3 Affected Environment

Potential environmental risks on the Project site currently include: existing powerlines, farming-related risks, and existing natural gas pipeline and pumping stations (see Figure 1.2).

2.13.4 Proposed Action and Project Alternatives

2.13.4.1 Environmental Impacts

Project facilities would include approximately 345 wind turbines, a substation, meteorological towers, access roads, underground power and data collection lines between turbines, and a 34.5-kV overhead powerline to deliver power from the turbine strings to the Project substation.

Potential health and safety risks associated with the construction and operation of these facilities include the potential for worker injury during construction; the potential for electrical shock and fires during Project construction and operation; general worker safety during Project operation and maintenance; and the potential effects of electromagnetic fields. In all cases, two conditions must exist to constitute a health or safety risk: a potential health hazard (such as proximity to high-voltage powerlines) and individual exposure to the hazard for a sufficiently long time to result in a health effect.

Construction-Related Risks

Potential health and safety risks affecting workers during Project construction include: exposure to fugitive dust generated during construction; the risk of electric shock from working with and in the vicinity of electrical equipment (i.e., transformers) and powerlines; fire hazards related to welding, careless smoking, and other construction activities; and injury associated with the use of heavy equipment and installation of elevated structures. Construction activities could also result in potential health and safety risks to any unauthorized visitors to the site during construction; however, it is expected that unauthorized visitors would be discouraged by the number of construction workers on the site.

Operation-Related Risks

Potential impacts to health and safety during operation of the Project include: the potential for electric shock from working with electricity and in the vicinity of high-voltage electrical powerlines; the potential for injury related to operation and maintenance of elevated structures that are accessed via ladders or cranes; and the potential for fire or explosion resulting from maintenance welding. Because the tower ladders will be enclosed inside the towers, the potential for falls due to conditions such as inclement weather and icy rungs would be minimized. Ladders would be designed to meet all applicable health and safety standards and would only be accessible to workers with keys.

Main access gates to the site would be equipped with locks, and existing fencing would be maintained. In addition, as discussed in Section 1.3.6.2, warning signs would be posted near high-voltage equipment, and the Project substation would be fenced and locked. Daily maintenance inspections of facilities by Project staff, as well as ongoing farming and ranching operations, would further discourage unauthorized use of the site. Nevertheless, persistent individuals could likely gain unauthorized access to some of the Project site and facilities.

Air Traffic Safety

The maximum height of the overall turbine structure (including blades) would be 56 meters (184 feet). This height falls below the 61-meter (200-foot) limit where structures fall under FAA regulation, and lighting, therefore, would not be required (14 C.F.R. 77). If it is determined that any military training flight routes are near the Project site, the FAA will notify the responsible military branch and request that they adjust their routes to avoid the site.

Electromagnetic Fields

Electric and magnetic fields (EMF) occur across a broad electromagnetic spectrum. EMF results from both natural phenomena and human activity such as communications equipment, appliances, and the generation, transmission, and local distribution of electricity. Much of the body of national and international research regarding EMF and public health risks remains contradictory or inconclusive. To date, the scientific and medical communities have not been able to form a consistent conclusion as to whether or not there are any adverse health effects from EMF at the frequencies typically associated with electric power systems.

The strength of electric and magnetic fields attenuates rapidly as the distance from the source increases. For overhead powerlines, the magnetic field strength is based on the square of the distance from the line to the point of interest. For example, if the magnetic field from an overhead powerline is 20 mG at the centerline and drops to 16 mG at 3 meters (10 feet) from the centerline, at 6 meters (20 feet) from the centerline the magnetic field falls to 4 mG. For electrical equipment such as substations, the magnetic field strength is based on the cube of the distance and results in even more rapid decrease in field strength. For example, if the magnetic field at a substation transformer is 4.5 mG and drops to 4.4 mG 0.6 meters (2 feet) from the transformer, at 1.2 meters (4 feet), the drop in field strength would be eight-fold, resulting in a field strength of 3.7 mG.

During Project operation, the overhead powerlines and substation will produce EMF in the immediate vicinity of these facilities. However, the nearest residences to the overhead powerlines would be approximately 150 and 365 meters (500 and 1,200 feet) away, far removed from any potential electric or magnetic field effects. In addition, it is anticipated that EMF resulting from the proposed 34.5-kV line would be lower in strength than the EMF fields currently produced in the vicinity of existing transmission and distribution lines in the area and would not represent an uncommon exposure to the public. The nearest residence to the proposed substation is at least 150 meters (500 feet) away, also well outside the influence of any adverse electric or magnetic field effects. Thus, the incremental increase in EMF due to the Project facilities, over and above that from other area lines, is not expected to be significant.

2.13.4.2 Mitigation Measures

In addition to the health and safety measures included in the Proposed Action and outlined in Section 1.4.5.2, the following measures would further reduce health and safety risks if implemented by the Applicant:

- Develop and maintain an on-site health and safety plan that informs employees and others on site what to do in case of emergencies, including the locations of fire extinguishers and nearby hospitals, important telephone numbers, and first aid techniques.
- Minimize accidental injury during construction and operations by:
  - offering specific job-related training to employees, including CPR, first aid, tower climbing, rescue techniques, and safety equipment inspection.
  - requiring each worker to be familiar with site safety;
  - assigning safety officers to each shift to monitor construction activities and methods;
  - ensuring that workers on each shift are certified in first-aid;
  - ensuring a well-stocked first-aid supply kit is accessible on site at all times and that each worker knows its location;
  - conducting periodic safety meetings for construction and maintenance staff.
- Follow the precautions to minimize fire hazards outlined in Section 2.12.3.2.

2.13.5 No Action

Health and safety risks associated with construction and operation of Washington Windplant #1 would be avoided if the agencies do not issue the required permits and approvals. Health and safety risks associated with ongoing agricultural activities and with existing powerlines and pipelines on the site would continue.

2.13.6 Significant Unavoidable Adverse Impacts

With the mitigation measures included in the Applicant's proposal, and additional mitigation measures identified above, significant unavoidable health and safety risks are not expected from construction or operation of the proposed Project or alternatives.

PART 3: CUMULATIVE IMPACTS

Part 3–Cumulative Impacts

3.1 Introduction

Klickitat County has received two Conditional Use Permit applications for wind power projects in the Columbia Hills area southeast of Goldendale, Washington. The first project—the 115-MW Washington Windplant #1—is proposed by KENETECH Windpower, Inc. Electrical power generated by Washington Windplant #1 (the KENETECH Project) would be transmitted over the Bonneville Power Administration's (BPA) transmission system to utilities purchasing the KENETECH Project's output. To date, utilities purchasing the output of the first phase of the KENETECH Project have submitted a good faith request to transmit 50 MW of power over BPA's system. Transmission services agreements between BPA and purchasing utilities will be required for the KENETECH Project. The second project—Columbia Windfarm #1—is proposed by Conservation and Renewable Energy Systems (CARES), a consortium of eight Washington public utility districts. Columbia Wind Farm #1 (the CARES Project) is being developed as a demonstration project sponsored by the Bonneville Power Administration (BPA). Other persons have expressed interest in developing other areas of Klickitat County for wind power generation, but applications have either not been received by the County or have been returned to the applicants for lack of action. Therefore, other potential projects are considered too speculative to be evaluated in this analysis of cumulative impacts.

This part of the EIS addresses the expected cumulative impacts resulting from construction and operation of the KENETECH and CARES Projects. (The relative location of the two projects and principal project features are shown on Figure 3.1.)

3.2 Summary Project Descriptions

3.2.1 Washington Windplant #1 (KENETECH Project)

The KENETECH Project would be located on 5,110 hectares (12,630 acres) of privately-owned land extending approximately 22.5 km (14 miles) along the crest of the Columbia Hills. KENETECH Windpower, Inc., has entered into wind power easement agreements with site landowners. The site is primarily zoned Extensive Agriculture; however, a small portion of the site is zoned Open Space. The site is currently used for livestock grazing and cultivated cropland.

Development of the KENETECH Project would ultimately entail installation of approximately 345 wind turbines. The proposed 33-MVS turbines are designed and manufactured by KENETECH Windpower, Inc. These three-bladed turbines employ a variable speed, horizontal axis, upwind design where the wind hits the turbine rotor prior to hitting the turbine tower. The turbines would be supported by tubular towers measuring 24 to 36.6 meters (80 to 120 feet); guy wires would not be required for tubular tower support. With the rotor blades, the turbine structures would range up to about 74.5 meters in height (up to about 184 feet).

Turbines would be arranged in 39 distinct rows (turbine strings). Turbine strings would also include secondary access road accessing individual turbines. The KENETECH Project would also include the following features:

- Underground power collection and communication lines.
- 24.6 kilometers (15.3 miles) of overhead 34.5-kV powerline.
- Transformers.
- An electrical substation to step up voltage from 34.5 kV to 115 kV.
- 19.3 km (12.1 miles) of new primary access road connecting various areas of the site.
- 6.0 km (3.6 miles) of upgraded road.
- A temporary construction staging area.

The operations/maintenance facility for the KENETECH Project would be located off site.

The KENETECH Project would be developed in two or more phases with each phase requiring between eight and 11 months for construction. Table 3.1 summarizes the estimated amount of land that would be disturbed during construction and the amount of land that would be permanently occupied by Project features. Up to 155 hectares (382 acres) or about three percent of the site would be disturbed during construction. Project features would permanently occupy about 79 hectares (193 acres), or about 1.5 percent of the site.

TABLE 3.1
SUMMARY OF KENETECH PROJECT FEATURES

Features	Area Temporarily Disturbed		Area Permanently Occupied	
	Hectares	Acres	Hectares	Acres
Turbine String and New Secondary Access Road[1]	98	243	33	82
Powerline	17	42	14	34
New Primary Access Road[2]	27	66	24	58
Substation	<1	1	<1	1
Upgraded Access Road	8	20	7	18
Construction Staging Area	4	10	0	0
TOTAL (rounded to closest hectare/acre)	155	382	79	193

1 Assumes 30-meter (100-foot) disturbance corridor along turbine strings except where steep terrain dictates the use of road switchbacks. Secondary roads along turbine strings are about 4 meters (12 feet) wide plus associated drainage ditches.

2 Assumes area required for an approximately 5-meter (16-foot) primary road and associated drainage ditches.

Peak power production would occur from April through September. During the peak season, peak daily power production would occur from the late afternoon through early evening. During operations, the KENETECH Project would employ approximately 9 full-time workers. Although the KENETECH Project would be operated remotely, maintenance employees would tour and inspect the Project site daily.

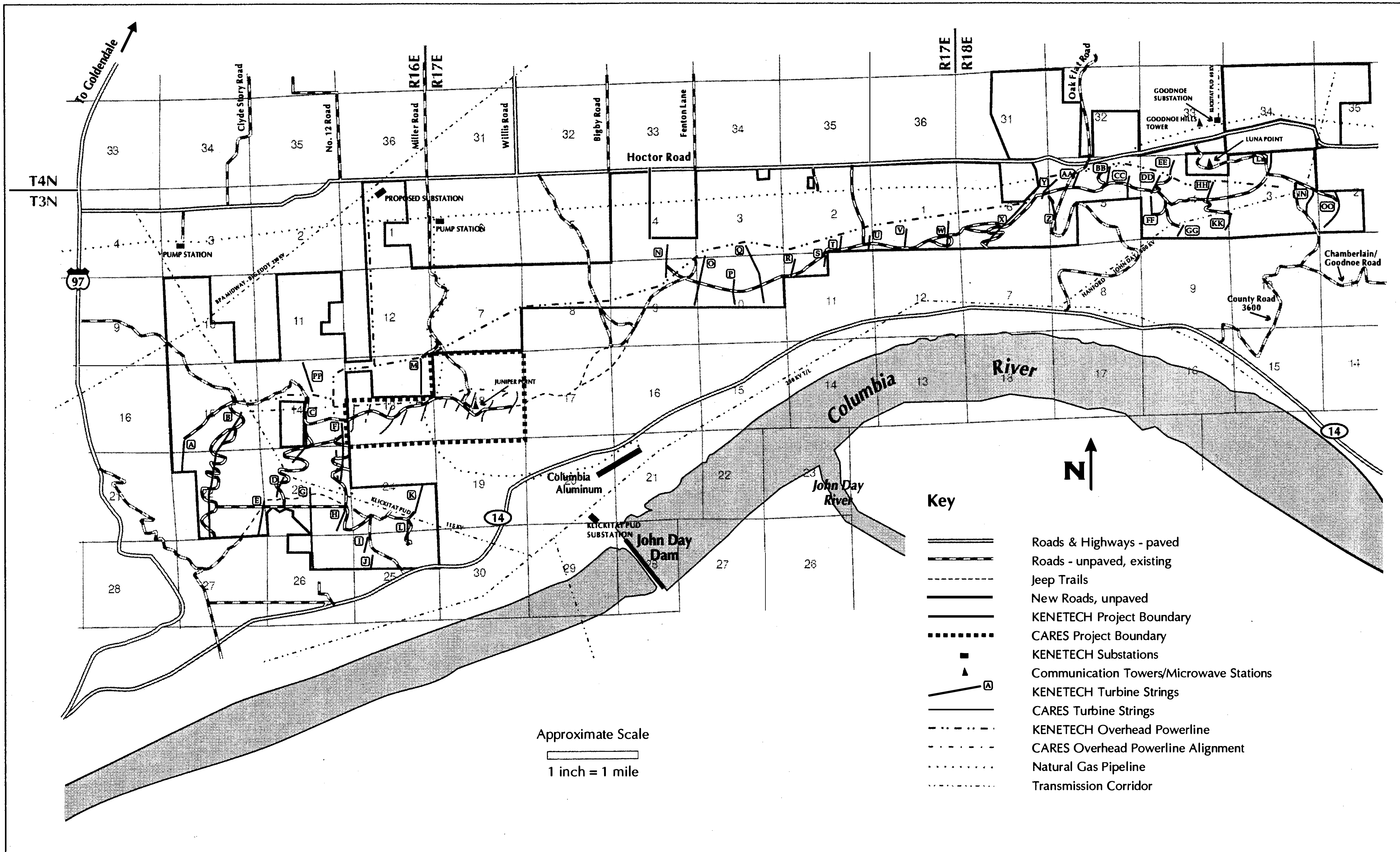

Figure 3.1 — CARES Project and KENETECH Project Sites

3.2.2 Columbia Wind Farm #1 (CARES Project)

The CARES Project would be located in the southern half of Section 13, Township 3N, Range 16E and Section 18, Township 3N, Range 17E on a site that includes Juniper Point, one of the predominant features of the Columbia Hills. The 395-hectare (975-acre) site is owned by Columbia Aluminum and is currently used for limited livestock grazing. In addition, a microwave and radio communications facility is located at the top of Juniper Point.

