Chapter 2
PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter describes Wind Ridge Power Partners, LLC (Applicant) proposed Wild Horse Wind Power Project (WHWPP), and includes information regarding the project site and location, facilities, construction activities and costs, operation and maintenance activities, mitigation inherent in project design, and decommissioning. Also described are the no action alternative, alternatives considered but eliminated, off-site alternatives, alternative transmission interconnection, benefits or disadvantages for reserving project approval for a later date, regulations and permits, coordination and consultation with the public and other organizations, and potential future activities.

2.1.1 Applicant

The applicant for the WHWPP is Wind Ridge Power Partners, LLC (Applicant), a wholly owned subsidiary of Zilkha Renewable Energy. Wind Ridge Power Partners was created as a Delaware Limited Liability Company for the sole purpose of developing, permitting, financing, constructing, owning and operating the Wild Horse Wind Power Project. The Applicant's address and telephone numbers are listed below.

Wind Ridge Power Partners, LLC
c/o Zilkha Renewable Energy
1001 McKinney Street
Suite 1740
Houston, TX 77002
Phone (713) 571-6640
Fax (713) 571-6659

The current local Applicant representative is:

Wind Ridge Power Partners, LLC
c/o Zilkha Renewable Energy
ATTN: Chris Taylor, Project Development Manager
210 SW Morrison, Suite 310
Portland, OR 97204
Phone (503) 222-9400, Ext. 3
Fax (503) 222-9404

Applicant Wind Power Projects

A partial list of other wind power projects developed, under construction, or planned in the near term by Zilkha Renewable Energy include the following (Taylor, pers. comm., 2004):

Kittitas Valley Wind Power Project (181.5 to 246 MW)

Zilkha Renewable Energy is proposing to construct a 181.5 to 246 MW wind project located on open ridgetops between Ellensburg and Cle Elum, about 12 miles northwest of the City of Ellensburg in Kittitas County, Washington. A Draft EIS was prepared on the project in December 2003. The project could be on line one year following approval by EFSEC. Energy would be sold to Puget Sound Energy or the Bonneville Power Administration.

Blue Canyon Wind Farm, Oklahoma (75 MW)

Zilkha Renewable Energy completed construction of the 75-MW Blue Canyon wind project near Lawton, Oklahoma in December 2003. Zilkha serves as the operations manager at Blue Canyon during the operational phase of the project. Energy is being sold under a long-term power purchase agreement (PPA) to Western Farmers Electric Cooperative of Andarko, Oklahoma.

Meyersdale Wind Energy Center, Pennsylvania (30 MW)

Zilkha Renewable Energy and its partner Atlantic Renewable Energy Corporation co-developed the 30-MW Meyersdale wind project. Development began in 2001, and Zilkha and Atlantic sold the project to FPL Energy in 2003. FPLE built and operates the project, which became operational in December 2003. Energy is being sold under a long-term power purchase agreement to FirstEnergy of Akron, Ohio

Top of Iowa Wind Farm, Iowa (80 MW)

Zilkha Renewable Energy and its partner Midwest Renewable Energy Corporation co-developed the 80-MW Top of Iowa wind project. Development began in 2000, and the project came on line in October 2001. Energy is being sold under a long-term power purchase agreement with Alliant Energy of Madison, Wisconsin. Zilkha and its partner secured the land for the project including transmission easements, obtained permits, marketed the energy from the project, and negotiated the PPA. Zilkha Renewable Energy serves as the operations management for the project.

Somerset and Mill Run, Pennsylvania (24 MW)

Zilkha Renewable Energy and Atlantic Renewable Energy built and developed these projects in 2001, totaling 24 MW of installed capacity. Output from both projects is sold to Exelon Powerteam under a long-term power purchase agreement. Zilkha and its partner Atlantic Renewable secured the land for the project including transmission easements, obtained permits, marketed the energy from the projects, and negotiated the PPAs. Zilkha financed construction of the project with its own resources and managed operation of the projects until their sale to FPL Energy in early 2003.

Pine Tree Wind Project, California (120 MW)

In 2003 Zilkha Renewable Energy and its partner Prometheus Energy negotiated an agreement with the Los Angeles Department of Water and Power (LADWP) for the turnkey construction and development of a 120-MW wind project near Tehachapi, California. Under the agreement Zilkha will develop and build the project, and hand it over to LADWP upon successful completion.

Tierras Morenas, Costa Rica (24 MW)

Zilkha Renewable Energy and its partner Energia Global co-developed the 24-MW Tierras Morenas wind project near Tilaran, Costa Rica. Zilkha's team spearheaded the final development, construction, and operations of this project. The project came online in 1999. The output is sold under a long-term power purchase agreement to ICE, the state-owned Costa Rican electric utility. Sagebrush Power Partners was created as a Delaware limited liability company for the sole purpose of developing, permitting, financing, constructing, owning, and operating the Kittitas Valley Wind Power Project. Sagebrush Power Partners LLC will own and operate the Kittitas Valley Wind Power Project and manage all of the facility's affairs, including activities related to obtaining permits and other approvals required for project development.

2.1.2 Scope of this EIS

The scope of this EIS was determined by EFSEC based on comments received and information compiled during scoping. EFSEC determined that the scope consists of a description of the proposed action and alternatives; a discussion of the affected environment; an evaluation of the project's potential impacts (direct, indirect, and cumulative); and identification of mitigation measures associated with project construction, operation, maintenance, and decommissioning of all components (and connected actions).

In assessing the potential impacts from construction and operation of the project and other connected actions, the following elements of the natural and built environment are addressed in this EIS:

- Earth
- Air Quality
- Water Resources
- Vegetation and Wetlands
- Wildlife
- Fisheries
- Energy and Natural Resources
- Noise
- Land Use
- Visual Resources/Light and Glare
- Population, Housing, and Economics

- Public Services and Utilities/Recreation
- Cultural Resources
- Traffic and Transportation
- Health and Safety

2.2 Description of Proposed Action

The following description of the proposed action is presented, in large part, from the final "Application for Site Certification, Wild Horse Wind Power Project" prepared and submitted on March 9, 2004 to EFSEC by Wind Ridge Power Partners, LLC. Information regarding project alternatives was derived from the December 2003 "Kittitas Valley Wind Power Project Draft Environmental Impact Statement" prepared by EFSEC, and December 2003 "Desert Claim Wind Power Project" prepared by Kittitas County.

2.2.1 Project Overview

The Applicant is proposing to build the Wild Horse Wind Power Project (project), a renewable energy generation facility with a maximum of 158 wind turbines and a maximum installed nameplate capacity of 312 megawatts (MW). The project would be constructed in central Washington's Kittitas Valley on high open ridge tops between the towns of Kittitas and Vantage. Elements of the project would be constructed in consecutive phases, and include roads, foundations, underground and overhead collection system electrical lines, grid interconnection substation(s), step-up substation(s), feeder line(s) running from the on-site step-up substation(s) to the interconnection substation(s), meteorological stations and monitoring towers, an operations and maintenance (O&M) center and associated supporting infrastructure and facilities. The entire project area encompasses 8,600 acres, with approximately 165 acres required to accommodate the permanent footprint of the proposed turbines and related support facilities. A site layout illustrating these key elements is contained in Figure 1-2. Maps showing the project location are presented in Section 2.2.2, "Project Site and Location" and in Figure 1-1. Project construction could begin in November of 2004 immediately after obtaining site certification from EFSEC, and it is anticipated that it would take about 1 year to construct. The expected service life of the project is 20 years. Refer to Section 2.2.6, "Decommissioning" for details addressing upgrade of equipment with more efficient turbines after the first 20-year period.

Project Feeder Lines

Two 230 kV transmission feeder lines are proposed for the project, one to allow interconnection with the Bonneville Power Administration (BPA) transmission system and one to allow interconnection with Puget Sound Energy (PSE) transmission system. It is anticipated that only one feeder line would be built, however, the Applicant is seeking approval to build and operate feeder lines to both the PSE and BPA transmission systems. Power from the project would be fed along these transmission feeder lines indicated in the site layout in Figure 1-2 as the BPA Feeder Line and the PSE Feeder Line to the point of interconnection with the respective utility.

A more thorough description of the project transmission system is described under Section 2.2.3, “Interconnection Feeder Lines.”

Power from the project would be fed to step-up substations indicated as the BPA or PSE step-up substation in Figure 1-2. The step-up substations would connect to the respective BPA or PSE feeder lines, which connect to the respective utility interconnect. The BPA feeder line runs west from the project site for approximately 5 miles to a point where it intersects with the existing corridor of BPA high-voltage transmission lines (the Schultz to Vantage 500 kV line). The PSE feeder line runs approximately 8 miles south and west from the project site to the PSE interconnection substation.

Project Turbine Scenarios

The project would utilize 3-bladed wind turbines on tubular steel towers. Turbines would range from 1 MW to 3 MW (generator nameplate capacity) and with rotor diameters ranging from 60 to 90 meters (197 to 295 feet) as shown in Figure 2-1. For the smallest turbine contemplated for the project, with a rotor diameter of 60 meters and each with a nameplate capacity of 1 MW, up to 158 units would be installed for a project nameplate capacity of 158 MW. If the largest contemplated turbine, with a rotor diameter of 90 meters and generator nameplate capacity of 3 MW is used, up to 104 units would be installed for a project capacity of 312 MW. The project site layout in Figure 1-2 shows 136 turbines of 1.5 MW each with a turbine spacing based on a 70.5-meter (231 ft.) rotor diameter. This scenario is in the middle of the range of turbines proposed and represents the anticipated project configuration or “most likely scenario”. Only one type and size of turbine would be used for the entire project

Regardless of which size of turbine is finally selected for the project, the turbines would generally be installed along the roadways as indicated on the Site Layout and all construction activities would occur within the same corridors with any final adjustments to specific turbine locations made to maintain adequate spacing between turbines for optimized energy efficiency and to compensate for local conditions. Table 2-1 presents a summary of the project scenarios, and Figure 2-1 presents a scale diagram comparing the various turbines sizes to one of the nearby BPA transmission towers.

The Applicant has indicated that the size and type of turbine used for the project would largely depend on such factors as safety, quality, price, performance and reliability history, power characteristics, guarantees, financial strength of the supplier, and the availability of a particular type of wind turbine at the time of construction.

The Applicant has indicated that some variances in exact locations of the project facilities would likely be required to allow for in-field conditions at the time of construction. Minor adjustments to road layout and turbine locations along the roadways shown in Figure 1-2 may be necessary due to such factors as:

- Geotechnical investigations may reveal underground voids, landslide planes, or fault line locations that would require shifting or eliminating the turbine location.
- The final on-site meteorological field survey may dictate that turbines be spaced slightly closer together in some areas and further apart in other areas;

- Spacing adjustments and reductions in the number of turbines to account for the use of larger rotor diameter turbines (e.g. 90 meters) to be used;
- Spacing adjustments and increases in the number of turbines to account for the use of smaller rotor diameter turbines (e.g. 60 meters) to be used; and
- Final field surveys of communication microwave paths may require that some turbine locations be adjusted slightly to avoid line-of-sight interference.

The Applicant indicated that turbine locations would not vary from their shown locations by more than 105 meters (350 feet).

Impact Analysis and Design Scenarios

The Applicant has fully analyzed the entire range of potential impacts and described all environmental effects from the full range of sizes and types of wind turbines. The impacts of the design scenarios are presented in Chapter 3 of this EIS. The potential impacts to earth, air, water, wildlife, socioeconomics, public health and safety, and other elements of the environment have been examined for the full range of sizes and numbers of wind turbines.

As indicated in Table 2-1, the project footprint would be essentially the same under all scenarios. Regardless of the number of turbines, roadways would have the same beginning and end points for each turbine string road. The footprint at each turbine pad location would be slightly different in size for the different sizes of wind turbines. Large turbines would require large foundations and larger crane pads to support the larger crane equipment for the erection of the machines. Although the turbine and crane pads would be slightly larger for larger turbines, there would be fewer turbines for the 104-turbine/3-MW scenario, resulting in a project footprint equal in size to the other scenarios (Table 2-1).

Table 2-1. Project Scenario Summary

	104 Turbines/3 MW	136 Turbines/1.5 MW (Most Likely Scenario)	158 Turbines/1 MW
Turbine Nameplate	3 MW	1.5 MW	1 MW
Number of WTGs	104	136	158
Project Nameplate	312 MW	204 MW	158 MW
Total Permanent Footprint Approx.	164.6 acres	164.7 acres	164.6 acres
Miles of Road Approx.	32 miles	32 miles	32 miles

2.2.2 Project Site and Location

Maps showing Kittitas County and the project are presented in Figures 1-1 and 1-2, respectively. The project would be built on open ridge tops between Kittitas and Vantage at a site located approximately 11 miles east of the City of Kittitas.

The ridges rise as high as 2,400 feet above the Yakima River Valley to the west and nearly 3,000 feet above the Columbia River to the east. The site boundary is located approximately 2 miles north of Vantage Highway, 11 miles east of the City of Kittitas. The most prominent geographic features in the area are Whiskey Dick Mountain and the Columbia River located 10 miles to the east.

Land Ownership

The project would be located primarily on rangeland to be purchased by Wind Ridge Power Partners, LLC. Parts of the project are proposed on land the Applicant has secured under a long-term lease with the Washington Department of Natural Resources (DNR). One portion of the project, located in Township 18 North, Range 21 East, Section 35, is owned by the Washington Department of Fish and Wildlife (WDFW). WDFW has expressed interest in leasing this land to the Applicant for wind power development and has granted the Applicant access to this parcel for the purpose of environmental and meteorological studies. WDFW is reviewing the potential benefits of leasing this land for wind power development and has not yet made a final determination regarding leasing this land to the Applicant.

All proposed project facilities are in areas currently zoned as Forest and Range or Commercial Agriculture by Kittitas County as shown in Figure 3.9-2, “Zoning Designations.” The site extends over approximately 8,600 acres, while the overall site footprint is approximately 165 acres.