The 25-MW CARES Project would include installation of 91 AWT-26 wind turbines designed by R. Lynette and Associates in collaboration with the U.S. Department of Energy and the National Renewable Energy Laboratory. The two-bladed turbines employ a horizontal-axis, downwind design where the wind hits the turbine tower prior to hitting the rotor blades. Tubular towers measuring approximately 43 meters (140 feet) tall and 0.9 meter (3 feet) in diameter are proposed. Towers would be supported by guy wires. With the rotor blades, the turbine structures would range in height from about 30 to 56 meters (98 to 184 feet) above the ground.

Turbines would be arranged in 11 turbine strings generally oriented southwest to northeast. Turbine strings would include secondary roads accessing individual turbines. The CARES Project would also include the following features:

- 91 model AWT-26 wind turbines using 43 m (140 ft.) high guyed tubular towers on concrete pier foundations.
- A new 115/24-kV substation on the Project site.
- A 149 m^2x4 m high (1600 ft^2 x 14 ft. high) steel operations and maintenance building.
- Approximately 25 pad mount transformers along the turbine access roads.
- Approximately 4.0 km (13,000 ft.) of underground communication and transmission lines.
- Approximately 5.6 km (3.5 mi.) of 24 kV wood pole transmission lines to deliver electricity to the Project 115 kV transmission line.
- Approximately 3.2 km (2.0 mi.) of 115 kV wood pole transmission lines to deliver electricity from the Project substation to Klickitat PUD's 115 kV Goldendale line.
- Interconnection with the BPA transmission system through the Goldendale line and Goldendale substation owned by the Public Utility District No. 1 of Klickitat County (PUD).
- 8.0 kms (5.0 mi.) of reconstructed and upgraded gravel surfaced roads.
- Approximately 6.4 kms (4 mi.) of new graveled roads along turbine strings.
- Meteorological towers guyed with rebar anchors.

As proposed, the 115-kV CARES Project powerline would extend off-site to the west and cross a portion of the KENETECH Project site prior to interconnecting with an existing 115-kV Klickitat County PUD transmission line. However, agreements with landowners to allow this crossing have not been entered into.

Table 3.2 summarizes the estimated amount of land that would be disturbed during construction of the CARES Project and the amount of land that would be permanently occupied by Project features. Up to 38 hectares (95 acres) or about 9.7 percent of the site would be disturbed during construction. Project features would permanently occupy about 19 hectares (48 acres) or about 5.0 percent of the site.

TABLE 3.2
SUMMARY OF CARES PROJECT FEATURES

Features	Area Temporarily Disturbed		Area Permanently Occupied	
	Hectares	Acres	Hectares	Acres
Turbine Strings Underground Collection Line and New Secondary Access Roads[1]	20	50	5.4	13
Overhead Powerline	4	10	3.1	8
Primary Access Road[2]	N/A	N/A	N/A	N/A
Substation	0.5	1	0.5	1
Upgraded Access Road	11	28	10	25
Maintenance Facility	0.4	1	0.4	1
Construction Staging Area	2	5	0	0
TOTAL (rounded to closest hectare/acre)	38	95	19	48

1 Assumes 100-foot disturbance corridor along turbine strings. Roads along turbine strings are assumed to be 12 feet wide plus associated drainage ditches.
2 All primary access roads are existing and are to be upgraded; all new roads are included in the turbine string development amounts.

During operations, the CARES Project would employ approximately five workers who would be housed in a small on-site operations building. The building would be fueled by propane. Bottled water and portable sanitary facilities would be included at the facility.

3.3 Cumulative Impacts

3.3.1 Earth

Both the KENETECH and CARES Projects would be located in the Columbia Hills area of Klickitat County. The Columbia Hills were formed from folds in the Columbia River Basalts—a hard, fine-grained rock formed from lava that flowed out of fissures in the earth's crust up to about 25 million years ago. Steep basalt cliffs are located south of the two Project sites, along the north shore of the Columbia River near John Day dam. No major faults have been mapped in the Columbia Hills, although some unidentified faulting may be associated with the basalt folds.

The KENETECH Project site generally follows the ridge of the Columbia Hills; elevations range from about 305 meters (1,000 feet) mean sea level (MSL) to about 880 meters (2,890 feet) MSL. Slopes on the KENETECH site range from 5 to 100 percent; turbine strings would be developed on slopes ranging from 5 to 50 percent. Based on unpublished Soil Interpretation Records (SCS, 1992) the KENETECH Project site contains four general soil groupings: 1) silt-loams on slopes less than 15 percent; 2) silt-loams on slopes greater than 15 percent; 3) cobbly silt loams/loamy sands; 4) and rock outcrops/haploxerolls complex (talus slopes). Some of the KENETECH Project site has not been mapped by the Resource Conservation Service (formerly Soil

Conservation Service). Portions of the KENETECH site are located in critical erosion areas in Klickitat County's Long Range Resources Plan (Klickitat County, 1983).

Elevations on the CARES Project site range from about 680 meters MSL (2,240 feet) to about 954 meters MSL (3129 feet) at the top of Juniper Point. Slopes on the CARES Project site range from 5 percent at the top of the ridge crest to 100 percent on the south side of the ridge crest. Turbine strings would be located on slopes ranging from 5 to 15 percent. Soils on the CARES site include silt loams, cobbly silt loams and loamy sands, and rock outcrops/talus slopes. However, the CARES Project site lies outside of critical erosion areas mapped by Klickitat County (Klickitat County, 1983).

Cumulative impacts to earth resources from the simultaneous construction of the KENETECH and CARES Projects would include increased potential for erosion. Construction activities for the CARES Project and Phase 1 of the KENETECH Project are expected to occur over the same general time frame. Silt loam soils are fine-grained and susceptible to both wind and water erosion. Silt loam soils with slopes greater than 15 percent would be the most susceptible to erosion. Table 3.3 summarizes soil disturbance during construction that would result from each Project as well as the combined soil disturbance that would result from both Projects. Together, these Projects would disturb approximately 187 hectares (466 acres) of soil. Because they would share a common access point off of Hoctor Road at its intersection with Miller Road, the cumulative amount of soil disturbance would be about 4.4 hectares (11 acres) less than if the estimated disturbances associated with each Project were added together.

TABLE 3.3
CUMULATIVE SOIL DISTURBANCES

Soil Type	KENETECH		CARES		Cumulative[1]	
	Hectares	Acres	Hectares	Acres	Hectares	Acres
Silt Loam (slope >15%)	37	92	2	6	39	98
Silt Loam (slope <15%)[1]	28	69	14	34	38	94
Cobbly Silt Loam, Loamy Sand	36	88	15	39	50	125
Rock Outcrop	3	8	6	15	9	23
Non-Classified, Unmapped[1]	51	126	0.4	1	51	126
TOTAL	155	382	38	95	187	466

1 The existing access road at the Hoctor Road and Miller Road intersection will be upgraded for access to CARES site and would be upgraded to access KENETECH turbine string M. Therefore, the cumulative impact is not strictly additive.

Mitigation identified for each of the two individual projects would also mitigate these cumulative impacts.

3.3.2 Water

The Columbia Hills are located in a semi-arid region of Klickitat County receiving about 15 inches of annual rainfall north of the ridge crest. Most of this rainfall occurs from late fall through early spring. The 100-year storm results in approximately 3.5 inches of precipitation over a 24-hour period. The Columbia Hills includes three major drainages: Swale Creek, Rock Creek, and direct drainage to the Columbia River. Runoff north of the crest of the Columbia Hills and to the west of Bigby Road drains to Swale Creek, a tributary of the Klickitat River. Runoff north of the crest of the Columbia Hills and to the east of Bigby Road drains to Luna Gulch and then to Rock Creek. Runoff from the KENETECH Project site drains to the Swale Creek Basin, the Rock Creek Basin, and directly to the Columbia River. Most runoff from the CARES Project site drains to the Swale Creek basin; runoff south of the ridge crest drains directly to the Columbia River. Drainage features on both sites include swales, intermittent streams, and stock watering ponds; however, none of the stockponds would qualify as jurisdictional wetlands.

The primary cumulative impact to water resources would be a potential to increase sediment loading to the Swale Creek basin during the simultaneous construction of the CARES Project and Phase 1 of the KENETECH Project. Mitigation identified for each of the two individual projects would also mitigate these cumulative impacts.

3.3.3 Plants

Much of the Columbia Hills has historically been heavily grazed. As a result, much of the area has been invaded by non-native weed species such as cheatgrass and includes less than 50 percent native plant cover. Nonetheless, portions of the Columbia Hills contain a number of priority habitats as defined by WDFW and high-quality native plant communities as defined by WDNR-Natural Heritage Program. Priority habitats include: shrub-steppe; oak woodland; and juniper savannah. Oak woodland is also considered a high-quality native plant community. Native plant communities in shrub-steppe areas include communities dominated by bunchgrasses, primarily bluebunch wheatgrass-Sandberg's bluegrass and bluebunch wheatgrass-Idaho fescue, and communities including a buckwheat shrub layer, primarily Douglas buckwheat/Sandberg's bluegrass. The buckwheat communities occur on shallow, rocky soils scattered along the crest of the Columbia Hills.

The KENETECH Project site extends over 5,110 hectares (12,630 acres) and includes: 3,150 hectares (7,870 acres) of rangeland; 910 hectares (2,280 acres) of land under cultivation; 77 hectares (195 acres) of juniper and scattered juniper woodland; 17 hectares (40 acres) of riparian habitat; 1,000 hectares (1,300 acres) of oak/oak-pine and scattered oak/oak-pine woodland; and 375 acres (945 acres) of shrub steppe habitat. About 70 percent of the shrub-steppe habitat is dominated by bunchgrass communities. The CARES Project site occupies 395 hectares (975 acres) and includes: 101 hectares (249 acres) of rangeland; 80 hectares (198 acres) of juniper and scattered juniper woodland; 0 hectares (0 acres) of riparian habitat; 2.6 hectares (6.4 acres) of oak/oak-pine and scattered oak/oak-pine woodland; and 211 hectares (522 acres) of shrub steppe habitat. About 65 percent of the shrub-steppe habitat is dominated by bunchgrass communities. Native shrub-steppe vegetation on the CARES site is relatively undisturbed due to the limited grazing that has occurred historically on the site.

Neither project is expected to result in impacts to state or federal threatened or endangered plant species since no threatened or endangered species were located during botanical surveys. In addition, wetlands are not expected to be affected by construction or operation of either Project. The primary cumulative impact to plant communities that would result from simultaneous

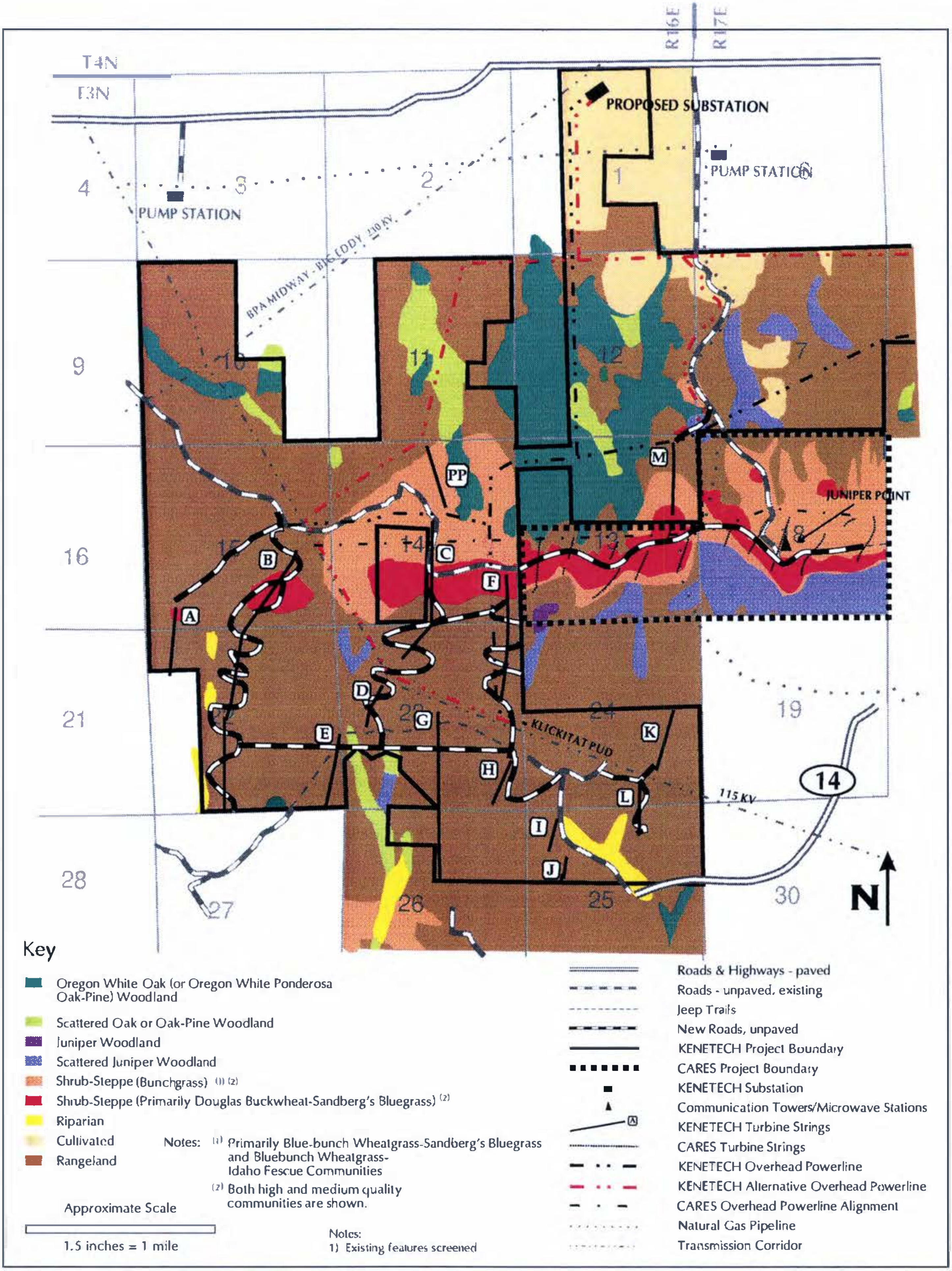

Figure 3.2 — Cumulative Impacts to Western Habitat Complex

construction and operation of the KENETECH and CARES projects would be cumulative impacts to the western habitat complex that extends over portions of both sites (see Figure 3.2). This habitat complex includes both shrub-steppe and oak communities and covers over 690 hectares (1,700 acres).

Table 3.4 summarizes direct impacts to the western habitat complex. Direct impacts from construction of both projects would include disturbance of about six percent of overall existing vegetation in this complex, including 3 hectares (6 acres) of oak/oak pine and 40 hectares (101 acres) of shrub-steppe. Indirect impacts would include splitting the habitat complex into smaller units and increasing the potential for invasive weeds. Development on the CARES Project site would be denser than development on the KENETECH Project site and would primarily involve disturbance to shrub-steppe communities, primarily Douglas' buckwheat/ Sandberg's bluegrass. The CARES powerline would create an additional corridor through the shrub-steppe habitat located on the KENETECH site. Splitting the habitat complex into smaller units combined with increased human activity in this area would lower the habitat's value for some wildlife.

TABLE 3.4
DIRECT IMPACTS TO WESTERN HABITAT COMPLEX

	KENETECH		CARES		Total	
	Hectares	Acres	Hectares	Acres	Hectares	Acres
Buckwheat[1]	3	8	17	43	20	51
Bunchgrass[1]	5	13	15	37	20	50
Oak/Oak Pine	2	5	<1	<1	3	6
Totals	10	26	33	81	43	107

[1] Shrub-steppe habitats.

In addition, soil disturbances, especially in the Douglas' buckwheat/Sandberg's bluegrass communities, would create the potential for invasive weeds to become established in this area. The Douglas' buckwheat/Sandberg's bluegrass communities would initially be most susceptible to invasive weeds, and successful methods for restoring this plant community are not known. Once disturbed, the Douglas' buckwheat/Sandberg's bluegrass communities would, therefore, typically be displaced by invasive weeds. Without controls, these weeds will tend to successfully compete with adjacent native vegetation. Thus, over time and without mitigation, the overall habitat quality of this area would be reduced, and shrub-steppe areas would become more like the grazed rangeland that is prevalent in most areas of the Columbia Hills. The value of invasive weeds for livestock grazing is generally less than the value of native grasses. Mitigation identified for each of the two projects would also mitigate cumulative impacts. Additional mitigation for cumulative impacts is discussed in Section 3.4.

3.3.4 Wildlife Resources (Non-Avian)

Common, non-avian wildlife that are likely to be present on both Project sites and in the Columbia Hills in general include a variety of small to large mammals such as shrews, mice, raccoons, weasel, badger, red fox, coyote, bobcat, and Columbian back-tailed deer. Common reptiles, including garter and rattle snakes, racer, and common lizards, use most habitat types found in the Columbia Hills, but are most likely found in talus and rock areas such as those found on the southern half of the CARES site.

Mitigation identified for each of the two projects separately would also reduce cumulative impacts. Mitigation to further reduce cumulative habitat impacts is discussed in Section 3.4.

Special-status species also use habitats found in the Columbia Hills. Oak and oak-pine woodlands, which provide habitat for the state-threatened western gray squirrel, are primarily found on the KENETECH site, while cliffs and talus slopes, which provide primary habitat for a variety of reptiles on the Washington "monitor" list, are primarily located on the southern portion of the CARES site. Both sites include juniper, which provides habitat for the juniper hairstreak, a butterfly that is a candidate for state listing. The CARES Project site and, to a lesser extent, the KENETECH Project site include rock outcrops and talus areas which provide habitat for the western gage lizard, a federal candidate. Nearby cliffs may provide roosting habitat for bats, including some species that are federal candidates.

The primary cumulative impacts to wildlife associated with development of the two projects would be the direct loss of habitat and indirect impacts which would occur in the vicinity of the western habitat complex located on the site. When considered separately, either project would leave relatively large portions of the complex undisturbed. When considered cumulatively, however, wider areas of this habitat complex would receive some disturbance and would, therefore, be less valuable to wildlife. Indirect impacts would include: a general reduction in overall habitat quality caused by splitting the habitat complex into smaller fragments; a higher potential for invasive weeds to become dominant; higher numbers and more concentrated man-made development; and increased human activity.

3.3.5 Birds

Year-long studies of avian use in the Columbia Hills indicate that the area supports a number of resident bird populations, but is not a major migratory corridor for raptors and other birds. Of the 22 special status bird species that were evaluated, eight were determined to be most important with respect to potential impacts either because of the numbers of birds using the area or because of their protected status as federally threatened or endangered species. These eight special status species include:

- Peregrine falcon (federal and state endangered)
- Bald eagle (federal and state threatened)
- Golden eagle (state candidate)
- Swainson's hawk (state candidate)
- Prairie falcon (state monitor)
- Turkey vulture (state monitor)
- Lewis' woodpecker (state candidate)
- Western bluebird (state candidate)

Two sightings of peregrine falcon were made in the eastern portion of the KENETECH site, in an area where turbine strings are not proposed. Peregrine falcons were never observed flying over the CARES site. A pair of peregrine falcons were observed frequenting the Rock Creek area, approximately 8 km (5 miles) east of the eastern edge of the KENETECH Project site and 19.3 km (12 miles) from the CARES site. However, no peregrine nests were identified within 16 km (10 miles) of the Columbia Hills study area. Peregrine falcons have a home range of up to 16 km (10 miles) from their nesting areas. Because waterfowl are a preferred prey for peregrine falcon and high cliffs are a preferred habitat type, they would be more likely to forage near the Columbia River than in the habitats found on the eastern portion of the KENETECH site. However, they could cross the site between foraging areas and are known to forage in upland areas north of the river (Anderson, pers. communication, 1994).

Between three and 10 individual wintering bald eagles were observed flying over the Columbia Hills area at altitudes that would potentially put them at risk of colliding with wind turbines. Three wintering bald eagle day roosts were located, near the Columbia River, east of the CARES site. Three night roosts were also observed. At dusk and dawn, bald eagles were most frequently observed flying over the eastern portion of the KENETECH site, in the vicinity of turbine strings Z, Y, AA, BB, and CC on their way to and from night roosts located in Luna Gulch, north of the KENETECH site. Between two and four eagles were found to roost at the Luna Gulch location. The direct flight paths between known day and night roosts do not cross over the CARES site, and no bald eagles were observed crossing that site during field studies. It is likely, however, that bald eagles occasionally fly over the CARES site.

Resident golden eagles were observed using all areas of the KENETECH and CARES sites, but used the south ridge face of the Columbia Hills most frequently. They also occasionally were observed flying along the ridge top, where turbines are proposed for both projects. Thirty-seven sightings of golden eagle were made during field studies. One active golden eagle nest was located in the Columbia Hills, approximately 3.2 km (2 miles) from the nearest turbine strings proposed on the CARES site and approximately 1.6 km (1 mile) from the nearest turbine strings proposed on the KENETECH site. Another nest was found on Miller Island, approximately 14.5 km (9 miles) south the CARES site.

Eighteen sightings of Swainson's hawk were made during the spring through fall studies; none were observed during winter studies because this species does not overwinter in the area. All sightings of Swainson's hawk were made in the eastern hills, ridge top, and northern plateau study units, primarily in the eastern hills area of the KENETECH site. Two active nest sites were located in the vicinity of the Columbia Hills. One nest was located downslope of Goodnoe Hills within 0.4 km (0.25 miles) of the nearest proposed KENETECH turbine string location. The second nest was located near Hoctor Road approximately 1.6 km (1 mile) from proposed turbine string locations on the KENETECH site and about 2.4 km (1.5 miles) from proposed turbine string locations on the CARES Project site. Swainson's hawk nest and forages in open habitats.

Seventeen sightings of prairie falcon were made during the spring through fall studies. They were also occasionally observed during the winter studies. Most prairie falcon activity was observed in the typical nesting, roosting, and foraging habitat along the cliffs of the Columbia River. During the winter study, prairie falcon were also observed along Hoctor Road. One prairie falcon nest was located south of the CARES site, on cliffs above SR-14. Another nest has been reported by the Washington Department of Fish and Wildlife to be located upslope of the Columbia Aluminum facility.

Fifty-nine sightings of turkey vultures were made during the spring through fall studies. Turkey vultures were not observed during winter studies because they leave the area during that period. Observations of turkey vultures were primarily made in the south-facing ridge face although they were occasionally observed in all study units. A communal nest was observed near Maryhill State Park.

Lewis woodpecker were observed to be relatively common near oak woodlands in the Columbia Hills and were typically observed flying below the altitude where they would vulnerable to collision with wind turbine blades. Western bluebirds were observed to migrate through the Columbia Hills and to breed on or near the project sites. One hundred and one sightings of western bluebirds were made during 16 observations in the spring through fall studies.

Other raptors, including American kestrel (125 sightings), red-tailed hawk (186 sightings), northern harrier (45 sightings) and sharp-shinned hawk (32 sightings) were observed in the area relatively frequently. Over 6,000 unidentified passerines were observed. Flocks of waterfowl were observed along the Columbia River; however, field studies suggest the project areas are not an important migratory corridor for waterfowl although agricultural lands receive some waterfowl foraging use.

Cumulative impacts to birds resulting from operation of the KENETECH and CARES projects would include an increased potential for collision with turbine blades due to the greater number of turbines that would be installed in the Columbia Hills and their wider distribution across the area. In addition, the CARES Project would introduce another potential risk factor—collision with guy wires—because the turbines proposed for the CARES project require guy wires for support. Both projects propose to incorporate design measures to minimize the potential for raptor electrocution into their powerline and powerpole designs.

The cumulative potential for peregrine falcons to collide with wind turbines associated with both projects would be low and would be similar to the potential created by the KENETECH Project alone for three reasons. First, peregrines were infrequently observed (two sightings) in the Columbia Hills. Second, peregrine falcons were only observed flying over the eastern portion of the KENETECH site. Finally, Rock Creek, where a pair of peregrines was observed more frequently, is located over 19.3 km (12 miles) from the CARES site while the home range of peregrines is typically about 16 km (10 miles).

The cumulative potential for bald eagles to collide with wind turbines associated with both projects would also be similar to but potentially higher than the risk created by the KENETECH Project alone because bald eagles were most frequently observed to cross the Columbia Hills in the eastern portion of the KENETECH site and known day and night roosts are located east of the CARES site. Bald eagle were not observed crossing the CARES site during field studies.

The cumulative risk of collision for other raptor species, which were observed in both Project sites, would generally be proportional to the increased number of turbines when the two projects are considered cumulatively. Based on estimates from other wind projects of annual raptor mortality from collision, cumulative raptor mortality could range from 1.7 to 5.8 birds per

100 turbines or from 8 to 25 birds per year. Mitigation incorporated into the design of the two projects would generally mitigate cumulative impacts.

3.3.6 Cultural Resources

Background research and cultural resource fieldwork identified a total of 144 cultural resource properties on the KENETECH and CARES project sites. Twenty-two of the properties are sites, while the remaining properties are isolates or cairns. Nineteen of the cultural sites on the KENETECH Project site and eight of cultural sites on the CARES Project site are eligible or potentially eligible for the National Register of Historic Places under Criterion D because they may be likely to yield information important to history or prehistory. These sites could potentially be adversely impacted by the proposed projects. Six cairns could also be potentially affected. It appears that nine of the 11 cultural resource sites located on the KENETECH Project site could be avoided through minor adjustments to features locations within turbine strings. Cairns could also be avoided.

In addition, review of oral history information prepared to date by the Yakama Indian Nation indicates that Juniper Point, on the CARES site, might qualify for listing as a traditional cultural property. Ongoing consultation will attempt to achieve an agreement with the Yakama Indian Nation and State Historic Preservation Office regarding the eligibility of Juniper Point for listing on the National Register of Historic Places, impacts from construction and operation of the CARES and KENETECH Projects, and measures to avoid or minimize such impacts. Consultation to date has revealed no other potentially eligible traditional cultural properties on the Project sites. However, landforms in the Columbia Hills form part of the tribal landscape with importance to Yakama Indians, and past traditional use by Native Americans indicates that burial sites may be located in this area. Cairns could potentially be burial markers.