Proximity to Residences and Recreational Areas

Figures 1-2 and 1-3, “Project Site Layout” illustrate the key project facilities on a topographic map and on an aerial photo map. Figure 3.8-1, “Residences in Project Vicinity,” illustrates the location of nearby residences to the project and feeder lines. The nearest residence to the project lies approximately 1.74 miles to the south near Vantage Highway. The nearest residence to the PSE feeder line is approximately 0.25 miles distant, and the nearest residence to the BPA feeder line is approximately 0.5 miles from the line. Figure 3.12-2, “Recreational Areas Surrounding Project Site,” illustrates the parks and recreational areas within 25 miles of the project site.

Project Area Land Use

A more thorough description of land uses on and surrounding the project site and transmission feeder lines is contained in Section 3.9, “Land Use.”

2.2.3 Project Facilities

The project would consist of wind turbines, associated electrical systems (electrical collector system, substations, and interconnection facilities), meteorological stations and monitoring towers, access roads and construction trails, an operation and maintenance building, rock quarries and rock crushing facilities, batch plant, informational kiosk, and safety features and control systems.

Wind Turbines

Wind turbines consist of three main components—the turbine tower, nacelle, and rotor blades. The nacelle is the portion of the wind turbine mounted at the top of the tower, which houses the wind turbine, the rotor, hub, and gearbox.

Towers

Tower height would range from approximately 151 feet to 262 feet tall at the turbine hub ("hub height") under the three scenarios. With the nacelle and blades mounted, the total height of the wind turbine ("tip height") would be approximately 249 to 410 feet high with a blade in the vertical position (Figures 2-2 and 2-3). The towers would be a tubular conical steel structure manufactured in multiple sections depending on the tower height. Towers for the project would be fabricated, delivered, and erected in two or three sections each. A service platform at the top of each section would allow for access to the tower's connecting bolts for routine inspection. An internal ladder would run to the top platform of the tower just below the nacelle to provide access for turbine maintenance. A nacelle ladder extends from the machine bed to the tower top platform allowing nacelle access independent of its orientation. The tower would be equipped with interior lighting and a safety glide cable alongside the ladder.

Nacelle

Figure 2-3 shows the general arrangement of a typical nacelle that houses the main mechanical components of the WTG—drive train, a gearbox, and the generator. The nacelle consists of a robust machine platform mounted on a roller bearing sliding yaw ring that allows it to rotate (yaw) to keep the turbine pointed into the wind to maximize energy capture. A wind vane and anemometer are mounted at the rear of the nacelle to signal the controller with wind speed and direction information. The nacelle is housed by a fully enclosed steel reinforced fiberglass or all steel shell that protects internal machinery from the environment and dampens noise emissions.

Rotor Blades

The modern wind turbine generators under consideration for the project have 3-bladed rotors that range in span from 60 to 90 meters (197 to 295 feet) in diameter (Figure 2-1). The rotor blades typically made from a glass-reinforced polyester composite and turn at less than 20 RPM. The blades are non-metallic, but are equipped with all lightning suppression system that is defined in detail in the Safety Features and Control Systems section below.

Electrical System

Electrical power generated by the wind turbines would be transformed and collected through a network of underground and overhead cables that would terminate at the project step-up substation. While it is most likely that only one substation would be constructed for the project, possibly two substations would be installed to allow access to both the BPA and Puget Sound Energy (PSE) systems. The project Site Layout in Figure 1-2 shows the general routing paths of the underground and overhead electrical lines as well as the proposed step-up substation locations. Figure 2-4 schematically illustrates the overall electrical collection system.

Collector System

Turbine Drop Cables

Power from the wind turbines would be generated at 575 Volts to 690 Volts (V) depending on the type of wind turbine utilized for the project. A set of heavy gauge, armored, flexible drop cables would connect to the generator terminals in the nacelle to a base bus cabinet and breaker panel inside the base of the tower. The length of cable from the nacelle to the cable support saddle allows the nacelle to freely rotate several times without damaging the cables. There are also independent over-twist prevention systems and sensors in the wind turbine generator to prevent cable-over-twist.

Another set of cables run from the bus cabinet through conduits in the foundation to the pad transformer which steps the voltage up to 34.5 kilovolts (kV). Some wind turbine generators, such as the Vestas V-80 and V90, have the step-up transformer in the machine house at the top of the tower called the nacelle.

Pad Transformers and UG Cable

The pad transformers would be interconnected on the high voltage side to underground cables that connect all of the turbines together electrically. The underground (UG) cables are installed in trenches that are typically 3–4 feet deep and run beside the project's roadways. Alongside the electrical cables would be buried a fiber optic or copper communication line which would tie all of the turbines back to the central control computer as illustrated in Figure 2-4. Due to the rocky conditions at the site, a clean fill material such as sand or fine gravel would be used to cover the cable before the native soil and rock are backfilled over the top.

The underground collection cables feed to larger feeder lines that would run to the step-up substation(s). At the substation(s), the electrical power from the entire wind plant would be stepped up to transmission level at 230 kV or 287 kV (for BPA) and delivered to the point(s) of interconnection.

Collection System Overhead Line

A 60-foot tall dual circuit single pole structure system is anticipated for the 2-mile run of overhead collection 34.5 kV power line on the north side of Whiskey Dick Mountain.

Junction Boxes and Switch Panels

Pad mounted junction boxes and/or pad mounted switch panels would be utilized to tie the underground lines together into one or more sets of larger feeder conductors and to allow for the isolation of particular strings of turbines. In total, it is anticipated that about 12 junction boxes and switch panels would be required for the electrical collection system. The anticipated locations of the pad-switches and/or junction boxes are indicated on the project site layout in Figure 1-2.

The switch panels would allow for the de-energization or isolation of particular collector lines and strings of turbines for maintenance and repair of the collection system as needed without de-energizing the entire project. The project would require approximately 27 miles of underground and 2 miles of overhead 34.5 kV electrical power lines to collect all of the power from the turbines to terminate at the step-up transformer substation(s).

Interconnection Facilities and Substations

Two sets of Bonneville Power Administration (BPA) transmission lines and one set of Puget Sound Energy (PSE) high-voltage transmission lines are within 8 miles of the project site. If connected to BPA's system, the project would interconnect with the Columbia to Covington 230 kV or with the Grand Coulee to Olympia 287 kV lines. If connected to PSE's system, the project would interconnect with PSE's Inter-Mountain Power line (IP line) at 230 kV.

The project substation and transmission facilities would consist of one or two step-up substations (indicated as the BPA and PSE step-up substations on the site layout in Figure 1-2), the PSE and BPA interconnection substations, and one to two feeder lines running from the step-up substation(s) to the interconnection substation(s). The step-up substations are located on the project site whereas the interconnection substations are located close to the proposed interconnection to the existing BPA and PSE power lines. The PSE interconnection substation would be located just north of where PSE's IP Line crosses I-90. The PSE point of interconnection (POI) would also serve as the PSE point of delivery (POD). The BPA interconnection substation would be located at BPA's existing Schultz substation, located approximately 14 miles northwest of the project site. The locations of the on-site step-up substations, the feeder lines and the interconnection substations are indicated Figures 1-1 and 1-2. The Applicant would own, operate and maintain both the BPA and PSE feeder lines.

BPA Interconnection

If connected to BPA's system, the project would interconnect with the Columbia to Covington 230 kV or to the Grand Coulee to Olympia 287 kV lines near the existing Schultz substation as the point of interconnection (POI). The point of delivery (POD) for power from the project, however, would be at the location where the project's BPA feeder line intersects the existing BPA corridor approximately 5 miles west of the project. If connecting to the BPA system, BPA would be responsible for permitting, constructing, owning and operating a new interconnection substation located near its existing Schultz substation as well as a new feeder line extension between the POI and the POD. The full details of the project's BPA interconnection would be included in the BPA's environmental review that would be prepared in a separate NEPA/SEPA document. The project's viability does not depend on the interconnection with BPA since interconnection could also be achieved with the PSE system.

Step-Up Substations

The main function of the step-up substation would be to step up the voltage from the collection lines (at 34.5 kV) to the transmission level (287 or 230 kV) and to provide fault protection The exact footprint of the substations would depend largely on the utility requirements, the number of turbines used and the resulting project nameplate capacity which would affect the number of 34.5 kV feeder breakers. The substations and interconnection facilities would each consist of a graveled footprint area of approximately 2 to 3 acres, a chain link perimeter fence, and an outdoor lighting system.

The substation(s) would have one or two mineral oil transformers that would be filled and tested during commissioning. The substation design would incorporate an oil containment system consisting of a perimeter containment trough, large enough to contain the full volume of transformer mineral oil with a margin of safety, surrounding the main substation transformers. The trough and/or membrane would drain into a common collection sump area equipped with a sump pump designed to pump rainwater out of the trough to the surrounding area away from any natural drainages. If the oil level inside a transformer drops due to a leak in the transformer tank, it would also shut off the sump pump system to prevent it from pumping oil, and an alarm would be activated at the substation and at the main wind project control (SCADA) system.

Interconnection Substations

The main function of the interconnection substation would be to mechanically terminate the project feeder lines to the utility grid and to provide fault protection. The exact footprint of the substations would depend largely on the utility requirements and the grid line characteristics at the point of interconnection. The substation(s) and interconnection facilities would each consist of a graveled footprint area of approximately 2 to 3 acres, a chain link perimeter fence, and an outdoor lighting system. In general appearance, the interconnection substation(s) would be very similar to the step-up substation(s) without the transformers, but with more steel poles structures and more high-voltage switch breakers.

The general schedule for construction of the interconnection facilities and the substation shall be coordinated with the construction of the rest of the project as outlined under Section 2.2.4, “Construction Activities.”

Interconnection Feeder Lines

Power from the project would be fed from the on-site step-up substation(s) through a feeder line(s) to the interconnection substation(s). The feeder line(s) would consist of a wood frame H-pole configuration roughly 60 feet tall, a 40 foot long top cross arm and with spans of approximately 500 to 700 feet between pole structures. The line design would be adequate to carry the full amount of power, up to 312 MW, with additional adequate safety margins to comply with design codes and standards.

The feeder line(s) would be constructed within a 150-foot wide right of way easement secured for the project.

Project Feeder Line to PSE

For interconnection with PSE, the project feeder line would run south from the on-site PSE step-up substation to the PSE interconnect substation and would run over private land for a total of approximately 8 miles. The point of interconnection with PSE's IP Line would also be designated as the PSE point of delivery (POD) for the project. Two road crossings would be required, one over Vantage Highway and one over Stevens Road Figure 1-2, "Project Site Map."

Project Feeder Line to BPA

If connected to BPA's system, the project would interconnect with the Columbia to Covington 230 kV or to the Grand Coulee to Olympia 287 kV lines near the existing Schultz substation as the point of interconnection (POI). The point of delivery (POD) for power from the project, however, would be at the location where the project's BPA feeder line intersects the existing BPA corridor approximately 5 miles west of the project. The project's BPA feeder line runs west from the on-site BPA step-up substation to the existing BPA Schultz to Vantage 500 kV line corridor to the BPA point of delivery (POD) as shown in Figure 1-2.

Transmission System Impact Studies (SIS)

The Applicant has contracted with both BPA and PSE to perform System Impact Studies (SIS) to determine the impact of adding wind power into the grid at the proposed points of interconnection. Since the results of the SIS work indicate that both the PSE and BPA systems can accept the power at the proposed interconnection points, the Applicant commissioned both BPA and PSE to perform Facility Impact Studies (FIS) to determine the final tasks, schedule and costs required to interconnect with the proposed project.

Stand-By Power Consumption

The project would generate power output approximately 80% of the time and would consume a small amount of power from the grid during periods of low wind. As with any power plant, the transformers and auxiliary systems at the substation consume some power to stay energized. The turbines also consume some electricity to maintain power to the hydraulic systems, pumps, heaters, fans, controller electronics, lighting, etc. Overall, the project would consume less than 1% of what it generates to support auxiliary systems with stand-by power.

Other Electrical Features

The project would also require substation transformers, capacitor banks and power factor/voltage control, and protective relays. Details regarding these features are included in the Applicant's application.

Meteorological Stations and Monitoring Towers

The project design would include five permanent meteorological (met) towers fitted with multiple sensors to track and monitor wind speed and direction and temperatures. The permanent towers would consist of a central lattice structure supported by three to four sets of guy wires and would be as tall as the hub height (HH) of the WTGs which is 46–80 meters (151–262 ft.) and would be connected to the plant's central SCADA system (Figure 2-4).

Each met tower would have a grounding system similar to that for the wind turbines. A buried copper ring and grounding rods would be tied to the lightning dissipaters or rods installed at the top of the towers to provide an umbrella of protection for the met tower's upper sensors.

Access Roads and Construction Trails

Access to the project site would be achieved via an existing private graveled access road that branches from Vantage Highway at a location approximately 11 miles east of the City of Kittitas. The project site is currently crisscrossed with an extensive network of existing roads and, wherever practical, existing roads would be utilized to minimize new ground disturbance. Up to 15 miles of existing roads would need to be improved and up to 17 miles of new roads would be constructed. The access roads and roads between turbine strings would generally consist of 20-foot wide compacted gravel surface and a 2-foot wide shoulder on either side to blend with the surrounding contours and allow for proper drainage. The roads between contiguous turbines in a string would be 34 feet wide to accommodate larger crane equipment to move between the individual turbine sites safely. In areas of steeper grades, a cut and fill design would be implemented to keep grades below 15% to facilitate access and help prevent erosion. Other graveled areas are parking areas near the project operations and maintenance facility and at a visitor's kiosk near the site entrance on Vantage Highway, as well as 3 equipment lay-down areas adjacent to the site roads. Figure 1-2, "Project Site Layout" illustrates the location of the project facilities.

Feeder Line Construction Trails

The project transmission feeder line(s) would require the installation of a 12-foot wide temporary construction trail to be cleared of large boulders to allow high clearance vehicles to pass. Cleared vegetation would be stockpiled in areas where vegetation is dense. The trail would be installed within the feeder line corridor(s) for access to support the construction of the feeder lines. Once construction is complete, the trail would be used approximately every 6 months for inspection and maintenance by the applicant. Native vegetation would be allowed to re-establish over the trails to the extent that 4-wheel-drive vehicle travel remains practical. The PSE feeder line would require approximately 8 miles and the BPA feeder line would require approximately 5 miles of new construction trails. Grading, and erosion control measures such as ditching and rock addition may be required at specific locations. Organic materials stockpiled during construction of the trails would be mulched and spread onto areas alongside roadways and also used for slope stabilization during the reseeding process.

Operation and Maintenance Facility

The project would include an O&M facility near the center of the project site, and out of sight from Vantage Highway, as indicated on the Project Site Layout in Figure 1-2. The O&M facility would include a main building with offices, spare parts storage, restrooms, a shop area, outdoor parking facilities, a turn-around area for larger vehicles, outdoor lighting and a gated access with partial or full perimeter fencing. The O&M building would have a foundation footprint of approximately 50 feet by 100 feet and the entire facility would have a footprint of approximately 2 acres.

Water Storage Tanks and Septic System

The O&M Facility would include 1 to 2 on-site storage tanks approximately 5,000 gallons in size for potable water to supply the building for domestic use. Domestic sewage would be discharged and treated in an on-site closed septic system.

Rock Quarries, Rock Crushing Facilities, and Batch Plant

Site Proximity to Existing Gravel and Concrete Sources

Three temporary rock quarries and one temporary concrete batch plant would be established on the project site to supply the large amounts of gavel and concrete required for the project. This eliminates the need for the use of off-site rock pits and concrete mixing plants that would require more than 17,000 additional heavy truck trips to and from the project site during construction.

Rock Quarries

A total of three temporary on-site rock quarries would be established for the project. Each rock quarry would have a disturbance footprint of approximately 5 acres and the depth would be approximately 10–20 feet depending on the type of rock encountered at each location. The total volume of excavated material is expected to be between 200,000 and 300,000 cubic yards depending on the rock characteristics and dirt content at each of the quarry sites. Each quarry location is indicated on the project Site Layout in Figure 1-2. Preliminary geotechnical analyses from 15 test pits throughout the site indicate that excavating equipment would likely encounter a very hard (R5) basalt layer at a depth between 1 and 3 feet. Following blasting to fracture and loosen the basalt, rock would be transported to the rock crusher. The majority of the crushed rock would be used for road building during early construction phases, with a small amount of gravel transported to the concrete batch plant for use in concrete slurry during the foundation construction phase. Blasting activities would be conducted by professionally trained and certified explosives experts and would employ industry-standard techniques. Peak production at any one quarry is expected to total 30,000 tons of gravel per day, with an average expected production of 20,000 tons per day. The quarry would become operational two weeks prior to road construction activities and would remain in operation until WTG foundations are completed. Please see "Blasting Activities" under Section 2.2.4 "Construction Activities," for more details about explosives work on-site.

A reclamation plan for the proposed rock quarries would be submitted to EFSEC for review and approval prior to construction and would include replacement of unused material and re-seeding each location with a designated mixture of native grasses. More details regarding site restoration of the rock quarries are contained in Section 3.1, "Earth," in Section 3.1.4, "Mitigation Measures."

Portable Rock Crusher

The primary construction-related portable equipment required for the project is a rock crusher to create road construction material and a concrete batch plant for mixing cement. The rock crusher would be located at one of the three on-site quarry pits for the duration of the construction period and would have an average capacity of approximately 20,000 tons per day and a peak capacity of 30,000 tons per day. The crusher would operate during project construction hours, 5 to 6 days per week during daylight hours for approximately 2 to 3 months during construction. The crusher would be located in an area approximately 5.7 acres in size, surrounded by a 1-foot high earth berm to contain water runoff. This area would be sprayed by a water truck several times each day for dust suppression. The crusher would contain several dust-suppression features including screens and water-spray. At no point would emissions exceed the 20% opacity for 3 minutes in any single hour, which is the state maximum threshold. More details regarding dust suppression are contained in Section 3.2, "Air Quality."

The crusher would require a stand-alone 40-60 kW generator unit that would draw fuel from a fuel storage tank approximately 1,000 gallons in size cradled in a containment seat. The crusher would consume approximately 30,000 to 50,000 gallons of water per day, drawn from a 20,000-gallon adjacent water storage tank that would be replenished two to three times daily. The equipment would be a licensed system with a current WA Department of Ecology (DOE) Temporary Air Quality permit. The rock crushing facility would be required to receive coverage under the Department of Ecology NPDES General Sand and gravel Permit.

Concrete Batch Plant

The cement batch plant would be located on-site at a central location within an area approximately 5.7 acres in size, surrounded by a 1-foot high earth berm to contain water runoff. It would have a daily production capacity of approximately 600 cubic yards and would operate during project construction hours of 10 hours per day, 5 to 6 days per week during daylight hours for approximately 3 to 4 months during construction. The peak production at the batch plant is approximately 700 cubic yards per day. The batch plant would require a stand-alone generator unit and would consume approximately 20,000 to 40,000 gallons of water per day, drawn from a 20,000-gallon adjacent water storage tank that would be replenished as needed. The batch plant would also carry a WA Department of Ecology (DOE) Temporary Air Quality permit. and would be required to receive coverage under the Department of Ecology NPDES General Sand and gravel Permit.

Following completion of construction activities the Applicant's contractor would rehabilitate the sites by dragging the top of both of the 500 x 500-foot crushing and batch plant areas with a blade machine and re-seeding the area with a designated mixture of native grasses.

Informational Kiosk

An information kiosk would be constructed near the site entrance to Vantage Highway.

Safety Features and Control System

Turbine Control Systems

Wind turbines would be equipped with sophisticated computer control systems to monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch and yaw angles, etc. The main functions of the control system would include nacelle and power operations. Each turbine would be connected to a central Supervisory Control and Data Acquisition (SCADA) System. The SCADA system would allow for remote control and monitoring of individual turbines and the wind plant as a whole from both the central host computer or from a remote computer.

Heat Dissipation

Heat dissipation for the operating machinery inside the wind turbines, such as the generator and gearbox, would be achieved with air cooling. Heat dissipation is very minimal and does not generate adverse impacts.

Safety Systems

All turbines are designed with several levels of built-in safety and comply with the codes set forth by European standards as well as those of OSHA and ANSI. The safety system would include braking systems, climbing safety, lightning protection and the grounding system for the towers, underground collection system and substations.

Braking Systems

The proposed turbines would be equipped with two fully independent braking systems that could stop the rotor either acting together or independently. The braking system is designed to bring the rotor to a halt under all foreseeable conditions. The system would include aerodynamic braking by the rotor blades and by a separate hydraulic disc brake system. Both braking systems would operate independently such that if there is a fault with one system, the other could still bring the turbine to a halt. Remote restarting of the turbine would not be possible following an emergency stop. The turbine would be inspected in-person and the stop-fault reset manually to re-activate automatic operation.

The turbines would also be equipped with a parking brake used to "park" the rotor while maintenance routines or stationary rotor inspections are performed.

Protection from Natural Hazards

Design features of the proposed project include protection from natural hazards, specifically wind storms, ice and snow storms, lightening storms, seismic events, landslides, volcanic events, soil erosion, and wildfire.

Graveled areas to protect against wild fires would surround the turbines, transformers, substations, and all other Project facilities. Weeds and vegetation would be managed as part of regular operations. The roads would act as fire breaks and help restrain the spread of fire.

Project Setbacks

Setbacks associated with wind projects are based on safety and avoidance of nuisance concerns, industry standards, and on the Applicant's experience in operating wind power projects. Setbacks from residences are not a consideration due to the remote location of the proposed project ((i.e., the nearest residence to the proposed project lies approximately 1 ¾ miles to the south). The remoteness of the site would avoid potential nuisance impacts such as noise and shadow-flicker.

Setback considerations for tip height relate to the size of the actual turbines to be installed. (Tip height refers to the total distance from the base of the turbine to the tip of the blade at its highest point). Tip height setbacks are primarily safety-related (e.g., if an entire tower and turbine were to collapse from a massive earthquake either combined with or independent from hurricane force wind, they would not fall on a public road or a neighbor's property). All public roads and adjoining properties are located beyond the proposed turbine tip height.

The proposed setback for the meteorological towers from public roads and residences is tip height. There are no designated setbacks for the other project components such as the O&M facility, substations, and gravel access roads.

One other setback consideration is the distance of wind turbines and their facilities from known (mapped) landslide boundaries. Based on geotechnical studies of the site, there would be approximately 800 feet distance from known landslide boundaries to the proposed project. The Applicant has indicated that more detailed geotechnical investigations would be performed to delineate the limits of potential landslide areas to ensure that facilities are not place in or adjacent to unstable terrain.

Lighting

The substation would be equipped with night-time and motion sensor lighting systems to provide personnel with illumination for operation under normal conditions, and for egress under emergency conditions. Emergency lighting with back-up power is also designed into the substations to allow personnel to perform manual operations during an outage of normal power sources. See Section 3.10, "Visual Resources/Light and Glare," for additional details.

The Applicant would also comply with FAA's aircraft safety lighting requirements for structures greater than 200 feet tall, which could include turbines and meteorological towers. Requirements include marking these structures with lights that flash white during the day and red at night.

2.2.4 Construction Activities

Project construction would be performed in several stages and would include the following main elements and activities:

- Grading of the field construction office and substation areas (also used for O&M building);
- Construction of site roads, turn-around areas and crane pads at each wind turbine location;
- Construction of the turbine tower foundations and transformer pads;
- Installation of the electrical collection system – underground and some overhead lines;
- Assembly and erection of the wind turbines;
- Construction and installation of the substation; and
- Plant commissioning and energization.

Please refer to "Table 3.2-2 Construction Equipment On Site During Construction" for a list of mobile equipment scheduled to be used during project construction,

Field Survey and Geotechnical Investigations

A site survey would be performed to stake out the exact location of the wind turbines, the site roads, electrical cables, access entryways from public roads, substation areas, and other project features.

A detailed geotechnical investigation would be performed to identify subsurface conditions which would dictate much of the design work of the roads, foundations, underground trenching and electrical grounding systems. Typically, the geotechnical investigation involves a drill rig that bores to the engineer's required depths (typically 8-inch diameter drill to 30–40 feet deep) and a backhoe to identify the subsurface soil and rock types and strength properties by sampling and lab testing.

The Applicant's engineering group would establish a set of site-specific construction specifications for the various portions of the project.

Equipment procurement would also be undertaken using the project site specifications. The primary EPC Contractor would use the design specifications as a guideline to complete the detailed construction plans for the project. The design basis approach ensures that the project would be designed and constructed to meet the minimum 20-year design life.

Site Preparation and Road Construction

Construction activities would include construction of project site access entry ways from public roads, rough grading of the roads, feeder line construction trails, leveling of the field construction site office parking area and the installation of about 6 to 8 temporary site office trailers sited near the O&M Facility Location indicated in Figure 1-2.

The project roads would be gravel surfaced and generally designed with a low profile without ditches to allow storm water to pass over the top. Road construction would be performed in multiple passes starting with the rough grading and leveling of the roadway areas. Water bars, similar to speed bumps, would be cut in to the roads in areas where needed to allow for natural drainage of water over the road surface and to prevent road washout. This would be done in accordance with a formal Storm Water Pollution Prevention Plan for the project as outlined in Section 3.3, "Water Resources."

Temporary staging and laydown areas would be required during wind turbine installation. Approximately 10 acres would be needed for temporary office trailers, parking construction vehicles, construction employees' personal vehicles, and other construction equipment. Three laydown areas would be located oon the site – one at the proposed O&M facility, a second adjacent to the PSE step-up substation, and a third approximately one mile east of the proposed batch plant. After construction has been completed, laydown and staging areas would be graded and reseeded to restore the area as close as possible to its original condition.

Flat areas adjacent to each turbine location, approximately 50 feet by 1,000 feet (5,000 square feet), would be cleared, compacted, and laid with gravel as necessary to place turbine blades and other turbine components and to station a construction crane as each tower is erected. At the end of most turbine strings (except where a turbine string is adjacent to a through-traffic road), a turn around area consisting of approximately 0.5 acre would also be needed to allow construction equipment to turn around safely.

Excavated soil and rock would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind. Larger excavated rocks would be used for reclamation of the gravel pits.

Project road construction would involve the use of several pieces of heavy machinery including bulldozers, track-hoe excavators, front-end loaders, dump trucks, motor graders, water trucks and rollers for compaction. Section 3.2, "Air Quality," contains a description of anticipated on site construction vehicles. Stormwater controls, such as hay bales and diversion ditches in some areas would control storm water runoff during construction.

Blasting Activities

Blasting would be required at each of the three on-site gravel pits once the top layers of rock have been removed.

Additional blasting may be required at foundation sites depending on the substrate encountered. Such blasting would continue as required until all foundation sites have been excavated The Applicant estimates that an average of 2 to 3 WTG foundations would be completed each day during the foundation construction phase, with a peak rate of 4 WTG foundations per day.

Foundation Construction

The project would require foundations for each turbine and pad transformer, the substation equipment and the O&M facility. Foundation construction would occur in several stages and would be conducted in a manner that would minimize the size and duration of excavated areas required to install foundations. Based on preliminary calculations and depending on the type of foundation design used, approximately 125 cubic yards of excavated rock and soil would remain from each turbine foundation excavation. The excess soils not used as backfill for the foundations would be used to level out low spots on the crane pads and roads and reseeded with a designated seed mix of around the edges of the disturbed areas. Larger cobbles and rock would be crushed into smaller rock for use as backfill or road material. All excavation and foundation construction work would be done in accordance to a formal Storm Water Pollution Prevention Plan (SWPPP) for the project as outlined in Section 3.3, "Water Resources."

The foundation design would be tailored to suit the soil and subsurface conditions at the various turbine sites based on the results of geotechnical investigations performed at each tower location. The project would require several foundations including bases for each turbine and pad transformer, substation equipment, and the O&M facility. Once the roads are complete for a particular row of turbines, turbine foundation construction would commence on that completed road section. Foundation construction would occur in several stages including drilling, blasting, and hole excavation, outer form setting, rebar and bolt cage assembly, casting and finishing concrete, removing the forms, backfilling and compacting, constructing the pad transformer foundation, and foundation site restoration.

Foundations for the turbine towers would consist of either spread footing-type foundation design or a vertical mono-pier foundation. Under the Most Likely Scenario, spread footing foundations would require holes approximately 100 feet by 100 feet square and about 18 feet deep. Backfill would be compacted in the bottom of the hole and reinforced square concrete footing would be poured. A reinforced concrete pedestal approximately 10 feet high would be mounted on the concrete footing to hold the tower. The concrete footing would be covered with approximately 6 to 8 feet of compacted backfill and 4 to 6 inches of topsoil depending on soil conditions.