The transmission line corridor extending from the western boundary of the CARES site into the KENETECH site has not been surveyed for cultural resources. This feature of the CARES Project creates the potential for additional impacts to unidentified cultural properties on the KENETECH site.

3.3.7 Aesthetics

Cumulative aesthetic impacts would result at locations where both Projects would be simultaneously visible. Generally, the western area of the KENETECH site would be seen from areas where the CARES site would also be visible. Cumulative aesthetic impacts are not expected from viewing locations near the eastern portion of the KENETECH site, such as the eastern end of Hoctor Road or along I-84 and SR-14 east of the John Day River.

Both projects would employ tubular-type towers that would appear similar in the landscape, thereby avoiding cumulative impacts associated with tubular and lattice-type towers being located in close proximity to one another. Potential cumulative aesthetic impacts that would be associated with the development of the two projects include:

- Short-term impacts resulting from construction activities that would be occurring simultaneously and that would be visible from off-site locations.

- A greater number of turbines on the landscape.
- Different arrangements and densities of turbines.
- Different blade configurations that would be apparent when turbines were not operating. (KENETECH turbines feature a three-blade rotor while CARES Project turbines feature a two-bladed rotor).

The following discussions summarize expected cumulative aesthetic impacts from five potential viewing areas: 1) within the Columbia River Gorge National Scenic Area; 2) from the general vicinity of Maryhill Museum and Maryhill State Park; 3) from SR-14 and I-84 east of the Scenic Area; 4) from the Goldendale Valley and along SR-97; and 5) from Hoctor Road. In addition, photosimulations from three viewpoints are included to illustrate how views from these locations would change with development of the two projects. The locations of these viewing areas and viewpoints are shown on Figure 3.3.

Columbia River Gorge National Scenic Area

From all potential viewing locations within the Scenic area, only the western portion of the KENETECH site would be visible, and Juniper Point would be the most predominant landform in the Columbia Hills. On the north side of the Columbia River, within the Scenic Area, only occasional glimpses of portions of the KENETECH and CARES the Project sites can be seen by those travelling east along SR-14 because twists and turns in the highway and intervening topographic features generally block the sites from view.

On the southern side of the Columbia River, clear views of portions of the KENETECH and CARES Project sites from within the Scenic Area occur more frequently. A long (approximately 5 km (3-mile)), clear view of the Project sites occurs for drivers travelling east on I-84 near the Deschutes River. At this location, both projects would be visible in the background view. The arrangement of KENETECH Project turbines would create a series long white lines running down the distant hillside. CARES Project turbines would create a more horizontal line at the crest near Juniper Point. Together, elements of the two projects would occupy a greater area of the distant view. At this distance, individual turbines may be visible; however, viewers would not likely be able to distinguish the three-bladed from the two-bladed models.

Vicinity of Maryhill Museum and Maryhill State Park

The general area including Maryhill Museum, Maryhill State Park, and the "Stonehenge" war memorial is located east of the Scenic Area and attracts a large number of visitors annually. Views of the western portion of the KENETECH site and the CARES site including Juniper Point can be seen from the grounds at Maryhill Museum and from Maryhill State Park; however, large trees obstruct the view in certain locations.

The most open and expansive view of the two project sites in this general area is from the "Stonehenge" memorial. From this viewpoint, the rolling hills of the western portion of the KENETECH site and the steeper south slope areas of the CARES site are clearly visible and dominant in the middleground view. High-voltage transmission towers are visible at the base of the middleground view; however, there is little encroachment on the remainder of the middle ground view. Figure 3.4 illustrates the view from "Stonehenge" with the two projects in place. From this viewpoint, KENETECH Project turbines would be visible in vertical rows running

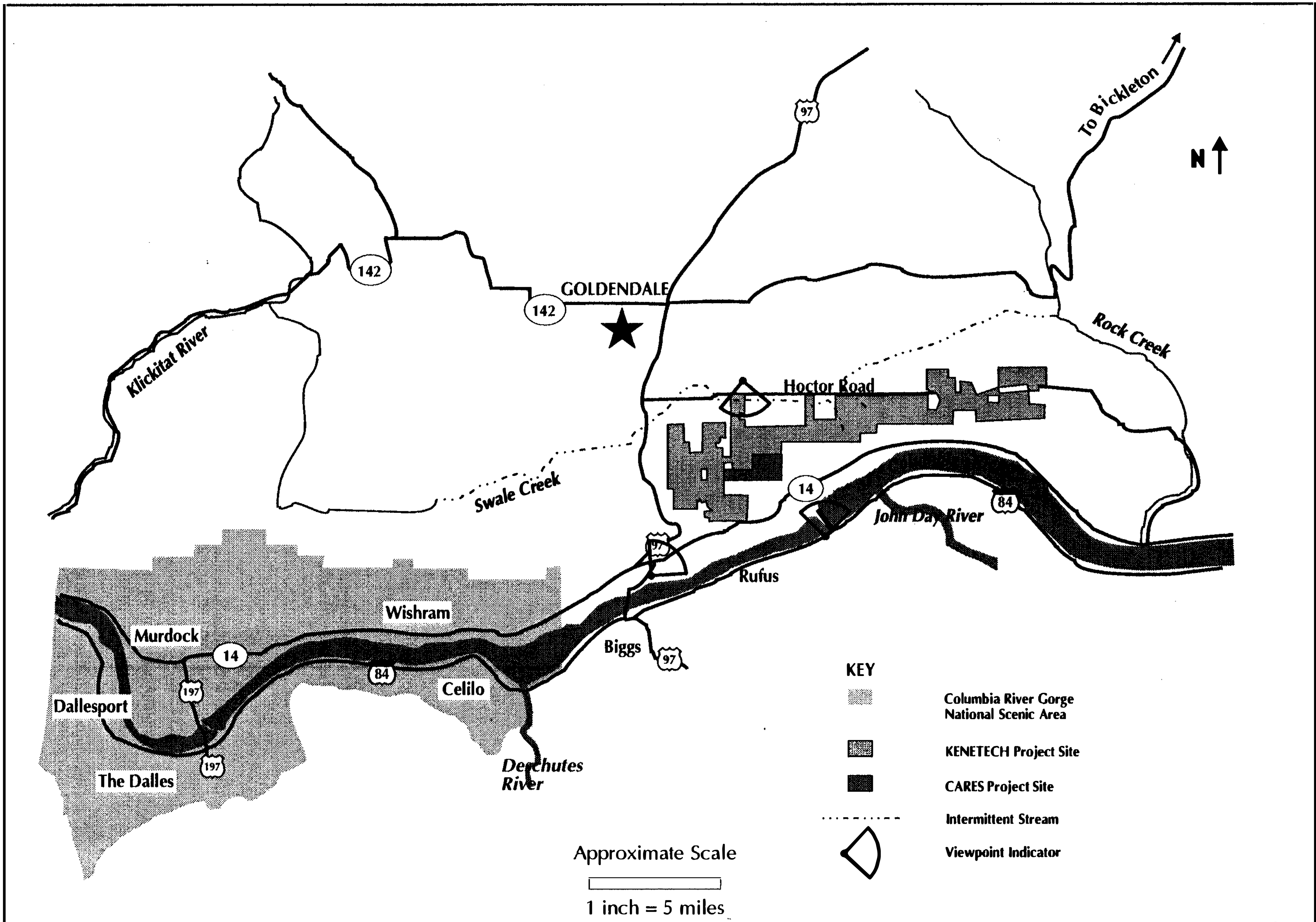

Figure 3.3 - Viewpoint Locations for Cumulative Impacts

Figure 3.4 View of KENETECH and CARES sites from "Stonehenge" (with Projects)

Figure 3.5 KENETECH and CARES sites from Giles French Park at John Day Dam (with Projects)

Figure 3.6 View of KENETECH and CARES sites from the Intersection of Hoctor Road and No. 12 Road (with Projects)

down the hillside that dominates the middleground of the view. CARES Project turbines would be visible in a more horizontal pattern near the crest of the Columbia Hills further to the east in the vicinity of Juniper Point. Thus, together, the two projects would occupy a greater area of the middleground view. Individual turbines would be visible, and viewers may be able to distinguish the two-bladed CARES Project turbines from the three-bladed KENETECH turbines when turbines were not operating. Roads would also be visible on the KENETECH site. Overall from this location, the projects would be more distinct from one another compared to views from a greater distance such as those from within the Scenic Area.

SR-14 and I-84 East of the Scenic Area

Outside of the Scenic Area, the western area of the KENETECH Project site and portions of the CARES site would be visible from a number of locations. Along I-84 in Oregon, long views of these areas would occur between the eastern boundary of the scenic area and the town of Rufus. Views from the towns of Biggs and Rufus being generally similar to the view from "Stonehenge."

Further east along I-84, portions of the central area of the KENETECH Project site and portions of the CARES site would be visible. Figure 3.5 is an example of a view from this area taken from Giles French Park at John Day Dam. This photosimulation is oriented to the northeast and includes portions of the Columbia Hills located east of Juniper Point. The Columbia River forms the foreground view; the Columbia Hills form the middleground view and recede into the distance further east. Columbia Aluminum, high-voltage transmission towers, and portions of SR-14 are visible in the foreground view. A large, orange and white high-voltage tower adjacent to John Day Dam is located on the right edge of the photograph. More distant and further east, portions of KENETECH project turbine strings that cross the crest of the Columbia Hills would also be visible. From this viewpoint, the visual patterns created by the arrangement of turbines on the landscape would be similar for the two projects. Although individual turbines would be visible, viewers may not be able to distinguish the two-bladed CARES Project turbines from the three-bladed KENETECH turbines from this location. Relative to views from the Oregon side of the Columbia River, visual changes would be more obvious when viewed from some locations along SR-14 and would be less obvious from other locations along SR-14 where the viewing angle is obscured.

Goldendale and US-97

Although the crest of the Columbia Hills is visible from some areas near Goldendale, much of the sites would be obscured from view for viewers travelling south from Goldendale on SR-97 by topographic features, including two cinder cones formed from old volcanoes. From US-97, both projects would be most easily seen by drivers travelling north on the steep portion of that roadway that climbs from SR-14 just as the roadway makes a sweeping turn to the left. At this point, the lower portion of the western KENETECH Project site and portions of the CARES site come into view. Views from this location would be similar to those from "Stonehenge" but would be at a closer range and have a more eastern orientation. From this vantage, however, the sites would only be visible for a short period of time because of the winding character and deep road cuts associated with this portion of US-97.

Hoctor Road

The northern portion of the KENETECH and CARES site would be visible from many locations and rural residences along Hoctor Road although both projects could be viewed simultaneously only from the western end of this roadway. Figure 3.6 is from a viewpoint located at the intersection of Hoctor Road and No. 12 Road. This view currently consists of roadside vegetation, barb-wire fencing, and relatively flat cropland and pasture in the foreground view. Rolling hills consisting of rangeland and scattered woodlands form the middleground view, and sky forms the background view. The view from this location is expansive from east to west, and most travellers along Hoctor Road would drive by this location. From this viewpoint, turbines from both projects would be visible in the middleground view along the crest of the hill (see Figure 3.6). CARES Project turbines would be located in the eastern portion of the view; KENETECH Project turbines would be located in the western portion of the view. Turbine strings from the two projects would create similar patterns on the landscape from this viewpoint location. At this distance (2 to 3 miles), viewers may not be able to distinguish the three-bladed KENETECH turbines from the two-bladed CARES project turbines.

3.3.8 Land Use, Recreation, and Socioeconomics

The CARES Project site and most of the KENETECH Project site would be located on land zoned Extensive Agriculture (EA). The purpose of the EA is to "encourage the continued practice of farming on lands best suited for agriculture and to prevent or minimize conflicts between common agricultural practices and non-farm uses." The KENETECH Project site is owned by a number of private landowners and is primarily used for livestock grazing, although some cultivation occurs in the northern portion of the site. The CARES Project site is owned by Columbia Aluminum. Grazing activity on the CARES site is generally less intensive than on the KENETECH site, and none of the CARES site is currently cultivated. A number of utility corridors currently cross the KENETECH site, including high-voltage transmission lines and natural gas pipelines. A radio and microwave communication station is located at Juniper Point of the CARES site. The CARES site is also crossed by a natural gas pipeline.

Provided that appropriate precautions are taken to minimize noise impacts, construction disturbance, and the potential for discarded or nonfunctioning equipment to be stockpiled on site; and provided that aggressive actions are taken to control erosion, revegetate disturbed areas, and provide for the long-term control of invasive weeds; neither project would substantially affect the area's potential to support agricultural uses, including grazing. Less than 1.5 percent of the KENETECH Project site would be occupied by Project features; less than five percent of the CARES Project site would be occupied by Project features. In addition, the CARES Project would create an additional transmission corridor across the KENETECH site. Both projects would create a limited number of permanent local jobs, provide construction employment, provide royalty or lease payments to landowners, and contribute to the local economy through increased purchases of goods and services. The effect of local job creation would be relatively small since together the two projects would require 15 or fewer full-time workers during operation.

3.3.9 Noise

Three types of cumulative noise impacts could potentially result from simultaneous operation of the KENETECH and CARES Projects:

- A greater number of residential receivers in the Columbia Hills area could experience higher than background noise levels.

- Receivers could experience noise levels with the two projects together that would exceed the highest impact created by either Project.
- Some residential receivers that would not experience noise levels exceeding standards with either Project, could experience noise levels that exceed the 60-dBA daytime noise standard or the 50-dBA nighttime noise standard when noise levels from the two Projects are combined.

Predicted noise levels at 16 receptor locations throughout the Columbia Hills are shown in Table 3.5. This table illustrates noise levels resulting from each Project as well as noise levels resulting from the combined effects of both Projects. Noise levels of the two projects are not additive because the decibel scale is logarithmic.