Vertical mono-pier foundations would require excavating a hole up to 35 feet deep and up to approximately 18 feet in diameter. If the underlying rock is cohesive, competent and strong enough, rock anchors can be used which will allow the excavation to be as shallow as 15 feet deep.

The construction process for the foundations would vary depending on the foundation engineer's requirements and soil conditions found at the site. The construction process may have variances from site to site if soil conditions are different from location to location; however it generally follows the same main steps regardless of which turbine configuration is used for the project as follows:

Mono-Pier Type Foundation

- Clearing and grubbing the area with a bulldozer at the exact surveyed turbine location
- Initial excavation of the foundation hole with a track hoe
- Drilling and setting of charges and blasting out excavation center and perimeter simultaneously
- Loosen rock with hydraulic jack hammer
- Excavation of foundation hole with the track hoe
- Installation and setting of the outer corrugated metal pipe (CMP) form and backfill or slurry into place
- Construct the bolt cage inside the CMP
- Insert inner CMP
- Backfill the inner CMP with remaining suitable spoils
- Set outer forms for tower floor and electrical conduits
- Pour Concrete into place for foundation
- Remove Forms
- Dispose of remaining spoils
- Restore temporarily disturbed surfaces

Spread Footing Type Foundation

- Clearing and grubbing the area with a bulldozer at the exact surveyed turbine location
- Initial excavation of the foundation hole with a track hoe
- Drilling and setting of charges and blasting out excavation area center and perimeter
- Loosen rock with hydraulic jack hammer
- Full excavation of foundation hole with the track hoe
- Installation and setting of the outer forms and pour concrete base mat (3-4 inches thick)

- Construct reinforcement bar (rebar) mat and pedestal anchor bolt cage
- Assemble forms in place for pedestal, Pour concrete, allow to set and remove forms
- Backfill the excavation
- Set outer forms for tower floor pad and electrical conduits and pour Concrete into place for floor
- Dispose of remaining spoils
- Restore temporarily disturbed surfaces

Excavation and foundation construction would be conducted in a manner that would minimize the size and duration of excavated areas required to install foundations. Portions of the work may require overexcavation and/or shoring. Foundation work for a given site would commence after excavation of the area is complete. Backfill for the foundations would be installed immediately after approval by the engineer's field inspectors. The Applicant plans to use onsite excavated materials for backfill to the extent possible. The excess excavated materials not used as backfill for the foundations would be used to level out low spots on the crane pads and roads consistent with the surrounding grade. The top soil layer of the excavated materials would be reseeded with a designated mix of grasses and/or seeds around the edges of the disturbed areas. Larger cobbles would be disposed of offsite or crushed into smaller rock at the nearby existing permitted quarry for use as backfill or road material.

Electrical Collection System Construction

Underground cables would be installed once the roads, turbine foundations, and transformer pads are complete for a particular row of turbines. The high-voltage underground cables would be fed through the trenches and into conduits at the pad transformers at each turbine.

Excavated soil and rock that is not reused in backfilling the trenches would be spread across the site to the natural grade to be reseeded with native grasses to control erosion by water and wind. Larger excess excavated rocks would be crushed or used in reclamation of gravel quarries. All excavation, trenching and electrical system construction work would be done in accordance to a formal Storm Water Pollution Prevention Plan (SWPPP) for the project as outlined in Section 3.3, "Water Resources."

Substation Interconnection and O&M Facility Construction

The substation(s) and interconnection facilities construction would involve several stages of work including grading of the area, the construction of foundations for transformers, steel work, breakers, control houses, and other outdoor equipment, the erection and placement of the steel work and all outdoor equipment, and electrical work for all of the required terminations. Construction of the Operations and Maintenance (O&M) Facility would commence with the preparation and pouring of its foundation, framing the structure and roof trusses, installing the outer siding, installing plumbing and electrical work and finishing the interior carpentry. Once physical completion is achieved a rigorous inspection and commissioning test plan is executed prior to energization of the substation.

Wind Turbine Assembly and Erection

Turbine erection would be performed in multiple stages including: setting of the bus cabinet and ground control panels on the foundation, erection of the tower (usually in 2-3 sections), erection of the nacelle, assembly and erection of the rotor, connection and termination of the internal cables, and inspection and testing of the electrical system prior to energization.

Turbine assembly and erection would involve mainly the use of large truck or track mounted cranes, smaller rough terrain cranes, boom trucks, rough terrain fork-lifts for loading and off-loading materials and equipment, flat bed and low-boy trucks for transporting materials to site.

Plant Energization and Commissioning (Start-Up)

Plant commissioning would follow mechanical completion of the project. Commissioning of the project would commence with a detailed plan for testing and energizing the interconnection substation, feeder lines and step-up substations and electrical collection system in a defined sequence with lock and tags on breakers to ensure safety and allow for fault detection prior to the energization of any one component of the system. Once the step-up substation is energized, feeder lines would be brought on-line one-by-one and then individual turbines would be tested extensively, commissioned and brought on-line one-by-one. Commissioning does not require any heavy machinery to complete.

Transmission Feeder Line Construction

Transmission Line construction would include survey, staking of the transmission line corridor and tower locations, construction trail clearing, drilling of the holes for the poles, wood pole placement, and hardware assembly. Construction of the feeder lines would require the use of a backhoe, rock drill rigs for the pole-line, dump trucks for import of clean back fill, transportation trucks for the poles and hardware, boom trucks for off-loading and setting of the poles, cable spool trucks used to un-spool the cable, man-lift bucket trucks for the pole-line work and a winch truck to pull the cable from the spools onto the poles.

Installation of the temporary construction trail would include clearing of large boulders and stockpiling cleared vegetation where it is dense. Organic materials stockpiled during construction of the trails would be mulched and spread onto areas alongside roadways and also used for slope stabilization during the reseeding process.

Project Construction Clean Up

Project clean up would consist of reseeding to control erosion by water and wind. All construction clean up work and permanent erosion control measures would be done in accordance to a formal Storm Water Pollution Prevention Plan (SWPPP) for the project as outlined in Section 3.3, "Water Resources."

Other project clean up activities might include interior finishing of the O&M building, landscaping around the substation area, painting of scratches on towers and exposed bolts as well as other miscellaneous tasks that are part of normal construction clean-up.

Construction clean up would require the use of a motor grader, dump trucks, front-end loaders, and light trucks for transportation of any waste materials, packaging, etc.

Construction debris that can not be recycled (i.e. materials brought onto the site for construction such as wood, metal, plastic) would be collected in drop boxes and hauled to a licensed facility, likely the Kittitas County construction and demolition landfill located across from the site entrance.

Construction Site Security

The Site Project Manager would work with a security contractor to develop a plan to effectively monitor the overall site during construction. The security inspection and monitoring plan would be changed throughout the course of construction based on the level of construction activity and amount of sensitive or vulnerable equipment and materials in specific area.

Construction materials would be stored at the individual turbines locations, or at the lay-down area around the perimeter of the O&M facility and site construction trailers. Temporary fencing with a locked gate would be installed for a roughly 1.5-acre area adjacent to the site trailers for the temporary storage of any special equipment or materials. After construction is completed, the temporary fencing would be removed and the area re-seeded with an appropriate seed mix.

Both the O&M facility and the main substation would be equipped with outdoor lighting and motion sensor lighting. The substation would be surrounded by an 8-foot tall chain-link fence with barbed wire along the top. All wind turbines, pad transformers, pad mounted switch panels and other outdoor facilities would all have secure, lockable doors.

Construction Schedule and Workforce

The amount of employment is outlined in Table 2-2. Overall, the project anticipates the involvement of about 250 on-site personnel.

Table 2-2. Construction Labor Force Mix (Approximate Number of Personnel)

Construction Phase	Project Management &Engineers	Field Technical Staff	Skilled Labor & Equip Operators	Unskilled Labor	TOTAL
Engineering/Surveying/Design	6	12	0	0	18
Road Construction	5	5	15	5	30
Foundations Construction	3	4	23	30	60
Electrical Collection System Construction	2	3	23	12	40
Substation Construction	5	3	8	4	20
Wind Turbine Assembly and Erection	4	6	15	15	40
Plant Energization and Commissioning	5	10	15	0	30

Construction Phase	Project Management &Engineers	Field Technical Staff	Skilled Labor & Equip Operators	Unskilled Labor	TOTAL
Construction Punchlist	1	1	3	10	15
Clean-Up					
TOTALS	31	44	102	76	253

At peak, it is expected that about 160 personnel would be on-site at once as multiple disciplines of contractors complete their work simultaneously. All employees are assumed to work single 10-hour shifts, 5 or 6 days per week, as the work demands, for the duration of project construction. During turbine erection, both stand-by days and days with double shifts are anticipated to allow for turbine erection in low wind conditions.

A detailed discussion of where the construction workforce is anticipated to come from, where they would be housed and how they would travel to the project site is included in Section 3.11, "Population, Housing, and Economics." It is anticipated that roughly half of all construction worker vehicles would be parked at the O&M facility location and the other half would be dispersed across the various turbine strings. With a peak workforce of approximately 160 people, the maximum number of worker vehicles anticipated at any one time is approximately 107, assuming that efforts to encourage carpooling would result in about one third of construction workers carpooling to and from the project site.

Construction Schedule, Activities, and Milestones

The construction schedules are based on obtaining a site certificate from Washington EFSEC by November 15, 2004.

This section describes the engineering, procurement, construction, and start-up schedule milestones for the project. For wind power projects, the longest lead-time items are typically the substation transformers, usually requiring from 8–12 months from time of order to delivery and the wind turbines, generally requiring from 5 to 8 months. The proposed project construction schedule summary showing the major tasks, key milestones, and number of expected on-site personnel is included in Table 2-3. Project construction is scheduled to over a period of approximately 12 months from the time of site certification to commercial operation and would require 250 personnel.

Project Schedule with Different Turbine Sizes

The construction schedule would not be significantly affected by the selection of different WTG sizes or manufacturers. The installation of larger or smaller numbers of WTGs would impact the construction schedule as shown in Table 2-4.

Table 2-3. Proposed Project Construction Schedule Summary

Task/Milestone		Start	Finish	Approx. On-Site Staff/Crew for Task
1	EFSEC Site Certification	15-Nov-04	15-Nov-04	
2	Engineering/Design/Specifications/Surveys	15-Nov-04	7-Jan-05	18
3	Order/Fabricate Wind Turbines	15-Nov-04	29-Apr-05	0
4	Order/Fabricate Substation Transformer	15-Nov-04	8-Jul-05	0
5	Road Construction	15-Apr-05	18-Aug-05	30
6	Foundations Construction	6-May-05	3-Nov-05	60
7	Electrical Collection System Construction	3-Jun-05	17-Nov-05	40
8	Substation Construction	4-Apr-05	19-Aug-05	20
9	Wind Turbine Assembly and Erection	3-Jun-05	27-Oct-05	40
10	Plant Energization	19-Aug-05	19-Aug-05	30
11	WTG Commissioning	22-Aug-05	11-Nov-05	15
12	Commercial Online Date	11-Nov-05	11-Nov-05	
Total				253

Table 2-4. WTG Alternative Configuration Impacts on Construction Schedule

	104 Turbines/ 3 MW	136 Turbines/1.5 MW (Most Likely Scenario)	158 Turbines/1 MW
Number of WTGs	104	136	158
Total Road mileage	32	32	32
Construction/ Erection days	35	45	53
Variance from Most Likely Scenario (days)	–11	0	7
Notes: Assumes foundation construction/erection of three WTGs per day			

2.2.5 Operation and Maintenance Activities

Operating Schedule

The project would be in operation 24 hours per day, 365 days per year. The Operations and Maintenance (O&M) team would staff the project during core operating hours 8 hours per day, 5 days per week, from 8:00 a.m. to 5:00 p.m. with weekend shifts and extended hours as required. The project's central Supervisory Control and Data Acquisition (SCADA) system would stay on-line full time, 24 hours per day, 365 days per year

Operation and Maintenance Staff

The project would be operated and maintained by a team of approximately 14 to 18 personnel consisting of the following staff positions:

Position	Number of Personnel
Project Asset Manager	1
Operations Manager	1
Operating Technicians	10–14*
Turbine Warranty Manager	1
Turbine Warranty Assistant	1

*depends on quantity and type of turbine selected

2.2.6 Decommissioning

The design life of major project equipment such as the turbines, transformers, substations, and supporting plant infrastructure would be at least 20 years. The trend in the wind energy industry has been to repower older wind projects by upgrading older equipment with more efficient turbines. It is likely that after mechanical wear takes its toll, the project could be upgraded with more efficient equipment and could have a useful life longer than 20 years. Such upgrades may require additional EFSEC review and approval in advance of the repowering being performed.

If the project were terminated, the Applicant would request the necessary authorizations from EFSEC and landowners with which leases have been established to decommission the facilities. Foundations would be removed to a depth of 3 feet below grade and unsalvageable material would be disposed of at authorized sites. The soil surface would be restored as close as reasonably possible to its original condition.

The Applicant would provide adequate financial assurances to cover the anticipated costs associated with decommissioning the project, including the costs of preparing and implementing a restoration plan, in the form of a rolling reserve account using funds from the operation of the project or a decommissioning surety bond. In all cases, final financial responsibility for decommissioning of the project would rest with the Applicant (Wind Ridge Power Partners LLC 2004). The specific process for funding has yet to be determined. However, this plan and the process for its funding would be developed and submitted to EFSEC for review and approval prior to project construction.

2.3 Construction Costs

The total project construction cost, including equipment, construction, development, financing, legal, and study costs, is estimated to be $1,000 per kilowatt of installed nameplate capacity. Therefore project cost would range from $158 million to $312 million depending on the project size and is expected to be in the $200 million range, as defined in Table 2-5.