Relative to the CARES Project alone, which would only cause an impact of 50 dBA or greater at only one location, the two projects together would cause an impact of 50 dBA or greater at eight receptor locations. This is primarily due to the influence of the KENETECH Project, which would by itself cause impacts of 50 dBA or greater at the same eight locations. Combined impacts of the two projects would not cause any additional receptors to exceed the 50 dBA or 60 dBA noise standards.

Together, the two projects would cause slightly elevated noise levels at Receptors 5 through 9 and at receptor 16 relative to the greatest noise levels created by the projects considered separately. Receptors 9 through 15 are located along Hoctor Road between Clyde Story and Bigby roads. The cumulative effect of the two projects would add 1 to 2 decibels to noise impacts that would result at these locations from the KENETECH Project alone. The greatest impact from either project, and the greatest cumulative impact would occur at Receptor 16, which is on property that was platted for residential use prior to enactment of the Klickitat County zoning ordinance. There is currently no residence constructed at this location and road access, drinking water, and wastewater (septic) service would be required in order to build and occupy a residence on this property. Therefore it is not certain whether this receiver would qualify as a residential property for purposes of its environmental designation for noise abatement. At Receptor 16 cumulative noise impacts would approach, but be somewhat lower than the 60 dBA. It should be noted, however, that noise modelling for the KENETECH Project includes "worst-case" assumptions about the number of turbines in each turbine string and, therefore, both the predicted impacts from the KENETECH Project and predicted cumulative impacts may, therefore, somewhat overestimate the actual noise levels that would be experienced at some locations.

Mitigation for the two projects separately would also help mitigate cumulative impacts. Compliance with noise standards will be the responsibility of the Applicants and turbine operations will be subject to noise abatement through County enforcement actions, typically initiated through complaints.

3.3.10 Air Quality

The primary cumulative impact to air quality from the development of the CARES and Phase 1 KENETECH projects will be the increased area-wide levels of fugitive dust due to the essentially simultaneous construction of the two projects. Together about 182 hectares (452 acres) would be disturbed, resulting in about 10.7 metric tons of fugitive dust not taking into account mitigation. This impact would be short-term in nature. The increase in overall dust generation in the area due to the operation of the two projects would be minimal because the majority of the areas disturbed would be restored after construction. Mitigation identified to reduce air quality impacts for the two projects individually would also reduce cumulative air quality impacts.

TABLE 3.5
CUMULATIVE CONSTRUCTION NOISE LEVELS DURING OPERATION

Receptor	KENETECH (dBA)	CARES (dBA)	Cumulative (dBA)
1.	50	32	50
2.	55	39	55
3.	49	38	49
4.	45	20	45
5.	42	34	43[1]
6.	40	36	41[1]
7.	38	37	41[1]
8.	40	37	42[1]
9.	41	35	42[1]
10.	56	31	56
11.	54	28	54
12.	50	24	50
13.	53	20	53
14.	55	16	55
15.	52	16	52
16.	55	57	59[1]

1 Receptors where cumulative noise impacts exceed the greatest noise impact created by one of the two Projects.

3.3.11 Traffic/Transportation

Cumulative transportation impacts would primarily result from use of Hoctor Road during simultaneous construction of the two projects. For the KENETECH Project, construction access would be provided at: three locations from Hoctor Road (at the Miller Road intersection, Oak Flat Road intersection, and about 1.5 miles east of the Oak Flat Road intersection); one location from US-97 in Section 9, T3N R16E; and one location from SR-14 in Section 25, T3N R16E (see Figure 3.1). An additional access from Hoctor Road to the central portion of the KENETECH site (near turbine strings T and U) would also be constructed in Section 2, T3N R17E. Construction access for the CARES Project is proposed to be from Hoctor Road at its intersection with Miller Road (see Figure 3.1).

Table 3.6 illustrates expected traffic volumes on Hoctor Road, US-97, and SR-14 with and without the two projects. Cumulative construction traffic along Hoctor Road would exacerbate impacts that would occur if either project were being constructed. Specifically, the traffic on Hoctor Road from both projects would interfere with the County's plans to repair the two western sections of Hoctor Road (a 0.8-mile stretch immediately east of US-97 and a 2.0-mile stretch from No. 12 Road to Willis Road) during the summer of 1995. During this time, site access would be more difficult for the two projects, which could potentially affect the projects' construction schedules. In addition, the increased concentration of heavy traffic during construction of the two projects would also accelerate or increase structural damage to Hoctor Road, which was constructed over compacted native soils without an engineered subgrade. These native soils are moisture-sensitive, making the road bed susceptible to failure from heavy loads that cause lateral displacement of the subgrade material.

TABLE 3.6
CUMULATIVE IMPACTS FROM HEAVY CONSTRUCTION VEHICLE TRAFFIC

	Projected 1995	KENETECH			CARES			Total		
		Const.	Total	% Incr.	Const.	Total	% Incr.	Const.	Total	% Incr.
US-97	4,700	141	4,841	3	20	4,720	0.4	161	4,861	3
SR-14	1,466	29	1,495	2	20	1,486	1.4	49	1,515	3
Hoctor Road	208	92	300	44	20	228	10	112	320	54

3.3.12 Public Services and Utilities

The Kenetech and CARES projects would receive public services from the same agencies, including the Klickitat County Fire District No. 7 for fire service, and the Klickitat County Sheriff's Department for police and emergency medical service. Neither project would require potable water or sewage service. The CARES project would require electric service.

Cumulative impacts to public services could result during the simultaneous construction of the Kenetech and CARES projects. Proportionally-higher demand for fire, police, and emergency medical service due to the combined construction activities could result. During operation, cumulative demand for fire, police, and emergency medical service would be much less than during construction because of reduced staffing levels and site activities. Because operation of the CARES Project would include full-time on-site staffing, it may somewhat reduce the potential for trespass and vandalism on adjacent portions of the KENETECH site.

The Kenetech and CARES projects could create cumulative impacts to communication systems located on Juniper Point if turbines or other project structures are located in the pathway of directional microwave signals. Obstruction of microwave signals by turbine blades or towers could interrupt or weaken these signals. Actual impacts would depend on the path and elevation of the microwave signals and the precise location and elevation of turbines. Mitigation identified to reduce impacts of the two projects individually would also reduce cumulative impacts.

3.3.13 Health and Safety Risks

Potential health and safety risks associated with the construction and operation of the KENETECH and CARES projects include the potential for worker injury during construction, the potential for electric shock and fires during Project construction and operation, general worker safety during Project operation and maintenance, and the potential effects of electromagnetic fields. These risks are expected to be low for either project and would also be low for the two projects considered cumulatively. The potential for fire and electrocution pose the greatest risks; however, these risks are greatly reduced by employing appropriate design, construction, and operating practices. Mitigation identified to reduce impacts of the two projects individually would also reduce cumulative impacts.

3.4 Mitigation for Cumulative Impacts

Mitigation identified to mitigate impacts of the KENETECH and CARES Projects individually would also help mitigate cumulative impacts. In addition, the following measures, targeted specifically at cumulative impacts could be employed:

- To the extent feasible, given safety considerations and the status of easements, realign the CARES Project powerline where it is proposed to cross the KENETECH site to follow the KENETECH powerline alignment.
- Jointly coordinate construction activities between the two projects and with the Klickitat County Department of Public Services to reduce traffic conflicts with scheduled repairs on Hoctor Road.
- Investigate the feasibility of jointly using the KENETECH access from US-97 during construction in order to provide an alternative access to the CARES site that avoids use of Hoctor Road during scheduled county road improvements.
- Coordinate the paint colors for the two projects' turbines.
- Coordinate revegetation plans and activities and long-term efforts to control invasive weeds where the two project sites adjoin.

PART 4: GLOSSARY AND ACRONYMS

Part 4—Glossary and Acronyms

GLOSSARY

Aboriginal Settlements are the dwellings of original inhabitants of an area.

Aggregate is gravel and crushed stone used for mixing foundations and surfacing roads.

Archaeological Site is a site containing an archaeological resource that is any material remains of human life or activities that are at least 100 years of age, and that are of archaeological interest.

Attenuate means to reduce the force, value, or amount.

Avian of, relating to, or typical of birds.

Backfill is earth used for refilling a trench or an excavation.

Bedding is a condition where planes divide sedimentary rocks of the same or different physical characteristics.

Best Management Practices (BMPs - general definition) means schedules of activities; prohibitions of practices; maintenance procedures; other physical, structural, and/or managerial practices to prevent or reduce the pollution of waters of the State of Washington.

Cairn is a mound of stones.

CCS Flakes are natural fragments of cryptocrystalline silicates.

Cinder Cone is a cone composed of particles ejected from a volcano.

Collector Arterial is a road that is designed to distribute traffic from groups of residences and link the traffic with county arterials and state and federal highways.

Conservation Reserve Program (CRP) is a national program designed to take small grain producing lands on highly erodible soils out of production to reduce erosion and degradation.

Construction Staging Area is an area required during construction for storing construction equipment and materials.

Conventional Tires are tires with inflatable inner tubes.

Corrosivity is the degree to which chemical processes, such as oxidation, gradually destroy metal alloys.

Critical Altitude as used in this EIS refers to the altitudes at which birds are most likely to have collisions with wind turbine blades [approx. range from 5-56 meters, (16-184 feet)].

Cultural Resource Site for this EIS is defined as an area identified as containing more than 10 cultural artifacts per 10 m^2.

Cultural Property is a definite location of past human activity, occupation, use, or traditional cultural practice identifiable through field survey, historical documentation, or oral history.

Culvert is a covered channel or a large-diameter pipe for transmitting surface water.

Daily Traffic Volume is the total amount of traffic that travels a given roadway in either direction over a 24-hour period.

dBA means an A-weighted decibel scale that measures sound levels and is weighted to frequencies perceived by humans.

Decibel is a measure of sound intensity, defined as 10 times the logarithm of the ratio of two sound pressures squared.

Dendritic means a branching or treelike shape.

Detention means the temporary storage of stormwater to improve quality and/or reduce the mass flow rate of discharge.

Easement is a right, as a right-of-way, afforded a person to make limited use of another's real property.

Electromagnetic Spectrum is the total range of wavelengths or frequencies of electromagnetic radiation, extending from the longest (radio waves) to the shortest (cosmic rays).

Electromagnetic Fields are forcefields associated with electric charge in motion and have both electric and magnetic components and contain a specific amount of electromagnetic energy.

Equivalent Sound Level (L_{eq}) is the level of constant sound with the same sound energy as the actual fluctuating sound.

Erosion and Sediment Control BMPs means BMPs that are intended to prevent erosion and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, and sediment traps and ponds. Erosion and sediment control BMPs are synonymous with stabilization and structural BMPs.

Erosion means the wearing away of the land surface by running water, wind, ice, or other natural processes.

Erosion and Sediment Control Plan means a document that describes the potential for erosion and sedimentation problems, and explains and illustrates the measures that are to be taken to control those problems.

Ethnobotanical pertains to botanical resources that are considered an important part of indigenous cultures.

Ethnography is the study of the origin and the physical, social, and cultural development of indigenous societies.

Fill Material is earth used for embankments or as backfill.

Final Stabilization means the completion for all soil-disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures that will prevent erosion.

Foraging is the act of looking or searching for food.

Fugitive Dust is temporary dust usually created as a result of construction or agricultural activities.

Gradient is a slope expressed as a ratio of the horizontal to the vertical distance.

Grading is segregating a product into a number of adjoining categories that often form a spectrum of quality.

Groundwater means water in a saturated zone beneath the land surface.

Guy Wire is a rope or wire securing a structure in a vertical position.

Habitat is the environment in which an organism or biological population usually lives or grows.

Habitat Complex is a large area containing a variety of contiguous native plant communities.

Habituate means to develop a tolerance or psychological dependence through frequent use.

Hectare is a metric unit equal to 2.471 acres.

Impervious pertains to materials that fluids cannot pass through.

In-community-processes include those processes that foster natural sustainability and growth of a given plant community.

Isolates in this EIS are defined as isolated artifacts that do not meet the definition of a *Cultural Resource Site.*

Jumper Wires are short lengths of conductor used to make a connection between two points or terminals in a circuit to provide a path around a break in a circuit.

Lightening Arrestor is a protective device designed primarily for connection between a conductor of an electrical system and ground to limit the magnitude of transient overvoltages on equipment.

Line of Sight is the actual physical path a microwave beam takes to transmit its signal from one point to another.

Magnetic Field is one of the elementary fields in nature; it is found in the vicinity of a magnetic body or current-carrying medium and, along with electric field, in a light wave.

Mean Sea Level (MSL) is the average sea surface level for all stages of the tide over a 19-year period, usually determined from hourly height readings from a fixed reference level.

Megahertz (MH) is a unit of frequency, equal to 1,000,000 hertz.

Meteorological Towers are towers used to collect data on windspeed and direction.

Microwave Repeater is a tower equipped with a receiver and transmitter for picking up, amplifying, and passing in either direction the signal sent over a microwave network.

Milligauss (mG) is a unit of magnetic flux density equal to one-thousandth of a gauss.

Mitigation includes avoiding an adverse impact by not taking a certain action or parts of an action; minimizing adverse impacts by limiting the degree of magnitude of the action and its implementation; rectifying an adverse impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating an adverse impact over time by preservation and maintenance operations during the life of the actions; and compensating for adverse impacts by replacing or providing substitute resources or environments.

Nacelle is a fiberglass enclosure that houses the gearbox, generator, and hydraulic controls on a wind turbine.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters from point sources.

National Environmental Policy Act is a federal act passed in 1969 requiring the environmental review of most federal or federally approved projects and programs.

Noxious Weeds are invasive plants that rapidly move in and take over native plant communities and are often dangerous for animals to ingest.

Omnidirectional means radiating or receiving equally well in all directions.

Overlay Zone is a secondary land use zone that may be imposed over a land use primary zone.