Table 2-5. Project Cost Summary for Various Project Size Scenarios

	104 Turbines/3 MW	136 Turbines/1.5 MW (Most Likely Scenario)	158 Turbines/1 MW
Turbine Nameplate	3 MW	1.5 MW	1 MW
Number of WTGs	104	136	158
Project Nameplate	312 MW	204 MW	158 MW
Estimated TOTAL COST (millions of dollars)	$312	$204	$158

2.4 Mitigation Measures Inherent in Project Design

Facility design would include mitigation measures as well as compliance with applicable codes and standards and implementing best management practices for erosion and sedimentation control. These mitigation measures are presented for each resource topic throughout Chapter 3. These measures have also been summarized in Table 1-3.

2.5 Alternatives Considered but Eliminated from Detailed Study

During the development phase of this project, the applicant considered alternative wind turbine technologies to be used, alternative wind turbine locations, and an alternative project layout. The alternatives considered but rejected are described below.

2.5.1 Alternative Wind Energy Technologies

Several types of wind energy conversion technologies were evaluated for the project (Table 2-6). The technology considered the most reliable and commercially viable is the 3-bladed, upwind, horizontal axis, propeller-type wind turbine (turbines labeled (c) and (d)). Figure 2-5 compares various wind turbine technologies on the basis of the relative scale and size of commercially used units and their typical sizes. Although larger versions of all models shown have been produced, the diagram illustrates the average sizes of versions that have been implemented on a substantial scale with hundreds of units installed.

The proposed project contemplates the use of the most successful class of wind turbines that are megawatt-class wind turbines. Compared to the other three technologies illustrated, this type of turbine requires fewer machines, covers a smaller overall project footprint, and is anticipated to have less visual impact, and less avian impacts because of a smaller total Rotor Swept Area and the lower RPM. A discussion of the other technologies and reasons for rejection is presented below.

Table 2-6. Comparison of Various Wind Turbines

Type	Typical Generator Size	Typical Size	No. of Units Required for 204 MW	Typical Rotational Speed
Darrieus Rotor	50-100 kW	A - 100-150 ft.	2,700-4,000	50-70 RPM
2 bladed (downwind)	50-200 kW	B - 150-200 ft.	1,000-4,000	60-90 RPM

Type	Typical Generator Size	Typical Size	No. of Units Required for 204 MW	Typical Rotational Speed
(downwind)				
3 bladed (upwind)	500-750 kW	C - 240-300 ft.	272-408	28-30 RPM
3 bladed (upwind)	1,000-3,000 kW	D - 300-400 ft.	158-312	17-25 RPM

Vertical Axis Darrieus Wind Turbines

The most widely used vertical axis wind turbine (VAWT) was invented in the 1920s by French engineer DGM Darrieus. It is called the Darrieus Wind Turbine, Darrieus Rotor and is commonly called the “eggbeater.” The Wild Horse Wind Power Project would utilize the horizontal axis type of wind turbines.

The Darrieus turbine was experimented with and used in a number of wind power projects in the 1970s and 1980s including projects in California and even an experimental machine installed by FloWind on Thorp Prairie located near Ellensburg, WA.

Despite years of design, experimentation and application, the Darrieus turbine never reached the level of full commercial maturity and success that horizontal axis turbines have for a number of reasons include inherent design and operation disadvantages discussed below.

Higher Wind Speeds Higher Above the Ground

Darrieus rotors are generally designed with much of their swept area close to the ground compared to horizontal axis (HAWTs). As the wind speed generally increases with the height above ground, HAWTs benefit from having higher wind speeds and higher wind energy incident to their rotor plane that can be extracted.

Start-up Wind Speed

VAWTs require a higher level of wind speed to actually start spinning compared to HAWTs. In older VAWT machines, the generator was used as a motor to start up the rotors. Modern VAWTs do not require generator to start up the rotor. HAWTs require less wind speed for start-up and most have the advantage of variable pitch blades, which allow the turbine to start up by a simply change to the blade pitch.

Variable Pitch

VAWTs do not have variable pitch capability and rely on stall regulation, which results in less efficient energy capture. Most modern HAWTs have mechanisms that pitch blades along their axis to change the blade angle to catch the wind. Variable pitch allows the turbine to maximize and control power output.

Avian Hazards – Guy Wires

VAWTs are generally constructed with guy wires which have been shown to be a greater hazard to birds than turbines themselves, as they are much more difficult for birds to see and avoid. HAWTs are typically erected on free-standing tubular steel towers and do not require the use of guy wires.

Turbine Footprint

VAWTs are fitted with four sets of guy wires that span from the top of the central tower and are anchored in foundations. Including the tower base foundation, VAWTs require a total of five foundations all spread apart. The result is that the overall footprint and disturbed area for a VAWT is larger than that for a comparably sized HAWT. HAWTs on freestanding towers use only one main foundation and have a smaller overall footprint.

Fatigue Life Cycles

Because of their design, VAWTs have higher fatigue life cycles than HAWTs, resulting in earlier and more frequent mechanical failures. As the VAWT rotor blades rotate through one full revolution, they pass upwind, downwind, and through two neutral zones (directly upwind of the tower and directly downwind of the tower). In contrast, the rotor blades on a HAWT do not pass through similar upwind/downwind neutral zones, and their fatigue life cycles are lower.

Two-Bladed, Downwind Wind Turbines

The most widely used vertical two-bladed wind turbines are of the downwind variety and are in the size range of 50 to 200 kW. They are referred to as downwind since the blades are downwind of the supporting tower structure. Although there is continued experimentation with prototype wind turbines of this design of a larger scale (300–500 kW), they are not as well proven as the three-bladed upwind technology. The two-bladed turbines require a higher rotational speed to reach optimal aerodynamic efficiency compared to a three-bladed turbine. Two-bladed turbines and the rotors also are more difficult to balance and this, combined with the downwind tower shadow, results in more mechanical failures compared to the three-bladed counterparts. As in the case of Darrieus turbines, two-bladed downwind turbines use guy wires, with higher associated avian impacts.

Smaller Wind Turbines

Over the past 20 to 30 years, wind turbines have become larger and more efficient. For comparison purposes, a smaller 660 kW turbine is about 73% the height of a 1500-kW (1.5-MW), while its output is only 44% that of the 1.5 MW turbine. Compared to the proposed action, using smaller turbines in the 500 to 750 kW range would be less cost-effective and would require more than twice as many total turbines for an equivalent energy output. This would result in more turbine foundations, a larger project footprint, and an overall higher impact on the surrounding environment. Compared to the proposed project, use of such smaller turbines would also result in a greater total RSA to produce the same amount of energy, and therefore a greater incidence of avian impacts

2.5.2 Consideration of Alternative Project Layouts

The Applicant identified and presented only the proposed project layout for development but defined the steps and criteria used to determine the selected site layout. The Applicant utilized a number of key criteria to design the proposed project layout (including roads, wind turbines, substations, electric collection lines, transmission feeder lines, O&M facility, equipment laydown areas, visitor kiosk, gravel quarries and concrete batch plant locations). These criteria include:

- Maximize use of existing roads to minimize the need to construct new roads
- Maximize the use of underground electric collection lines (vs. overhead collection lines) to minimize visual impacts and potential avian impacts
- Avoid siting any project infrastructure in or near any sensitive areas, including:
  - Wetlands
  - Streams and riparian areas
  - Documented locations of any threatened or endangered wildlife and/or plant species
  - Documented locations of any archeological or historical sites
  - In close proximity to any residences
- Avoid obstructing any line-of-sight communications paths
- Minimize wake loss effects among wind turbines
- Minimize visual impacts

The proposed layout was defined during the project development phase based on the results of Applicant-commissioned surveys and studies including cultural resource surveys, telecommunications obstruction analysis, plant and wildlife studies, and visual impact assessments, and considerations of terrain, technology and existing infrastructure on site (e.g., roads.).

As a result of this process, the project infrastructure was sited to avoid all documented locations of wetlands, streams, cultural resources and other sensitive areas. Mitigation is identified in this EIS to further reduce and avoid potential impacts.

As described above, the Applicant currently has no plans for further expansion on contiguous or adjacent lands. The potential for expansion would depend on landowner consent, market demand, pricing of turbines and electricity, and regulatory approvals. However, future expansion seems unlikely at this time because the Applicant believes the areas for which development (the project) is proposed and for which site certification is being sought are those areas that represent the best wind resource potential in the area.

2.6 Off-Site Alternatives

The Applicant's proposal for the Wild Horse Wind Power Project identified only the proposed project area for development. The study area was chosen primarily for its energetic wind resource suitable for producing electricity at competitive prices and access to several sets of power transmission lines that traverse the site and have adequate capacity to allow the wind-generated power to be integrated into the power grid. Other factors considered were site accessibility and surrounding land use compatibility. These combined factors rendered the proposed site the most practical and feasible from a technical and economic standpoint.

To comply with the requirements of EFSEC Energy Facility Siting Rules Title 463 WAC and Chapter 80.50 RCW, EFSEC requested an investigation into potential off-site alternatives within Kittitas County (Figure 2-6). .

2.6.1 Process for Identifying Off-Site Alternatives

This section describes the approach used for selection of offsite alternatives for evaluation in the EIS. The analysis did not include the Desert Claim or the KVWPP sites since both of those projects are under SEPA review by Kittitas County and EFSEC.

The methodology used to identify and evaluate off-site locations was modeled after the approach used in the Desert Claim Wind Power Project Draft EIS (Kittitas County 2003). The objective of the analysis was to identify wind resource sites (in addition to WHWPP, Desert Claim and KVWPP) within Kittitas County that could accommodate a wind power project to meet the "most likely scenario" described in the March 2004 Application for Site Certification for WHWPP (Wind Ridge Power Partners LLC 2004).

To be considered as a potential off-site location, a site had to generally meet the following criteria:

- Minimum average wind speed of 16 mph. In the Pacific Northwest, the site for a potential wind power facility must have a minimum average wind speed between 15 to 17 miles per hour to be considered economically viable. Potential sites are initially identified using wind energy maps, such as those published by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL). Promising sites under go intensive on-site meteorological investigations, typically over a minimum 1 to 2-year period. Once a site is selected by a developer, a computer model is used to identify the optimal location for each turbine.
- Existing 115kV or 230 kV transmission line with unused capacity within 10 miles of site. Wind energy projects must connect to an electric transmission line to deliver power to the regional power grid. The costs associated with constructing a transmission line much further than 10 miles to connect to the regional grid can make a site financially impractical.
- Large undivided parcels of land totaling a minimum of approximately 6,000 acres. The amount of land required for a wind power project is directly related to the size of the project (in terms of power output) and the size and number of turbines. Large parcels in rural or

agricultural settings with a dispersed population are preferred and tend to minimize the potential for land use conflicts.

- Kittitas County zoning classification of AG 20, Commercial AG, or Forest and Range. The zoning classifications of AG 20, Commercial AG and Forest and Range are associated with land uses that are generally compatible with wind farm development. The Kittitas County Zoning Code (Title 17) includes a Wind Farm Resource Overlay Zone that can be applied to any zone as long as the proposed site is appropriate, the welfare of the public can be protected and the wind farm is compatible with nearby land uses.
- Absence of significant environmental constraints or conflicting land uses. Examples of significant on-site environmental constraints include lakes, rivers and streams; wetlands; critical habitat; or recorded cultural or archaeological resources. Conflicting land uses include parks, recreation areas and wildlife refuges. Sites with significant environmental constraints or conflicting land uses typically experience higher construction costs. Such sites are also subject to a complicated federal, state and local permitting process that can be time-consuming and unpredictable. It is often best to entirely avoid sites burdened with substantial environmental constraints or conflicting land uses.

GIS files for Kittitas County were obtained to assist with identifying potential wind power sites. Wind speed data was obtained from the U.S. Department of Energy National Renewable Energy Laboratory (NREL). NREL wind data for potential sites was reviewed and validated by Ron Nierenberg, a professional meteorologist with extensive knowledge of wind conditions in Kittitas County.

Information on transmission line locations was obtained from the Bonneville Power Administration. GIS mapping showing parcel boundaries, zoning designations, parks and recreation land, and wildlife refuges were obtained from Kittitas County. Information on wetlands was obtained from the USFWS National Wetland Inventory and Kittitas County. Information on Priority Habitats was obtained from the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species Database.

A total of six potential off-site locations (above and beyond the KVWPP and Desert Claim proposed wind energy projects), were identified using the criteria and GIS mapping described above. Four of the potential sites were identified and evaluated in a previous off-site investigation conducted for the Desert Claim Wind Power Project Draft EIS (Kittitas County 2004). These sites included Springwood Ranch, Swauk Valley Ranch, Manastash Ridge, and the Boylston Mountains. Two additional sites were added as a result of the analysis—Skookumchuck and Quilomene. Figure 2-7 shows the locations of these off-site alternatives in relation to one another.

2.6.2 Alternative Sites Selected for EIS Analysis

The six off-site alternatives were identified and screened against the five major criteria listed above affecting the viability of a site for potential wind farm development (Table 2-7). All six sites were found to meet the minimum average wind criteria of 16 mph, however, none of the alternatives stood out as being superior to others based on wind data alone (Table 2-7). Four of the sites (Springwood Ranch, Swauk Valley Ranch, Manastash Ridge and Boylston Mountains) had existing transmission lines either on site or within three miles of the site. Skookumchuck and Quilomene were farthest from existing lines at 6 and 8 miles, respectively.

All six sites are composed of fairly large parcels. Four sites (Swauk Valley Ranch, Manastash Ridge, Boylston Mountains and Skookumchuck) are well over the desired size threshold of 6,000 acres. At 5,000 and 4,200 acres respectively, Quilomene and Springwood Ranch are both below the desired size threshold.

Most of the sites have the required zoning classifications of AG-20, Commercial AG and Forest and Range. The exception is Manastash Ridge, which is zoned Commercial Forest and is therefore not suitable for operation of a wind farm. The Boylston Mountains site is also unsuitable because it is actively used for military training purposes—a use that is incompatible with operation of a wind farm.

All of the sites have varying degrees of environmental constraints including on-site springs, streams and wetlands. Springwood Ranch, Manastash Ridge and Skookumchuck all have large streams flowing across their sites that can complicate site design, especially placement of access roads and other major facilities. The northern portion of the Swauk Valley Ranch site is off limits to development because it is protected by a Nature Conservancy easement.