Overstory refers to the vegetation that occupies the higher elevations in a large plant community, such as large oak trees.

Pad-Mount Transformers are small electrical devices set on a concrete foundation that convert or "step up/step down" the incoming voltage to a higher/lower outgoing voltage.

Particulates are fine solid particles that remain individually dispersed in the atmosphere.

Passerines are perching birds and songbirds such as jays, blackbirds, sparrows, finches, and warblers.

Permeability is the capacity of a porous rock, soil, or sediment to transmit a fluid.

Pollutant Discharge is any dredged soil, solid waste, incinerator residue, filter backwash, sewage, sewer sludge, garbage, munitions, chemical waste, biological materials, radioactive materials, heat, rocks, sand, discarded equipment, or industrial, agricultural, or municipal waste discharged into water.

Population Density is the number of people located in a given area.

Potable Water is water considered safe for human consumption.

Primary Zoning District is a district set forth by standards which control density and create uniform districts with compatible uses.

Principal Arterial is a road designed to meet appropriate state and federal design standards and is intended to move traffic safely and efficiently to and from major destinations in a given location.

Priority Habitat is a designation given by the Washington Department of Fish and Game to habitats that provide unique or significant value to wildlife species.

Radio Repeater is a repeater that acts as an intermediate station in transmitting radio communications signals or radio programs from one fixed station to another; serves to extend the reliable range of the originating station.

Raptors are birds of prey, such as hawks or owls.

Recreational Species are those species that can be legally hunted when in season by those with the proper permits.

Repeater Station is a station containing one or more repeaters.

Right-of-Way Width is the width needed to properly construct a roadway; usually exceeds the actual width of paved road.

Roost Site is a place where birds go to rest or sleep.

Sediment means the fragmented material that originates from the weathering and erosion of rock or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Seismic Event is an "earthquake."

Significant Impact is an impact that has reasonable likelihood of more than a moderate adverse impact on environmental quality (WAC 197-11-794).

Silt Loam are moderately erodible soils that consist largely of clay and silt.

Special Status Species are classified either under state or federal laws or programs as endangered, threatened, proposed, candidate, sensitive, or monitor status.

Stabilization means the application of appropriate BMPs to prevent the erosion of soils, such as temporary and permanent seeding, vegetative covers, mulching and matting, plastic covering, and sodding (see also the definition of Erosion and Sediment Control BMPs).

Stormwater is a water that falls as precipitation and drains from the land surface.

Subgrade is the existing natural soil layer upon which imported soil component layers, such as topsoil or road foundation materials, are placed during the construction of a given project.

Substation is an assembly of equipment in an electric power system through which electric energy is passed for transmission, transformation, distribution, or switching.

Swales are slight or shallow depressions amidst generally level land.

Switchbacks are a zigzag arrangement of road by which vehicles can reach a higher or lower level by succession of easy grades.

Turbine String is a continuous line of individual wind turbines.

Ultra High Frequency (UHF) is the band of frequencies from 300-3000 megahertz in the radio spectrum, corresponding to wavelengths of 10 centimeters to 1 meter.

Understory refers to the vegetation beneath taller, shading vegetative cover and occupying ground level or lower elevation areas.

Very High Frequency (VHF) is the band of frequencies from 30-300 megahertz in the radio spectrum, corresponding to wavelengths of 1 meter to 10 meters.

Visual Resources are visual features of the landscape, the character of those features, and the sensitivity of those features to change.

Waters of the State includes those waters in the State of Washington as defined as "waters of the United States" in 40 CFR Subpart 122.2 and as defined in Chapter 90.48 RCW which include lakes, rivers, ponds, streams (including intermittent streams), inland waters, underground waters, salt waters, and all other surface waters and water courses within the jurisdiction of the State of Washington.

Wetlands are areas inundated or saturated by water at a frequency or duration sufficient to support a prevalence of plants commonly known as hydrophytic vegetation, and animals typically adapted for life in saturated conditions.

Wind Erosion causes detachment, transportation, and deposition of loose topsoil or sand by the action of wind.

ACRONYMS

BMP	Best Management Practice
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
EMF	Electromagnetic Fields
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESC Plan	Erosion and Sediment Control Plan
kV	Kilovolt
mG	Milligauss
MW	Megawatt
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service (formerly SCS)
ODFW	Oregon Department of Fish and Game
PM_{10}	Particulate matter less than 10 microns
PUD	Public Utility District
RCW	Revised Code of Washington
SCS	Soils Conservation Service
SEPA	State Environmental Policy Act
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
$\mu g/m^3$	Micrograms per cubic meter

PART 5: REFERENCES

Part 5—References

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PART 6: DISTRIBUTION LIST

Part 6—Distribution List

6.1 DEIS Recipients

The following recipients have been sent copies of the DEIS. In addition certain recipients were sent copies of separately bound technical reports as indicated by:

[1] Sent copy of Appendix B–Washingtin Windplant #1 Botanical Resources Field Survey

[2] Sent copy of Appendix C–Avian Use of Proposed KENETECH and CARES Windfarm Sites in Klickitat County, Washington

[3] set copy of Appendix D–Cultural Resources Assessment of the KENETECH Windpower Washington Windplant No. 1 Project, Klickitat County

Federal Government

Bureau of Indian Affairs [1]
June Boynton
911 NE 11th Ave.
Portland, Oregon 97232

Bureau of Indian Affairs [1]
Rob Palmer
P.O. Box 632
Toppenish, WA 98948

Bonneville Power Administration [1][2][3]
Kathy Fisher, R.A.E.
P.O. Box 3621
Portland, OR 97208-3621

Conboy Lake Wildlife Refuge
100 Wildlife Refuge Road
Glenwood, WA 98619

Environmental Protection Agency [1][2][3]
1200 Sixth Avenue
Seattle, WA 98101

Federal Aviation Administration
1601 Lind Ave. S.W.
Renton, WA 98055-4056

U.S. Army Corps of Engineers
Portland District
P.O Box 2946
Portland, OR 97208-2946

U.S. Army Corps of Engineers
Regulatory Branch/Eastern WA
P.O. Box 273
Chattaroy, WA 99003

U.S. Army Corps of Engineers
John Day Dam
Rufus, OR 97050

U.S. Department of Interior, Fish and Wildlife Service [1][2]
Portland Area Office
911 NE 11th Ave.
Portland, OR 97232-4181

U.S. Department of Interior, Fish and Wildlife Service [1][2]
Portland Field Office
2600 SE 98th Avenue, Suite 100
Portland, OR 97266

U.S. Department of Interior, Fish and Wildlife Service [1][2]
Ecological Services
3704 Griffin Lane SE, Suite 102
Olympia, WA 98501-2192

U.S. Department of Interior, Fish and Wildlife Service [1][2]
Moses Lake Sub Office
P.O. Box 1157
Moses Lake, WA 98837

U.S. Federal Hwy Administration
Don Levine
711 S. Capital Way, Suite 501
Olympia, WA98501

USDA Forest Service
Mike Boynton
Columbia River Gorge NSA
902 Wasco Ave.
Hood River, OR 97031

USDA Natural Resource Conservation Service
Eastern and Central District
1107 S. Columbus
Goldendale, WA 98620

State Government

Maryhill State Park
50 Hwy 97
Goldendale, WA 98620

Washington Department of Natural Resources [1]
Natural Heritage Program
900 47th Ave. NE
Mail Stop EX-13
Olympia, WA 98504

State Office of Archaeology and Historic Preservation [1][3]
P.O. Box 84300
Olympia, WA 98504

Oregon Department of Energy
Don Bain
625 Marion Street NE
Salem, OR 97310

Oregon Department of Fish & Wildlife [2]
Christopher Carey
61374 Parrell Rd.
Bend, OR 97702

Oregon Department of Fish & Wildlife
P.O. Box 59
Portland, OR 97207

Washington Department of Agriculture
101 General Admin. Bldg, AX-13
210 11th Street
Olympia, WA 98504-3200

Washington Department of Fish and Wildlife [1][2]
David P. Anderson
5405 N.E. Hazel Dell Ave.
Vancouver, WA 98663

Washington Department of Fish and Wildlife [1][2]
Carl Dugger
5405 N.E. Hazel Dell Ave.
Vancouver, WA 98663

Washington Department of Fish and Wildlife [1][2]
P.O. Box 43200
Olympia, WA 98504-3200

Washington Department of Community, Trade and Economic Development
9th and Columbia
P. O. Box 48300
Olympia, WA 98504-8300

Washington Department of Utilities & Transportation Comm.
1300 S. Evergreen Park Dr. SW
Mail Stop FY-11
Olympia, WA 98504

Washington Parks and Recreation Committee
Mike Ramsey
P.O. Box 42668
Olympia, WA 98504

Washington State Department of Ecology
106 S. 6th Avenue
Yakima, WA 98902-3387

Washington State Department of Transportation
P.O. Box 1709
Vancouver, WA 98668

Washington State Department of Transportation
P.O. Box 47300
Olympia, WA 98504-7300

Washington State Dept. of Ecology, PV-11 [1][2][3]
Barbara J. Ritchie
P.O. Box 47703
Olympia, WA 98504-7703

Washington State Energy Office
809 Legion Way SE
P.O. Box 43165
Olympia, WA 98504-3165

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The Dalles, OR 97058

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P.O. Box 505
White Salmon, WA 98672

Columbia River Gorge Commission
P.O. Box 730
White Salmon, WA 98672

Dallesport Community Council
Jim Wise
P.O. Box 763
Dallesport, WA 98617

Gilliam County Planning Dept.
Alcenia Byrd
P.O. Box 427
Condon, OR 97823

Goldendale Chamber of Commerce
P.O. Box 524
Goldendale, WA 98620

Goldendale City Manager
P. O. Box 69
Goldendale, WA 98620

Goldendale Public Library [1][2][3]
131 West Burgen
Goldendale, WA 98620

Klickitat County
Alan Shipp, Assessor
205 S. Columbus Ave.
Goldendale, WA 98620

Klickitat County
Nancy Evans, Auditor
205 S. Columbus Ave.
Goldendale, WA 98620

Klickitat County
Mark Bryan, Emergency Services
P.O. Box 5
Goldendale, WA 98620

Klickitat County
Extension Agent
228 W. Main, Room 210
Goldendale, WA 98620

Klickitat County
Port District
P.O. Box 1429
White Salmon, WA 98672

Klickitat County
Knute Rife, Prosecuting Attorney
205 S. Columbus Ave.
Goldendale, WA 98620

Klickitat County
Robert Niemela, Treasurer
205 S. Columbus Ave.
Goldendale, WA 98620

Klickitat County
Marty Hudson, Director
Weed Control
228 W. Main
Goldendale, WA 98620

Klickitat County
Beth Pine, Tourism Director
205 S. Columbus Ave.
Goldendale, WA 98260

Klickitat County Board of Adjustment
Carl Allaway
18 Stoller Rd.
Trout Lake, WA 98650

Klickitat County Board of Adjustment
Ray Thayer, NMI
(also property owner within 300 feet of Project site)
391 Hoctor Rd
Goldendale, WA 98620

Klickitat County Board of Adjustment
James Dean
55 Mt. Adams Hwy
Glenwood, WA 98619

Klickitat County Board of Adjustment
Henry Garner
851 Dalles Mtn. Rd.
Centerville, WA 98613

Klickitat County Board of Adjustment
Mike Smith
P.O. Box 137
Dallesport, WA 98617

Klickitat County Board of Commissioners
205 S. Columbus Ave.
Goldendale,WA 98620

Klickitat County Planning Commission
Gayla Guenther
335 Snowberry Lane
Goldendale, WA 98620

Klickitat County Planning Commission
Victor Clausen
37 Stoller Rd.
Trout Lake, WA 98650

Klickitat County Planning Commission
Dennis Jaekel
880 Jaekel Rd.
Centerville, WA 98613

Klickitat County Planning Commission
Craig Schuster
965 Bickleton Rd.
Goldendale, WA 98620

Klickitat County Planning Commission
Fred Wilkins
P.O. Box 92
Bickleton, WA 99322

Klickitat County Planning Commission
Randy Knowles
P.O. Box 73
Bingen, WA 98605

Klickitat County Planning Commission
Sondra Clark
P.O. Box 100
Lyle, WA 98635

Klickitat County Planning Commission
Barton Crall
P.O. Box 526
White Salmon, WA 98672

Klickitat County Planning Director [1][2][3]
Curt Dreyer
228 W. Main, Rm. 150
Goldendale, WA 98620

Klickitat County Public Services
Ed Hoyle, County Administrator
205 S. Columbus Ave.
Goldendale, WA 98620

Klickitat County PUD #1
1313 S. Columbus Ave.
Goldendale, WA 98620

Klickitat County Sheriff
205 S. Columbus Ave.
Goldendale,WA 98620

Klickitat Economic Development Council
P.O. Box 450
White Salmon, WA 98672

Klickitat/Skamania Community Dev. Council
P.O. Box 1580
White Salmon, WA 98672

Lyle Community Council
Don Brasher
P.O. Box 695
Lyle, WA 98635

Mid Columbia Economic Dev. Council
1113 Kelly Ave.
The Dalles, OR 97058

NW Power Planning Council
809 Legion Way SE
Olympia, WA 98504

Rural Fire District #7
327 W. Brooks
Goldendale, WA 98620

Rural Fire District #9
c/o Dale Conley
Roosevelt, WA 99356

Sherman County Planning Dept.
500 Court
Moro, OR 97039

Wasco County Planning Dept.
2705 E. 2nd Street
The Dalles, OR 97058

White Salmon Public Library [1][2][3]
142 E. Jewett Blvd.
White Salmon, WA 98672

Wishram Community Council
Ruth Schwinof
P.O. Box 382
Wishram, WA 98673

Tribes

Confederated Tribes of the Warm Springs Reservation [1][2][3]
P. O. Box C
Warm Springs, OR 97761-0078

Yakama Indian Nation Cultural Resource Program Manager [1][2][3]
Johnson Meninick
P.O. Box 151
Toppenish, WA 98948

Yakama Indian Nation Cultural Resource Specialist [1][2][3]
Fred Ike, Sr.
P.O. Box 151
Toppenish, WA 98948

Yakama Indian Nation Fish and Wildlife Program [1][2][3]
P.O. Box 151
Toppenish, WA 98948

Yakama Tribal Attorney [1][2][3]
Rory Snow Arrow Flint Knife
P.O. Box 151
Toppenish, WA 98948

Yakama Indian Nation [1][2][3]
Sharon Goudy
P. O. Box 151
Toppenish, WA 98945

Yakama Indian Nation Culture Committee (3 copies) [1][2][3]
P. O. Box 151
Toppenish, WA 98945

Yakama Indian Nation [1][2][3]
Dr. Gordon Lofthson, Special Projects Manager
P.O. Box 151
Toppenish, WA 98948

Yakama Indian Nation [1][2][3]
Bill Bradley, Wildlife Resource Manager
P. O. Box 151
Toppenish, WA 98948

Yakama Indian Nation [1][2][3]
Moses Dick Squeocks
Environmental Protection Officer
P.O. Box 151
Toppenish, WA 98948

Yakama Tribal Council (3 copies) [1][2][3]
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes and Bands Umatilla Tribal Chair [1][2][3]
Don Sampson
P.O. Box 638
Pendleton, OR 97801-0038

Confederated Tribes and Bands Umatilla Tribe [1][2][3]
Jeff Van Pelt
Cultural Resources Protection Coordinator
P.O. Box 638
Pendleton, OR 97801-0038

Property Owners within 300 ft. of Project Site

Richard Beckett
11642 First Ave. South
Seattle, WA 98168

Michael Bernath
10023 Point View Dr.
Jonesboro, GA 30236

D.J. Bickford
3300 NW Empire
East Wenatchee, WA 98802

Melvin Brewer, NMI
4309 Driftwood Dr.
Plano, TX 75074

Wayne Clausen
8448 Hoctor Rd.
Goldendale, WA 98620

Glen Clausen
Box 432
Goldendale, WA 98620

Columbia Aluminum
55 Johm Day Dam Rd.
Goldendale, WA 98620

Marc Dallas
Box 116
Milton, WA 98354

Ruth Davenport
744 Hoctor Road
Goldendale, WA 98620

Bruce and Peggy Davenport
119 West Main
Goldendale, WA 98620

Clinton Deeter
1425 Tawny Lane
Walla Walla, WA 99362

Eleanor Dooley
604 Hwy 97
Goldendale, WA 98620

Dean Dunlap
Box 467
Wishram, WA 98673

Daniel Edelson
2626 175th Ave NE
Redmond, WA 98052

Sam Enfield
8011 29th Ave. NW
Seattle, WA 98117

Ronald Fisk
7426 A Street
Tacoma, WA 98408

John and Juanita Fitzgerald
7219 NE 47th Ave.
Vancouver, WA 98661

James Gleason
409 Hoctor Rd.
Goldendale WA 98620

James Goddard
10426 Abington Way
Racho Cordova, CA 95670

Patricia Gow
350 Linden Road
Goldendale, WA 98620

Charles Gronewall
2069 Sargent Lane
Clarkston, WA 99403

Daniel Gunkel
171 Maryhill Hwy
Goldendale, WA 98620

Lee Hagmeier
9364 Lakeview Ct.
Juneau, AK 99801

Lois Harvison
c/o Louis Wilson
5404 NE 121st Ave #39
Vancouver, WA 98682

Marie Hilyer
7636 SE 34th
Mercer Island, WA 98040

Walter Hoctor
488 #4 Rd.
Goldendale, WA 98620

Zona Hoctor
690 Hoctor Rd.
Goldendale, WA 98620

John Hoctor
559 Hoctor Rd.
Goldendale, WA 98620

Donald and Nellie Hoctor
749 Hoctor Rd.,
Goldendale, WA 98620

Charles Hoctor
486 Hoctor Rd.
Goldendale, WA 98620

Joann Van Hoy
1040 Hoctor Rd.
Goldendale, WA 98620

Wilford Imrie
911 Llama Lane
Goldendale, WA 98620

Robert Imrie
1619 Imrie Rd.
Roosevelt, WA 99356

Robert and Jane Lee
11360 Hwy 14
Goldendale, WA 98620

Calvin Linden
34 Centerville Hwy
Goldendale, WA 98620

Joel Marr
307 Ave G, Box 94
Grandview, WA 98930

Richard McCarter, NMI
351 Oak Hill Rd.
Goldendale, WA 98620

Dan McCormick
4360 SW Minter Bridge Rd.
Hillsboro, OR 97123

Fred Meier
348 Oak Hill Dr.
Goldendale, WA 98620

Dennis Newland
510 Meadow Dr. South
Richland, WA 99352

Emmett Hoctor, NMI
c/o Henry Garner
851 Dalles Mtn. Rd.
Centerville, WA 98613

George Gunkel, NMI
89 Maryhill Hwy
Goldendale, WA 98620

Rex Joseph, NMI
3209 61st SW
Seattle, WA 98116

Gary Harter, NMI
86 Cemetery Rd.
Glenwood, WA 98619

Maryhill Museum of Art
35 Maryhill Museum Drive
Goldendale, WA 98620

Marvin and Phyllis Norris
298 Hoctor Rd.
Goldendale, WA 98620

Harold Von Olmhausen
Rt. 4, Box 9000
West Richland, WA 99352

Donald Ormiston
9116 NE 102nd St.
Vancouver, WA 98662

Michael Pitts
Rt. 1 Box 415-H
Long Beach, CA 98631

Raymond Rossignol
130 Perry Way
Yakima, WA 98901

Edwin Rummerfield
217 E. Nelson Rd.
Moses Lake, WA 98837

CR Sandberg
10209 Maple Dr.
Pasco, WA 99301

William Sarfield
502 Mint Rd.
White Swan, WA 98925

Martin Sorenson
9108 Bender
Lynden, WA 98264

Michael Spasyk
Box 1
Cabot, VT 05647

Clyde Story
307 Clyde Story Rd.
Goldendale, WA 986207

Dennis and Sondra Templer
P.O. Box 500
Dallesport, WA 98617

Richard and Elisa Troutman
P.O. Box 12
Wishram, WA 98673

James and Ruth Trull
7417 West Mercer Way
Mercer Island, WA 98040

Terry and Sheryl Walker
501 South Zinser
Kennewick, WA 99336

Washington Department of Natural Resources
201 John Cherberg Blvd.
Olympia, WA 98504

William Wilkins
Box 8
Carson, WA 98610

Ellen Willis
198 Willis Rd.
Goldendale, WA 98620

Arthur Winterstein
254 Winterstein Rd.
Goldendale, WA 98620

William and Dorothy Young
350 Hoctor Rd.
Goldendale, WA 98620

Others

Brenda Altman
302 Oak Flat Rd.
Goldendale, WA 98620

Erin Anders
P.O. Box 471
Goldendale, WA 98620

Linda Anderson
212 E. Broadway
Goldendale, WA 98620

Jill Barker
P.O. Box 572
Mosier, OR 97040

Bats Towing
1015 E. Broadway
Goldendale, WA 98620

Bess Clausen
110 E. Broadway
Goldendale, WA 98620

Goldendale Sentinel
117 W. Main St.
Goldendale, WA 98620

Robert Havig
160 Rio Vista
White Salmon, WA 98672

Thomas C. Jasto
1217 N. Columbus Ave.
Goldendale, WA 98620

Robert Kahn
7900 S.E. 28th Street, Suite 200
Mercer Island, WA 98040

Fred Keast
PacifiCorp
920 SW Sixth Avenue
Portland, OR 97204-1256

Richard Lefever
1405 N. Columbus Ave.
Goldendale, WA 98620

James Lefever
P.O. Box 558
Goldendale, WA 98620

Lucille Lefever
208 E. Broadway
Goldendale, WA 98620

Jay Letto
1208 Snowden Road
White Salmon, WA 98672

William H. Link
10300 Hwy 14
Goldendale, WA 98620

Ron Lodigis
14 Kawasentha Dr.
White Salmon, WA 98672

Patty Lowe
Greenhouse Action
Box 68218
Seattle, WA 98168

Dick and Linda McCarter
515 South Elm St.
Toppenish, WA 98948

B.J. Moughon
840 Maple Dr.
Goldendale, WA 98620

Mike Nelson
WSEO
624 W. Ewing St.
Seattle, WA

Renewables Northwest
Marci Proutt
1130 SW Morrison #330
Portland, OR 97205

Christine Pfister
Henkle Middle School
480 Loop Road
White Salmon, WA 98672

Toni Potter
19548 47th Ave. NE
Seattle, WA 98155

Matt Rielly
1380 N. Mane Ave.
White Salmon, WA 98672

Richard N. Rife
2600 E. 14th Street
The Dalles, OR 97058

Jim Rikey
1717 Pipeline Rd.
Goldendale, WA 98620

John Scarola
70 Scarola Dr.
Goldendale, WA 98620

Tim Scarola
P.O. Box 104
Goldendale, WA 98620

Lawrence Schienbein
Battelle PNL
P.O. Box 999
Richland, WA 99352

Sallie Schullinger
Greenpeace
4649 Sunnyside Ave N.
Seattle, WA 98103

Foster Pepper & Shefelman
Thomas M. Pors
1111 Third Ave., Suite 3400
Seattle, WA 98101

Keith Silen
P.O. Box 685
Goldendale, WA 98620

George Stricker
Zond Systems
2515 4th Ave. #1101
Seattle, WA 98121

Sandy Thompson
1506 E. Collins Rd.
Goldendale, WA 98620

Dennis White
367 Oakridge Rd.
White Salmon, WA 98672

Jeannine Vinyard
31 Pine Vista Rd.
Glenwood, WA 98619

Cellular One Center
Norm Davis
1600 S.W. 4th Ave.
Portland, OR 97201

Columbia Gorge Audubon Society [1][2]
P.O. Box 512
Hood River, OR 97031

CARES [1][2][3]
Michael S. Burnett and Ben Wolff
6918 NE Fourth Plain Blvd, Suite B
Vancouver, WA 98661

Brent Carson
Buck & Gordon
1011 Western Ave., Suite 902
Seattle, WA 98104

Portland General Electric
121 SW Salmon St.
Portland, OR 97204

Puget Sound Power & Light Co.
P.O. Box 0868
Bellevue, WA 98009-0868

Goldendale Observatory
1602 Observatory Drive
Goldendale, WA 98620

K.C. Golden
Northwest Conservation Act Coalition
217 Pine St. #1020
Seattle, WA 98101-1520

Michael F. Kitchen
P.O. Box 1267
Goldendale, WA 98620

Brian Knox
Shidler, Gates, & Ellis
701 5th Ave, Suite 5000
Seattle, WA 98104

Dana Peck [1][2][3]
KENETECH Windpower, Inc.
210 SW Morrison, Suite 300
Portland, OR 97204

Northwest Pipeline Corporation
295 Chipeta Way
Salt Lake City, UT 84158

Paul Spies
Columbia Aluminum
8000 NE Parkway Dr., Suite 200
Vancouver, WA 98661

FloWind Corporation [1][2][3]
Albert Davies
990 A Street, Suite 300
San Rafael, CA 94901

White Salmon Enterprise
P. O. Box 218
White Salmon, WA 98672

KENETECH Windpower, Inc. [1][2][3]
Steve Steinhour
500 Sansome St.
San Francisco, CA 94111

Friends of the Columbia Gorge
Joe Walicki
319 SW Washington #301
Portland, OR 97204

6.2 Notice-of-Availability Recipients

Bill Arthur
Sierra Club
1516 Melrose Ave
Seattle, WA 98122

The Columbian
701 W. 8th St.
Vancouver, WA 98663

The Dalles Chronicle
414 Federal
The Dalles, OR 97058

Wayne Cordrey
P.O. Box 888
Hood River, OR 97031

H. Paul Friesema
Department of Political Science, Scott Hall
601 University Place
Evanston, IL 60208-1006

Nancy Holbrook
Box 733
Clinton, WA 98236

Hood River News
409 Oak
Hood River, OR 97031

Rebecca Levison
WashPIRG
340 15th Ave. E. #350
Seattle, WA 98112

Roosevelt Grange Master
Roosevelt Grange
Roosevelt, WA 99356

Centerville Grange Master
Centerville Grange
Centerville, WA 98613

Bickleton Grange Master
Bickleton Grange
P.O. Box 65
Bickleton, WA 99322

Vicky Morris
7732 18th Avenue NE
Seattle, WA 98115-4426

The Oregonian
292 Rimrock Rd.
Goldendale, WA 98620

Audubon Society of Portland
5151 NW Cornell Road
Portland, OR 97210

Burlington Northern Railroad
1101 NW Hoyt
Portland, OR 97209

Eugene Rosolie
Northwest Environmental Advocates
133 SW 2nd Ave #302
Portland, OR 97204-6634

Susan Smillie
Labat-Anderson Inc.
2200 Clarendon Blvd., Suite 900
Arlington, VA 22201

Randy Swisher
AWEA
777 N. Capitol St. NE #15
Washington, D.C. 20002

John Turner
5704 SE Washington
Portland, OR 97215

Warren Jim
Pine Creek Band
Roosevelt, WA 99356

Dale V. Wilhelm
Tennessee Valley Authority
400 Summit Hill Drive, WT8L-K
Knoxville, TN 37902

TriCities Herald
107 N. Cascade
Kennewick, WA 99336

The Yakima Herald
114 N. 4th St.
Yakima, WA 98901

Mark Ohrenschall
Conservation Monitor
P.O. Box 900928
Queen Anne Station
Seattle, WA 98109

Andrea Fouks
Woodward and Clyde
111 S.W. Columbia Suite 990
Portland, OR 97201

John Williams
LAZER
12770 S.W. Foothill Dr.
Portland, OR 97225

REBOUND
Gwen Lee
2700 1st Ave. #103
Seattle, WA 98121

APPENDIX A

APPENDIX A

WASHINGTON WINDPLANT #1
CHECKLIST OF ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS

A. Environmental Consultation, Review, and Permit Requirements

This section addresses federal statutes, implementing regulations, and executive orders potentially applicable to the Proposed Action (the Washington Windplant #1). In each case, the text provides a brief synopsis of the relevant aspects of the law or order and a summary of Proposed Action compliance with these requirements. Consultation is summarized in Table A.1.