All sites also have varying amounts of designated Priority Habitats for anadromous fish and large mammals, and known nest sites for raptors and neotropical bird species (WDFW 2004). The Springwood Ranch site contains the most spawning and rearing habitat for anadromous fish, while the Manatash Ridge and Skookumchuck Creek sites support diverse large mammal populations (elk, mule deer, black-tailed deer, bighorn sheep). Sensitive shrub-steppe plant communities occur at Quilomene, while four sensitive plant and plant communities are found at the eastern edge of the Swauk Valley Ranch site.

Table 2-7. Summary of Initial Screen Findings

Screening Criteria	Springwood Ranch	Swauk Valley Ranch	Manastash Ridge	Boylston Mountains	Skookumchuck	Quilomene
Minimum average wind speed of 16 mph	"Good 15.7 – 16.8 mph"	"Good 15.7 – 16.8 mph"	"Good 15.7 – 16.8 mph"	"Good 15.7 – 16.8 mph"	"Good 15.7 – 16.8 mph"	"Good 15.7 – 16.8 mph"
Existing transmission line within 10 miles of site	Existing line located approx. 1.5 miles north of site across the Yakima River.	Existing line crosses through center of the site.	Two existing lines are located within 3 miles of the site.	Existing line approx. 2 to 3 miles east of site across the Columbia River.	Closest line is approx. 6 miles east of site, across the Columbia River.	Closet line is approx. 8 miles east of site across the Columbia River.
Large undivided parcels of land totaling approx. 6,000 acres	Most parcels within site are moderate in size (~1/8 ac.). Total size ~4,200 acres.	Most parcels are large. Some smaller parcels in central portion of site. Total size >6,000 acres.	Most parcels are very large. Total size >6,000 acres.	Large parcels. Total size >6000 acres	Large parcels. Total size >6,000 acres	Checkerboard site comprised of seven or more very large 1-square mile parcels. Total size ~5,000 acres.
Zoning: AG20, Commercial AG, or Forest and Range	Primarily Forest and Range, some Commercial AG and AG20.	Forest and Range	Commercial Forest	Commercial AG. Site currently used for military training.	Forest and Range	Commercial AG and Forest and Range.
Absence of significant environmental constraints	Taneum Creek crosses site and Yakima River borders eastern edge, riparian habitat, anadromous fish habitat, scattered wetlands and steep slopes, two recorded archaeological sites.	Numerous small streams, small lakes and scattered wetlands. Western bluebird nesting, several DNR-designated plant communities, designated mule deer and black-tailed deer habitat. No recorded archaeological sites. Northern portion of site is designated as Nature Conservancy easement.	South Fork Manastash Creek crosses site and provided priority fish habitat, scattered small lakes, wetlands and steep slopes. Site supports elk, mule/black-tailed deer and bighorn sheep three recorded archaeological sites.	Numerous springs, small streams, and scattered wetlands. Site supports mule deer and chukar partridge, nesting for Swainson's hawk, prairie falcon, and peregrine falcon and four sensitive plant communities. Fifty-six recorded archaeological sites.	Situated between 2 wildlife areas. Skookumchuck Creek flows eastward through the center of the site. Site supports mule deer, elk, bighorn sheep and two sensitive plant species. No known archaeological sites.	Two streams and 3 archaeological sites Site supports shrub-steppe, mule deer, elk, and two sensitive plant species. Adjacent to Quilomene Wildlife Rec. Area and Ginkgo Petrified Forest State Park.

In addition, most sites have at least a few recorded archaeological sites within their boundaries. The Boylston Mountains have the greatest number, at 56 recorded archaeological sites. The presence of archaeological sites can increase development costs by requiring expensive measures to avoid and possibly recover known or discovered cultural artifacts. Skookumchuck and Quilomene are both located immediately adjacent to wildlife areas that could be problematic for a wind farm operation. Quilomene also abuts Ginkgo Petrified Forest State Park, and both are heavily used recreation areas.

Based on the initial screening criteria, both Swauk Valley Ranch and Springwood Ranch were brought forward for analysis as off-site alternatives in this EIS. These two sites, along with the KVWPP and Desert Claim projects, represent the four off-site alternatives to WHWPP (Figure 2-8 through 2-11). The Kittitas Valley Wind Power Project Draft EIS (EFSEC 2003) and the Desert Claim Wind Power Project Draft EIS (Kittitas County 2003b) were referenced for information to support the off-site alternatives analysis presented in this Draft EIS for the Kittitas Valley, Desert Claim, and Springwood Ranch alternatives.

Kittitas Valley

Sagebrush Power Partners (the Applicant), a limited liability corporation (LLC), proposes to construct and operate a wind turbine electrical generation facility in Kittitas County, Washington. The Kittitas Valley Wind Power Project (KVWPP) would consist of between 82 and 150 wind turbine generators with a total nameplate capacity of between 181.5 to 246 megawatts (MW).

Location and Site Characteristics

The project would be located on open ridge tops on each side of US 97 roughly halfway between Ellensburg and Cle Elum (Figure 2-7). KVWPP is an approximately 7,000-acre site located approximately 3 miles north of Thorp and 10 miles east of Cle Elum in central Kittitas County. KVWPP is bounded by Highway 10 on the south, and bisected by US 97 (see Figure 2-8). The Yakima River lies approximately 0.5 mile south of the site. Approximately 5,000 acres of the project area is in private ownership, with the remaining 2,000 acres owned by the state of Washington and managed by the Washington DNR (2003). The overall population density in the project area is low. There are approximately 60 dwellings within 1 mile of the proposed project.

Land use in the project area consists of cattle grazing interspersed with some rural residential development. None of the land in the project area is irrigated and no crops are grown. Most grazing use is seasonal in nature (primarily in the spring). About half of the private property owners within the project area currently use their land for grazing; those owners primarily raise cattle, but one owner raises bison and horses. About half of the Washington DNR parcels within the project area are currently used for grazing. Forested lands are north and east of the project site.

The KVWPP site is north and east of the Yakima River on the ridges that slope south from Table Mountain. Although these ridges slope gently southward along their spines, their transverse slopes are steep. The project site and adjacent lands range in elevation from approximately 2,200 to 3,100 feet above mean sea level. Between the ridges are ephemeral and perennial creeks that flow into the Yakima River. Slopes within the project area generally range from 9 to 36% and can reach 84% or more in some of the canyons.

Vegetation communities within the KVWPP site consist primarily of sagebrush and grasslands. There are riparian zones along ravines and lithosols (shallow soils) communities along ridge tops. The higher portions of the project area border the ponderosa pine zone. Specialized habitats such as lithosols occur throughout the region, although the extent of this habitat has not been quantified at a regional scale. Several riparian areas associated with springs, seeps, and creeks also are present in the project area.

Wind Power Facilities

Depending on the type of wind turbine technology used, the Kittitas Valley project would occupy between 93 and 118 acres of land (Figure 2-8). The final selection of the exact type and size of wind turbine to be used for the project depends on a number of factors including equipment availability at the time of construction. The number of turbines and the resulting nameplate capacity of the project would depend on the make and model of turbine used. The "Middle Scenario" is 121 turbines (Table 2-8).

Table 2-8. Summary of Off-site Wind Power Facilities

	Springwood Ranch	Swauk Valley Ranch	Kittitas Valley	Desert Claim
Turbine Nameplate	1.5 MW	1.5 MW	1.5 MW	1.5 MW
Number of WTGs	40 to 45	42	121	120
Project Nameplate	64.5 MW	63 MW	181.5 MW	180 MW
Total Permanent Footprint Approx.	30 acres	53 acres	93 acres	82 acres
Miles of Roads Approx.	unknown	10 miles	26 miles	23 miles

Source: EFSEC 2004; Kittitas County 2003

The facilities, equipment, and features to be installed as part of the KVWPP would include the following:

- approximately 19 miles of new roads,
- improvements to roughly 7 miles of existing roads,
- approximately 23 miles of underground 34.5-kV electrical power lines,
- approximately 2 miles of overhead 34.5-kV electrical power lines,
- two substations,
- one 5,000-square-foot operations and maintenance facility with parking, and
- up to nine permanent meteorological towers.

The KVWPP would be constructed across a land area of approximately 7,000 acres in Kittitas County, although the actual permanent facility footprint would comprise 93 acres. The majority of the KVWPP site and the proposed interconnect points lie on privately owned lands and there are five parcels owned by the Washington State Department of Natural Resources (DNR). The Applicant has obtained wind option agreements with landowners for all private lands within the project site boundary necessary for project installation. In June 2003, the Applicant executed a lease agreement for use of DNR property in the project area.

Desert Claim

The Desert Claim Wind Power Project (DCWPP) is a proposed wind power project under review by Kittitas County. An application was submitted in January 2003 to Kittitas County Community Development Services by Desert Claim Wind Power LLC for permits to construct and operate the wind facility.

Location and Site Characteristics

The proposed DCWPP would consist of a 180 MW wind energy facility on 5,237 acres of privately owned land (Figure 2-9).

The project area contains approximately 5,237 acres held by eight landowners. The southern edge of the project area is located approximately 8 miles north of the central part of Ellensburg. The project area extends approximately 5.5 miles from east to west and up to 5 miles in a north-to-south direction. The southwestern corner of the project area is over 1.5 miles east of U.S. Route 97 (see Figure 2-9) and can be accessed from U.S. Route 97 via Smithson Road. Access to the project area from Ellensburg can be via Wilson Creek Road, Robbins Road, Pheasant Lane, Reecer Creek Road or Lower Green Canyon Road.

The project area is situated along the northern margin of the Kittitas Valley, which is the broad valley area of central Kittitas County on either side of the Yakima River between approximately Lookout Mountain and the Yakima Canyon. The terrain within the project area is relatively flat and open, with a gradual south-to-north rise in elevation totaling approximately 1,000 feet over a distance of approximately 5 miles. Surface elevations range from approximately 2,100 feet to 2,500 feet above sea level across most of the project area. The northernmost portion of the project area lies within the foothills of the Wenatchee Mountains (a portion of the Cascade mountain range), which rise to the north of the Kittitas Valley. Several small, gently sloping creeks flow generally north to south across the project area, forming shallow depressions across the otherwise even landscape.

Approximately 53% of the site consists of shrub-steppe and 30% as grasslands. Remnant native shrub-steppe and grassland vegetation remain around the outer edges of the valley. The existing vegetative cover in most of the valley is dominated by agricultural cultivation and landscape plantings. Habitats range from poor to moderate quality for wildlife. Five perennial and 14 intermittent streams occur within the Desert Claim project area (Kittitas County 2003b).

There are no publicly owned lands in the project area. The project area is in a rural, relatively lightly populated section of Kittitas County and is characterized primarily by cultivated feed crop production or pasture. There are extensive areas of rangeland used for grazing. Rural residential development occurs in a number of locations, including dwellings on farm or ranch properties, scattered residences on large lots, and a few small clusters of homes. A total of 31 occupied single-family residences (and one abandoned trailer) are within the project area or within 1,000 feet of the project area boundary (Kittitas County 2003b).

Wind Power Facilities

The proposed DCWPP project would occupy approximately 82 acres of land and support up to 120 turbines (Table 2-8 and Figure 2-9). The specific facilities for the project include:

- A maximum of 120 wind turbines, each with a capacity of 1.5 MW and a total project generation capacity of 180 MW;
- Free-standing tubular-steel towers up to 262 feet high and supporting three-bladed rotors (Total maximum height including blades of 393 feet);
- Approximately 23 miles of roads;
- Underground 34.5-kV electrical power lines;
- One substation;
- Up to several miles of overhead 115- or 230-kV transmission line from the substation to the regional transmission system;
- One 5,000-square-foot operations and maintenance facility with parking, and
- As many as four meteorological towers up to 164 feet in height.

Construction of the project would require 9 months and 120 to 150 workers. DCWPP would operate and maintain the wind facility during an assumed 30 years useful life. Operation and maintenance would include round-the-clock monitoring of output and performance and patrolling the project area to ensure security.

Springwood Ranch

Although wind energy companies have investigated the prospects for wind energy development in the Springwood Ranch area, there has been no specific proposal for a wind energy project on this site. The following project description is based on a conceptual layout for a wind power project on the Springwood Ranch site that was prepared by enXco, at Kittitas County's request, specifically for use in the Desert Claim EIS. The location of the site is presented in Figure 2-7 and the site layout is shown in Figure 2-10. A conceptual layout of wind turbine and meteorological towers was presented in the Kittitas Valley Wind Power Project Draft EIS (ESFEC 2004). However, it did not include access roads, power collection cables, a substation, operations and maintenance facility, or a transmission interconnection. These facilities would be required for a wind power project at this site, and their characteristics would likely be similar to those defined in Section 2.2 for the same components of the WHWPP.

Location and Site Characteristics

Springwood Ranch is an approximately 3,610-acre site located approximately 0.5 mile northwest of the town of Thorp and 10 miles northwest of Ellensburg. Springwood Ranch is bounded by I-90 (or Thorp Prairie Road) on the south and the Yakima River on the north (Figures 2-7 and 2-10). The western end of the property abuts the Sunlight Waters community, in the Elk Heights area. The Iron Horse State Park/John Wayne Trail runs adjacent to or through the northern and eastern edge of the site. The northern boundary of the L. T. Murray Wildlife Recreation Area, managed by WDFW, is located near the site but south of I-90.

The surrounding area is primarily rural/agricultural (designated Forest Multiple Use and Agriculture in the Kittitas County Comprehensive Plan, and zoned Agriculture-20 and Forest and Range). A small cluster of commercial uses is located at Thorp (designated an Urban Growth Node [UGN] in the Kittitas County Comprehensive Plan). A ranch house and several accessory structures and outbuildings are located onsite.

The topography of most of the site is gently rolling, but gives way to steep bluffs along a narrow canyon that contains the Yakima River in this location. Taneum Creek runs in a southwest/northeast direction through the eastern one-third of the site. The predominantly upland terrain on the site drops approximately 200 feet to the valley along Taneum Creek, causing a wind shadow over the eastern third of the property. Vegetation is predominantly shrub-steppe and grazed grasslands. Alfalfa and hay are grown on the site. NWI maps identify 20 wetlands on the site, ranging in size from less than 3 acres to 8 acres. Most are associated with irrigation channels or excavated ponds.