A.1 National Environmental Policy Act

This EIS was prepared pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.), which requires federal agencies to assess the impacts their actions may have on the environment. Decisions will be based on understanding of the environmental consequences and actions that will be taken to protect, restore, and enhance the environment.

This joint NEPA/SEPA EIS was prepared in compliance with NEPA guidelines and Washington State SEPA rules (Chapter 197-11 WAC). The federal (BPA) and state (Klickitat County Planning Department) lead agencies held public scoping meetings and invited comments on the scope of the EIS. An EIS Implementation Plan was prepared and published by BPA in compliance with Department of Energy NEPA Regulations. Public comments received on the Draft EIS will be addressed in the Final EIS. The EIS and the overall processes by which it was developed comply with NEPA's requirement for documentation and public involvement.

A.2 Endangered and Threatened Species and Critical Habitat

The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536), as amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the preservation of the ecosystems upon which they depend. Section (7a) requires federal agencies to ensure that the actions they authorize, fund, or carry out do not jeopardize endangered or threatened species or their critical habitats. Section 7(c) of the ESA and the federal regulations on endangered species coordination (50 CFR section 402.12) require that federal agencies prepare biological assessments of the potential effects of major construction actions on listed or proposed endangered species and critical habitats.

Table A.1 Summary of Consultation

Requirement	Applicability	Remarks
National Environmental Policy	Yes	This Draft EIS evaluates alternatives and significant impacts and identifies mitigation measures to reduce or avoid impacts.
Endangered and Threatened Species	Yes	USFWS provided lists of threatened and endangered species potentially present in the Project vicinity and provided input on the Project avian study plan. Formal Section 7 consultation under the Endangered Species Act is being initiated with submittal of a Biological Assessment to the USFWS.
Fish and Wildlife Conservation	Yes	Consultation integrated into review process for this EIS. State wildlife agencies consulted during preparation of study plans.
Heritage Conservation	Yes	Section 106 consultation will be initiated with review of draft cultural resources report by the Washington State Historic Preservation Office.
Land Use Plan Consistency	Yes	Consultation integrated into review process for this EIS. Project appears to be consistent provided mitigation is implemented. Plan consistency will be a critical element of the County's conditional use permit requirement, and is within the County's jurisdiction.
Coastal Zone Management	No	Project not in coastal area.
Floodplain Management	No	Project not in floodplain.
Wetlands	No	None that would be impacted by the Project identified through environmental review and botanical field studies.
Farmlands	Yes	EIS assesses compatibility with farm and range lands. Only 1.5% of site lands would be permanently occupied by Project features. Agricultural uses would continue on remaining lands.
Recreation Resources	Yes	No adverse impacts associated with Project.
Global Warming	Yes	No adverse impacts associated with Project.
Permit for Structures in Navigable Waterways	No	No obstacles to be constructed.
Permit for Discharges into Waters of the U.S.	Yes	US Army Corps Section 404 Nationwide Permits required for crossings of intermittent streams.
Public and Indian lands Right-of-Way Permit	No	Project to be constructed on private lands.
Energy Conservation at Federal Facilities	No	No federal facilities involved.
Pollution Control at Federal Facilities	No	No federal facilities involved.
Watershed Protection and Flood Protection Act	Yes	Erosion and Sediment Control Plan required under Washington State NPDES General Permit.

Technical studies to support the Washington Windplant #1 EIS included a botanical resource survey, wildlife assessment, and a year-long study of birds in the Project vicinity. The botanical resources survey concluded there were no federally threatened or endangered species located on the Project site. The USFWS identified three non-avian animal species that are candidates for listing as threatened. The avian resources study identified one federally endangered species, one federally threatened species, and three candidates for federal listing in the Project vicinity. Impacts to special-status plant, animal, and bird species are discussed in the EIS.

A.3 Fish and Wildlife Conservation

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 et seq.) encourages federal agencies to conserve and to promote conservation of nongame fish and wildlife species and their habitats. The EIS lead agencies are responding to this policy through full consideration of fish and wildlife needs in developing alternatives and in comprehensive analysis of fish and wildlife impacts and identification of potential mitigation measures.

The Fish and Wildlife Coordination Act does not apply to the Washington Windplant #1 because the Project does not divert, control, or modify any bodies of water.

The Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act) (16 U.S.C. 839 et seq.) established the Pacific Northwest Electric Power and Conservation Planning Council (Council) to develop a Regional Electric Power and Conservation Plan (Plan). In implementing its mandate to assure an adequate, efficient, economical, and reliable power supply, a federal agency must give due consideration to the protection, mitigation, and enhancement of the region's fish and wildlife resources. Any action a federal agency takes, including acquisition of major resources (i.e., resources with a planned capability greater than 50 average megawatts acquired for more than five years) must be consistent with the Plan, including its fish and wildlife components, unless an exemption is granted by an Act of Congress. The Plan does not apply since it involves power purchases by private utilities. However, windpower is identified as a renewable resource in the Plan.

The National Wildlife Refuge System Administration Act does not apply to the Washington Windplant #1 because the Project does not include a Wildlife Refuge within its boundaries.

The Migratory Waterfowl Act does not apply to the Washington Windplant #1 because none of the Project lands were acquired or reserved under the Act.

The Marine Protection, Research, and Sanctuaries Act does not apply to the Washington Windplant #1 because the Project does not include dumping materials into the ocean.

A.4 Heritage Conservation

The National Historic Preservation Act A number of federal laws and regulations have been promulgated to protect the nation's historical, cultural, and prehistoric resources. A federal agency must consider whether its actions may have an effect on a property listed or eligible for listing on the National Register of Historic Places, a property listed on the National Registry of

Natural Landmarks, a property listed as a National Historic Landmark, a property listed on the World Heritage List, a property listed on a statewide or local lists, or the ceremonial rites or access to religious sites of Native Americans.

A cultural resources survey was conducted to locate cultural resource properties and sites. A total of 60 cultural resource properties were located; 14 are sites and 48 are isolates. Of the 14 sites, nine are considered potentially eligible under Criterion D of the National Register of Eligibility. All but two could be avoided.

TRADITIONAL CULTURAL PROPERTIES

The Archeological Resources Protection Act does not apply to the Proposed Action because the Project is not located on public or Native American lands.

The Native American Graves Protection and Repatriation Act (NAGPRA) addresses the recovery, treatment, and repatriation of Native American and Native Hawaiian human remains and cultural items (associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony). No graves have been identified on the site, although past Native American use and the presence of cairns suggest the potential for graves.

The American Indian Religious Freedom Act (AIRFA) of 1978 was a joint resolution of Congress establishing a policy that the Untied States will protect and preserve American Indians' rights of freedom of belief, expression, and exercise of traditional religions. Courts have interpreted AIRFA to mean that public officials must consider American Indians' interests in traditional religious practices before undertaking actions that might harm those interests. Consideration of these issues is addressed in Section 2.6 of this EIS.

A.5 State, Areawide, Local Plan, and Program Consistency

The CEQ regulations for implementing NEPA (40 CFR 1506.2) require agencies to consider the consistency of a proposed action with approved state and local plans and laws. In accordance with Executive Order 12372, this EIS will be circulated to the appropriate state clearinghouses to satisfy review and consultation requirements.

A.6 Coastal Zone Management Consistency

The Coastal Zone Management Act of 1972 requires that federal actions be consistent, to the maximum extent practicable, with approved state Coastal Zone Management programs. The Washington Windplant #1 is not expected to have any impacts on the coastal zone.

A.7 Flood Plain Management

Executive Order 11998 requires federal agencies to evaluate potential effects of any actions that might take place in a flood plain and to ensure that planning, programs, and budget requests reflect consideration of flood hazards and flood plain management. The Washington Windplant #1 is not located in a flood plain and is not anticipated to create any flood hazards.

A.8 Wetlands Protection

Executive Order 11990 (Protection of Wetlands) and DOE regulations implementing the Executive Order (10 CFR Part 1022) require federal agencies to minimize the destruction, loss, or degradation of wetlands; and to preserve and enhance the natural and beneficial values of wetlands when undertaking federal activities or programs. If a wetland will be affected, a finding must be made that there is no practicable alternative to affecting that wetland and that all practicable measures have been taken to minimize harm. Wetlands located on the Washington Windplant #1 site would not be impacted by the Project as proposed.

A.9 Farmland Protection

The Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) requires federal agencies to identify and take into account the adverse effects of their programs on the preservation of farmlands. The Proposed Action has been evaluated to determine whether it would cause physical deterioration and/or reduction in productivity of farmlands. The Proposed Action is expected to occupy less than one and one-half percent of the Project site, therefore minimizing its effect to surrounding farmland.

A.10 Recreation Resources

The Wild and Scenic River Act does not apply to the Washington Windplant #1 because the Project will not have any direct significant adverse effect on any wild or scenic rivers.

The Columbia River Gorge National Scenic Area Act does not apply to the Washington Windplant #1 because the Project is not located in the Scenic Area.

The Water Resources Development Act does not apply to the Washington Windplant #1 because the act pertains to reservoir development, which the Project does not include.

The Federal Water Project Recreation Act does not apply to the Washington Windplant #1 because the Project does not include plans to establish or significantly alter water resources in the site vicinity.

The Land and Water Conservation Fund Act does not apply to the Washington Windplant #1 because the Project does not significantly adversely affect outdoor recreation resources.

A.11 Global Warming

A discussion of possible global warming effects from thermal generating projects has been incorporated by reference from BPA's Resource Programs Final EIS Summary and presented in this EIS for comparison purposes.

A.12 Permits for Structures in Navigable Waters

The Rivers and Harbors Act of 1899 prohibits constructing bridges, dams, dikes, or causeways over harbors or navigable waters of the United States without approval of the Corps of Engineers. The act also prohibits any obstruction to the navigable capacity of any waters of the United States. The Washington Windplant #1 would not involve construction of any obstacles in navigable waters.

A.13 Permits for Discharges into Waters of the United States

A Department of the Army permit under Section 404 of the Federal Water Pollution Control Act (Clean Water Act) of 1972, as amended is required from the Corps of Engineers to discharge dredge or fill material into waters of the United States for non-Corps actions. The Washington Windplant #1 will require the Section 404 Nationwide Permits for fills in intermittent streams.

A.14 Permits for Rights-of-Way of Public Land

If a proposed action involves the use of public or Native American lands not in accordance with the primary objective of the management of those lands under the Federal Lands Policy and Management Act (43 U.S.C. 1701 et seq.), a federal permit for a right-of-way across such lands is required. The Proposed Action will not require permits for rights-of-way on public or Native American lands.

A.15 Energy Conservation at Federal Facilities

Energy conservation at federal facilities is not addressed in the EIS because the Proposed Actions do not involve the operation, maintenance, or retrofit of an existing federal building; or the procurement of insulation products.

A.16 Pollution Control at Federal Facilities

The Clean Air Act (CAA) establishes a comprehensive program for improving and maintaining air quality throughout the United States. The goals of the CAA are achieved through permitting of stationary sources, restricting the emission of toxic and other pollutants from stationary and mobile sources, and establishing National Ambient Air Quality Standards (NAAQS). Building the Washington Windplant #1 would result in a temporary increase in fugitive dust emissions related to construction activities. These emissions are not expected to exceed national standards. Operation of the Washington Windplant #1 would have no significant adverse impacts on air quality.

The Clean Water Act (CWA) sets national goals and policies to eliminate discharge of water pollutants into navigable waters, to regulate discharge of toxic pollutants, and to prohibit discharge of pollutants from point sources without permits. The primary instrument for implementing the act is the National Pollutant Discharge Elimination System (NPDES) permit.

The NPDES permit would be required for discharging stormwater from the Washington Windplant #1. The mitigation measures to reduce impacts related to stormwater runoff are discussed in Section 2.1 of this EIS.

Compliance with the following legislation is mandatory; however, none of those listed directly below, except for the Noise Control Act, is applicable to the Washington Windplant #1.

- Safe Drinking Water Act
- Comprehensive Environmental Response and Liability Act
- Resource Conservation and Recovery Act
- The Federal Insecticide, Fungicide, and Rodenticide Act
- The Toxic Substances Control Act

The Noise Control Act of 1972 as amended (42 U.S.C. 4901, et seq.) sets forth a broad goal of protecting all people from "noise that jeopardizes their health or welfare." It places principal authority for regulating noise control with the states and local communities. Noise related to the Washington Windplant #1 would not violate day or evening standards, but may potentially exceed nighttime noise standards in some location of the Project site. Mitigation is suggested in Section 2.9 of the EIS.

A.17 Watershed Protection and Flood Protection Act

The purpose of the Watershed Protection and Flood Protection Act is to protect watersheds from erosion, floodwater, and sediment damages. It provides assistance programs to local organizations to conduct investigations and surveys, prepare plans and estimates, develop soil and water conservation practices, and install improvement works for protection of watersheds. An Erosion and Sediment Control Plan would be required under the NPDES General Permit for this Project.