Habitat on the site would support animals adapted to open grasslands or the ecotone between forest and grasslands. The Yakima River in this vicinity supports one run of spring chinook salmon. Several species of trout, including bull and steelhead, have been reported. Lower Taneum Creek has been historically used by resident trout and anadromous fish for spawning and rearing. Taneum Creek is listed as “water quality limited” surface waters (for temperature and instream flow) under section 303 (d) of the federal Clean Water Act.

Wind Power Facilities

According to the Kittitas Valley Wind Power Project EIS (EFSEC 2004), the Springwood Ranch site could accommodate approximately 40 to 45 turbines (Figure 2-10 and Table 2-8).

A lesser or greater number of turbines could potentially be accommodated based on micro-siting. Using a 1.5 MW turbine, this number of turbines would generate approximately 64.5 MW of electric power, which is 68% less than the capacity of the proposed action under the Most Likely Scenario. This reduced scale raises questions whether this could be a commercially viable site; in any case, it is below the Applicant’s objectives for a wind power facility (i.e., at least 158 MW) and less than the quantity of wind energy that is currently being sought by regional utilities (e.g., in September 2003, PSE issued a draft request for proposals to acquire approximately 150 MW of capacity from wind power). Connection to transmission facilities (for the Bonneville lines) would require building a transmission line approximately 5 miles long, including crossing the Yakima River. Easements would also need to be acquired to travel across private properties located between the project site and the transmission line.

Other project facilities and construction techniques would be the same as described for the proposed action. The project substation would be located on the property, while a switchyard would be located at the interconnect point. Project access roads would be similar in design to the proposed action, but would be proportionally less in terms of total distance and disturbance. Based on corresponding unit factors for the various project components, the total area disturbed by construction activities for this alternative site would be approximately 125 acres. The total area permanently occupied by project facilities in this case would be approximately 30 acres. The labor force required for construction and for long-term operation and maintenance of a 65-

MW wind project on the Springwood Ranch site would be less than for the proposed action, but the specific numbers or differences have not been estimated.

Swauk Valley Ranch

Although wind energy companies have investigated the prospects for wind energy development in the Swauk Valley Ranch area, there has been no specific proposal for a wind energy project on this site. The following project description is based on a conceptual layout prepared by Wind Ridge Power Partners LLC. The location of the site is presented in Figure 2-7 and the layout is shown in Figure 2-11. A conceptual layout of wind turbine and meteorological towers was prepared, but does not include access roads, power collection cables, a substation, operations and maintenance facility, or a transmission interconnection. These facilities would be required for a wind power project at this site, and their characteristics would likely be similar to those defined in Section 2.2 for the same components of the WHWPP.

Location and Site Characteristics

The Swauk Valley Ranch site is located north of the Yakima River approximately 12 miles northwest of the City of Ellensburg in the vicinity of Lookout Mountain (Figure 2-7). Topography on the more than 6,000-acre site is gently rolling to steep. Typical elevations range from 500 m to 1000 m above sea level.

The NREL wind maps show the quality of wind resources on the site falling primarily in the "Good 15.7 – 16.8 mph" range with a few upper elevation locations falling into the "Excellent 16.8 – 17.9 mph" and "Outstanding 17.9 – 19.7 mph" categories. However, wind data from other public domain and confidential sources suggest that a more accurate rating for the site would be "Good 15.7 – 16.8 mph." A BPA transmission line crosses through the center of the site in an east-west direction.

Several streams and small lakes are located on the site. Kittitas County wetlands maps identify nine wetlands on the site ranging from approximately 0.25 acre to slightly more than 3 acres. WDFW identified approximately 220 acres of the northern portion of the site as western bluebird nesting habitat (a WDFW Monitor Species) and oak woodland as Priority Habitat. There are several DNR-designated Natural Heritage Areas (thyme buckwheat/Sandberg's bluegrass, ponderosa pine/common snowberry, and Oregon oak/Geyer's sedge plant communities) along the eastern edge of the site. WDFW also indicated all of the site as mule deer/black-tailed deer habitat and the northern portion as elk habitat (WDFW 2004).

No recorded archaeological sites are located within the boundaries of Swauk Valley Ranch; however, 11 sites are located within a 1-mile radius of the site. Most of the site is composed of large parcels (i.e. greater than 1/8 section). Fifteen or so smaller parcels are located in the central portion of the site. Land cover on southern half of the site is a mixture of grasslands and shrublands, while the northern half of the site is dominated by conifer forest. The entire site is zoned Forest and Range. A large part of the site in the northern panhandle (over 3 square miles) is designated as a Nature Conservancy easement and is off limits to development.

Wind Power Facilities

Based on an estimate made by Wind Ridge Power Partners, the Swauk Ranch site could accommodate approximately 42 turbines (Table 2-8, Figure 2-11). A smaller or greater number of turbines could potentially be accommodated based on micro-siting. Using a 1.5 MW turbine, this number of turbines would generate approximately 63 MW of electric power, which is 69% less than the capacity of the WHWPP under the Most Likely Scenario. This reduced scale raises questions whether this could be a commercially viable site; in any case, it is below the Applicant's objectives for a wind power facility (i.e., at least 158 MW) and less than the quantity of wind energy that is currently being sought by regional utilities (e.g., in September 2003, PSE issued a draft request for proposals to acquire approximately 150 MW of capacity from wind power). Since Bonneville lines cross the middle portion of the site, connection to the power transmission grid could be accommodated.

Other project facilities and construction techniques would be the same as described for the proposed action. The project substation would be located on the property, while a switchyard would be located at the interconnect point. Project access roads would be similar in design to the proposed action, and are estimated to be 10 miles in length. Based on corresponding unit factors for the various project components, the total area permanently occupied by project facilities in this case would be approximately 53 acres. The labor force required for construction and for long-term operation and maintenance of the 63-MW wind project on the Swauk Valley Ranch site would be less than for the proposed action, but the specific numbers or differences have not been estimated.

2.7 No Action Alternative

Under the No Action Alternative, the project would not be constructed or operated, and the environmental impacts described in this EIS would not occur. The No Action Alternative assumes that future development would comply with existing zoning requirements for the project area, which is zoned Commercial Agriculture and Forest and Range. According to the County's zoning code, the Commercial Agriculture zone is dominated by farming, ranching, and rural lifestyles, and permitted uses include residential, greenhouses and agricultural practices. Permitted uses in the Forest and Range zone include logging, mining, quarrying, and agricultural practices, as well as residential uses (Kittitas County 1991). However, if the proposed project is not constructed, it is likely that the region's need for power would be addressed by a combination of user-end energy efficiency and conservation measures, existing power generation sources, or by the development of new renewable and non-renewable generation sources. Base load demand would likely be filled through expansion of existing, or development of new, thermal generation such as gas-fired combustion turbine technology. Such development could occur at conducive locations throughout the state of Washington.

A baseload natural gas-fired combustion turbine would have to generate 67 average MW of energy to replace an equivalent amount of power generated by the project (204 MW at 33% net capacity). (An average MW [aMW] is the average amount of energy supplied over a specified period of time, in contrast to MW, which indicates the maximum or peak output [capacity] that can be supplied for a short period.) Table 2-9 presents the basic parameters of a hypothetical 67-aMW natural gas-fired combustion turbine.

Table 2-9. Potential Annual Environmental Impacts for Hypothetical 67 Average Megawatt Natural-Gas-Fired Combined-Cycle Combustion Turbine

	On-Shore Gas Extraction	Transportation	Generation
Air Pollutants			
Sulfur Oxides (tons)	64	0	2
Oxides of Nitrogen (tons)	4	18	389
Particulates (tons)	0.1	-	2.0
Carbon Dioxide (tons)	-	-	261,632
Carbon Monoxide	-	-	149
Water Quality Impacts			
Consumption (acre-ft)	-	-	228
Discharge	0.4 acre-ft drilling mud	-	0.5
Other Discharge	0.1	-	
Biological Oxygen Demand (tons)	0.5	-	43.6
Chemical Oxygen Demand (tons)	1.5	-	
Oil and Grease (tons)	0.004	-	
Chromium (tons)	0.001	-	
Total Dissolved Solids (tons)	20	-	71
Total Suspended Solids (tons)	-	-	76
Ammonia (tons)	-	-	0.01
Chloride (tons)	4	-	-
Sulfate (tons)	3	-	-
Waste Streams			
Solid Wastes (tons)	150 (drill cuttings)	-	undetermined

Basis: BPA FEIS - Resource Programs, Vol. 1, Table 3-26. February 1993.

Impacts from gas-fired combustion turbine projects include air emissions and other impacts of construction and operation near the new plant, and impacts associated with natural gas extraction and transport. Combustion turbine projects require significant amounts of water, the extraction of which may have adverse impacts on surface water or groundwater resources. Gas extraction impacts include those related to drilling and associated development activities, and those related to ongoing operation of gas wells and associated delivery systems that would occur for the life of the project. Although it is speculative to estimate impacts of a similarly sized combustion turbine because of the uncertainty of the location and type of technology, impacts of a typical combustion turbine are identified in the No Action Alternative sections of Chapter 3 for informational purposes (Bonneville et al. 2002).

2.8 Alternative Transmission Interconnection Routes

There are two 230 kV transmission feeder lines proposed for the project, one to allow interconnection with the Bonneville Power Administration (BPA) transmission system and one to allow interconnection with the Puget Sound Energy (PSE) transmission system. It is anticipated that only one feeder line would be built; however, the Applicant is seeking approval to build and operate up to two feeder lines. Power from the project will be fed along these transmission feeder lines indicated on the Site Layout in Figure 1-2 as the BPA Feeder Line and the PSE Feeder Line to the point of interconnection with the respective utility.

Feeder line routes should have sufficient access to allow for the safe delivery and construction of the pole structures and lines during construction and for inspection and maintenance during operation. Where practical, the feeder lines can parallel existing roads to facilitate access and minimize ground disturbance impacts, and can run along property lines to avoid segmentation of landowners' property. Where feasible, the lines should not be routed alongside or across existing power lines and should be set back from residences and commercial areas.

The Applicant examined various transmission feeder line routes and performed surveys to examine the possible routes. The straight line routes that were examined crossed over very steep and unfavorable terrain, required pole construction in potential stream beds and riparian areas, and involved smaller parcels of land and multiple landowners. For these reasons, the Applicant considers the alternative routes to be inferior alternatives to the proposed transmission feeder line routes.

2.8.1 BPA Schultz-Vantage Transmission Line Corridor

If connected to BPA's system, the project will interconnect with the Columbia to Covington 230 kV or to the Grand Coulee to Olympia 287 kV lines near the existing Schultz substation as the point of interconnection (POI). The point of delivery (POD) for power from the project, however, would be at the location where the project's BPA feeder line intersects the existing BPA corridor approximately 5 miles west of the project. The project's BPA feeder line runs west from the on-site BPA step-up substation to the existing BPA Schultz to Vantage 500 kV line corridor to the BPA point of delivery (POD) as shown in Figure 1-2.

If the WHWPP is connected to the BPA system, BPA will be responsible for permitting, constructing, owning and operating facilities interconnecting to their system, including a new interconnection substation located near the existing Schultz substation as well as a new 230 or 287 kV line between the BPA POI and BPA POD. The project's viability does not depend on the interconnection with BPA since interconnection can also be achieved with the PSE system.

Corridor Description

The following gives a brief description of each environmental and resource element of the Shultz-Vantage Transmission Line Corridor in the area of the project.

Water Resources

The corridor crosses seven perennial streams. Six of these streams occur within the Upper Yakima River Watershed, while one is within the Upper Columbia Entiat Watershed. Streams in the Yakima River Watershed are part of the Wilson-Taneum Creek sub-basin. In this sub-basin, streams are heavily diverted on the Kittitas valley floor and have been channelized into an intricate drainage/irrigation system. The stream within the Upper Columbia Entiat Watershed drains the northeast corner of the Yakima Training Center. The Upper Yakima and Upper Columbia Entiat Watersheds are below state or tribal water quality goals.

Shorelines

Taneum Creek is the only designated Shoreline of the State that is crossed by the corridor. It is located in Section 20 and 21 of T19N, R19E in Kittitas County. The environmental designation of the shoreline in this area is Rural, and is characterized primarily by agricultural activities with some compatible recreational uses.

Floodplains

Several FEMA 100-year floodplain areas are located in the corridor. Taneum and Wilson Creeks meander near each other eventually joining just south of the existing Schultz-Vantage line. Near their intersection, the two creeks essentially share one broad, tree- and shrub-lined floodplain area that contains the braided channels of both creeks. Cooke Creek also has a 100-year floodplain area identified by FEMA.

Wetlands

Fifteen features in the corridor mapped by NWI are associated with either intermittent or perennial creeks. With the exception of Wilson, Taneum, and Cooke Creeks, all are located along narrow drainages with a narrow band of vegetation. A field survey verified the presence of six wetlands. Five are associated with creeks and one is associated with an ephemeral drainage.

Soils and Geology

The corridor crosses a broad plateau (elevation 2,300 feet) that extends to the Saddle Mountains in the northern portion of the Yakima Training Center. Soils range from shallow to deep, are well drained, and formed in a variety of parent materials including loess, residuum, alluvium, and basaltic colluviums.

Vegetation

The vegetation in the corridor is mainly shrub-steppe with a few riparian and agricultural lands. Most comprises lithosol shrub-steppe communities, which typically support stiff sagebrush, Sandberg's bluegrass, narrow leaf goldenweed, thyme-leaf buckwheat, and Hood's phlox. Other common flowering plant species observed growing in this community in the corridor include bitterroot, desert-parsley species, and yarrow.

Deep-soiled portions of the corridor support a big sagebrush/bluebunch wheatgrass shrub-steppe community. One small area is designated a WNHP high quality plant community and consists of big sagebrush/bluebunch wheatgrass shrubland. In addition, the corridor has several tree-lined riparian areas.

Eleven Washington State Class B weeds of concern were identified along the corridor. Several Washington State Class C species were observed in the corridor and include spiny cocklebur, bull thistle, Canada thistle, globepodded hoarycress, field bindweed, common St. John's-wort, and reed canarygrass.

No federally listed threatened, endangered, or candidate species were identified along the corridor. Two potential habitats for federal listed and candidate plant species were identified in the corridor. Hoover's tauschia, a federal species of concern, was identified within the immediate vicinity (approximately 500 feet of the corridor).

Wildlife

Wildlife populations along the corridor are generally typical of shrub-steppe habitats. The area is used as wintering grounds by large herds of mule deer. The riparian areas of Wilson and Taneum Creeks provide winter roosting and foraging habitat for numerous bald eagles. Colockum Creek Canyon is identified as a migration corridor for the Quilomene elk herd. Sage grouse and white-tailed jackrabbits have also been observed in the corridor.

Fish Resources

The corridor crosses nine fish-bearing streams. Several fish species have been documented in these streams, but within the corridor only rainbow trout have been documented. Mountain suckers are also likely to be present within the corridor. Federally endangered chinook salmon (Taneum Creek and Coleman Creek) and federally threatened bull trout (Coleman Creek) have been documented downstream and of the corridor. The major issue facing these streams is the lack of access between the Yakima River and the headwater areas due to obstructions from irrigation and agricultural operations in the lower sections.

Land Use

The corridor is entirely within Kittitas County and crosses both private and publicly administered lands. A significant portion of the private lands consists of rangeland that is used for raising and grazing livestock. The remainder of private land is utilized for commercial, industrial, transportation, agriculture, and unknown uses. Public lands are administered by the Washington Department of Natural Resources (WDNR), the Bureau of Land Management, and the Department of Defense (Yakima Training Center).

Socioeconomics

In Kittitas County, the corridor is composed of rural-agricultural and grazing land uses on private lands and military exercises at the Yakima Training Center. The population in Kittitas County is located in sparsely populated rural areas, with Ellensburg (population 15,460) being the closest urban area. Population in Kittitas County averaged an increase of 20% between 1990 and 2000. Government provides approximately 31% of local jobs, with per capita income substantially lower than the statewide average. The 2001 unemployment rate of 6.5% in Kittitas County paralleled the state.

Visual Resources

Visually sensitive viewpoints along the corridor include an area near Colockum Pass, due to the number of residences with foreground views of the transmission lines. Typical views in this area are generally foreground and middleground views of valley agricultural lands, and rolling hills of sagebrush and rabbitbrush. Background views are of the Wenatchee, Boylston, and Saddle Mountains and sky. Viewers would be residents of the low-density, scattered valley homes, dispersed recreationalists, and motorists on Vantage Highway, Highway 90, Colockum, and other rural roads in the area. Approximately 25 residences occur within 500 feet of the line segment. Segment A would generally be in the background and adjacent to the existing Schultz-Vantage 500-kV transmission line, or at or near the base of the surrounding mountain ranges.

Recreational Resources

Recreational resources in and around the corridor include open range, Charlton Canyon, Schnebly Canyon and Creek, Cooke Creek, Burnt Creek, Cave Canyon, Trail Gulch, Parke Creek, and Trail Creek. Recreational activities within these areas include hunting, off-road vehicles, fishing, hiking, rock hounding, horseback riding, primitive camping, snowshoeing, and snowmobiling. These activities are considered dispersed recreation, which refers to activities that are not limited to a finite location.

Cultural Resources and Historic Properties

Several cultural resources and historic properties in and around the corridor have been identified, and include prehistoric camps and villages, prehistoric burial grounds, prehistoric caves, archaeological districts, lithic scatters, prehistoric stone tool quarries, historic homesteads, historic railroad sites, historic refuse scatters, traditional fishing locations, and traditional root-gathering areas. Literature reviews have identified up to 38 of these sensitive areas.

2.9 Benefits or Disadvantages of Reserving Project Approval for Later Date

Delaying the approval of the project for a later date would have disadvantages. The utilities to which the Applicant has proposed and/or intends to propose the sale of the project's output have identified a need to acquire additional energy output within defined periods of time. Typically, utility solicitations (RFPs) specify an on-line date that a proposed project must meet in order to be considered for purchase. If project approval is delayed, these utilities may determine that the delay would cause the project's on-line date to be beyond the time at which the utilities require additional energy resources, and thus would no longer be interested in acquiring the project's output. This could result in the project becoming infeasible. There would also be a delay in direct, indirect, and cumulative impacts.

Several regional utilities have identified a need for renewable wind-generated energy to diversify their resource portfolios. Failure to approve the project at this time would thus make it more difficult for these utilities to meet their stated goals of cost effective portfolio diversification at a minimum cost to their customers.

Advantages of reserving project approval to a later date may include a better understanding of the economic and energy benefit verses cost in terms of environmental consequences or other issues.

2.10 Applicable Federal, State and Local Requirements

Pertinent Federal, State and Local Codes, Ordinances, Statutes, Rules, regulations and Permits that apply to the project are presented in Table 2-10 and discussed in the following sections. The table lists the permits or requirements that may be required, identifies the permitting agency, and cites the authorizing statute or regulation. In accordance with Chapter 80.50 RCW, if the project is approved, EFSEC would have single permit authority over all state and local permits.

Table 2-10. Pertinent Federal, State, and Local Codes, Ordinances, Statutes, Rules, Regulations, and Permits

Permit or Requirement	Agency/Code, Ordinance, Statute, Rule, Regulation or Permit
Aviation Regulations And Lighting	Federal Aviation Administration (FAA) 14, CFR Part 77: specifies the criteria for determining whether a "Notice of Proposed Construction or Alteration" is required for potential obstruction hazards; FAA Advisory Circular 70/7460-1 AC70/7460-1K, Obstruction Marking and Lighting, Chapters 4, 8 and 12, describes the FAA standards for marking and lighting structures that may pose a navigation hazard as established using the criteria of Title 14, CFR Part 77; FAA Advisory Circular No. 70/460-2H, relates to the filing of a "Notice of Proposed Construction or Alteration."
Threatened Or Endangered Species	U.S. Fish and Wildlife Service
	Endangered Species Act of 1973 (16 USC, Section 1531, et seq.) and implementing regulations. Designates and provides for protection of threatened and endangered plants and animals and their critical habitat.
Electrical Construction Permit	Washington Department of Labor and Industries
	Chapter 296-746A WAC Washington Department of Labor and Industries Safety Standards – Installing Electrical Wires and Equipment – Administration Rules.
Noise Control	Washington Department of Ecology
	Noise Control, Chapter 70.107 RCW; Chapter 173-58 WAC, Sound Level Measurement Procedures; and Chapter 173-60 WAC, Maximum Environmental Noise Levels.
Water Quality Stormwater Discharge: Construction Activities	Washington Department of Ecology
	Water Pollution Control Act, Chapter 90.48 RCW establishes general stormwater permits for the Washington Department of Ecology National Pollutant Discharge Elimination System Permit Program (NPDES); Chapter 173-201A WAC Washington Department of Ecology Water Quality Standards for Surface Waters of the State of Washington, which regulates water quality of surface waters.
	Federal statute(s) and regulations implemented by the above state statute(s) and regulations include: Federal Clean Water Act, 42 USC 1251; 15 CFR 923-930.
Surface Mining	Department of Natural Resources regulates surface mining pursuant to RCW 78.44. RCW 78.44.

Permit or Requirement	Agency/Code, Ordinance, Statute, Rule, Regulation or Permit
Fish And Wildlife	The Washington Department of Fish and Wildlife, pursuant to Chapter 232-12 WAC, designates certain "Priority Habitats."
State Environmental Policy Act (SEPA)	Kittitas County would have been lead agency absent EFSEC jurisdiction, Washington Environmental Policy Act, Chapter 43.21C RCW; Chapter 197-11 WAC Washington Department of Ecology SEPA Rules, which establishes uniform requirements for compliance with SEPA.
Archaeology and Historic Preservation	Washington State Office of Archaeology and Historic Preservation Archaeological Sites and Resources, Chapter 27.53 RCW.
Comprehensive Plan	Kittitas County Comprehensive Plan, 2000-2020.
Zoning Ordinance.	Kittitas County Code Title 17
Building Codes	Kittitas County Code 14.04 Implements Chapter 19.27 RCW, State Building Code and Chapter 51-40 WAC State Building Code regulations.
Sewage Disposal Installation And Design And Septic Tank Cleaning Regulations	Kittitas County Code Title 13.04
Stormwater Management Plan	Kittitas County Code Title 12.70
Noxious Weed Control	Kittitas County Noxious Weed Control Board Noxious Weeds-Control Boards Chapter 17.10 RCW.
Critical Areas Review/Determination	Kittitas County Code Title 17A (Critical Areas Ordinance)

2.11 Coordination and Consultation with Agencies and Indian Tribes

The Applicant consulted with local, state, and federal agencies and tribal representatives during the development of the proposed WHWPP.

2.11.1 Local Agency Contacts

County Planning Staff

The Applicant submitted land use application materials for the proposed project to Kittitas County Community Development Services (CDS) Department for administrative review on June 4, 2004. On June 17, 2004, Clay White of CDS sent a letter requesting that the Applicant submit two forms and a map in order for the application to be complete. On June 25, 2004 the Applicant submitted the forms and map requested by Mr. White for his review. As of July 7, 2004, the County was still reviewing the application for completeness. Once the application has been deemed complete by CDS, the County will issue a notice of application and begin its formal review process.

County Public Works Department

Representatives of the Applicant met with County Public Works Director Paul Bennett on October 14, 2003 to discuss the location of the project and any potential concerns in terms of potential impacts on County facilities such as roads. Mr. Bennett requested assurance that the Applicant would agree to mitigate for any impacts that might occur to County roads (primarily Vantage Highway) from construction traffic and requested confirmation that the project would not interfere with any existing or proposed approaches or protected airspace for the Ellensburg Airport (Bowers Field). Mr. Bennett indicated he would prefer to wait for the permit application to be filed before conducting a detailed review of the potential issues associated with the project.

Fire District

Representatives of the Applicant met with Chief Stan Baker of the Kittitas County Fire District #2 on October 14, 2003 to discuss the project and the potential for KFD #2 to provide fire protection during the construction period under a contract with the Applicant.

The project area is not within any existing fire district. Vantage and KFD #2 are the two closest fire districts, but KFD #2 has considerably more equipment and staffing than Vantage. Chief Baker planned to visit the Stateline Wind Power Project in Walla Walla County and respond to the Applicant with a proposal for a fire protection arrangement for the project. There have been no written responses resulting from this consultation.

Kittitas School District

Representatives of the Applicant made a presentation to the Kittitas School Board at their regular public meeting on October 28, 2003 to present the proposed project and discuss potential impacts to the District. Superintendent Jerry Harding addressed the board regarding the potential fiscal impacts of the project.

2.11.2 State Agency Contacts

WDFW

Jones & Stokes and the Applicant's wildlife and plant consultant contacted WDFW regarding the potential occurrence of state-listed threatened or endangered species within the project area. This consultation is described in Section 3.4, "Vegetation and Wetlands," and Section 3.5, "Wildlife." Representatives of the Applicant and their wildlife and biological consultants have met with staff of the WDFW (Ted Clausing, Brent Renfrow, Lee Stream, and Ed Bracken) to discuss the proposed project beginning on May 29, 2003. Copies of the study protocols and draft findings were provided to WDFW. The Applicant organized a site tour for a group of WDFW regional staff and managers from the Ellensburg and Yakima offices on September 25, 2003. During this site visit, WDFW representatives had the opportunity to visit any areas of the proposed project and the proposed transmission feeder lines they wished to visit and to discuss the findings of the wildlife and plant studies conducted at the site with the principal researchers.

WDNR

The Applicant has met with staff of the WDNR to discuss the proposed project beginning in Spring 2003. These discussions have addressed both the leasing of WDNR land for wind power development as well as potential impacts to plants, animals and cultural resources that might result from the project. A follow-up meeting was held on November 24, 2003 with WDNR cultural resources and wildlife experts in Olympia. WDNR representative Milt Johnston invited the Applicant to attend a meeting of the Big Game Management Group that includes representatives of WDNR, WDFW, the Kittitas County Cattleman's Association, the Kittitas County Farm Bureau, the Field and Stream Club, and other local landowners in Kittitas County to discuss potential project effects on big game. The Applicant has also consulted via e-mail and telephone with Cindy Preston, Surface Mining Coordinator with the WDNR in Olympia, regarding requirements for the proposed gravel quarries associated with the construction of the project. Ms. Preston has responded that the WDNR does not typically require surface mining reclamation permits for temporary on-site construction gravel quarries if the quarries are to be temporary in nature, and are to be used solely for the construction of a project built on land owned by the same landowner(s), and the gravel will not be sold or used off-site. She indicated that this was the case with the gravel quarries used for the construction of the now-operating Stateline Wind Energy Center in Walla Walla County.

WSDOT

The Applicant consulted with Mr. Rick Holmstrom, Development Services Engineer with the Washington Department of Transportation regional office in Union Gap regarding potential impacts of the project on state highways. Mr. Holmstrom has indicated that the only road under state jurisdiction that would potentially be affected by the project is I-90 and that the impacts to I-90 are anticipated to be minimal.

OAHP

Representatives of the Applicant and the Applicant's cultural resources consultant, Lithic Analysts, met with Russell Holter and Stephanie Kramer of OAHP and Irina Makarow of EFSEC on June15, 2004 to discuss the cultural resources issues associated with the proposed project. After reviewing the information submitted by the Applicant and the history and status of tribal consultations by the Applicant and EFSEC, OAHP staff requested that the Applicant's cultural resources consultant submit a letter to OAHP addressing whether the proposed project can be considered a "cultural landscape" and if so, what impacts the project might have on that landscape. The Applicant agreed to this request and Lithic Analysts is currently conducting the research necessary to submit such a letter. At the June 15, 2004 meeting, the Applicant also informed OAHP of the fact that the Applicant is in the process of entering into a contract with the Confederated Tribes of the Colville Indian Reservation (CCT) to conduct an analysis of potential Traditional Cultural Properties (TCPs) at the project site. The contract has since been signed by the Applicant and is awaiting formal approval by the CCT. The relevant portions of the results of the CCT's analysis of TCPs at the project site will be provided to EFSEC for inclusion in the FEIS for the project. Confidential information regarding location of TCPs will not be published or made public, per the CCT's request, in order to protect confidential and/or sensitive location information.

2.11.3 Federal Agency Contacts

BPA

The Applicant has consulted with Mr. Rick Yarde, NEPA Environmental Project Manager, regarding BPA's potential involvement in NEPA review of the project. Mr. Yarde has indicated that BPA does not intend to take an active NEPA review role in the project because BPA would not be enabling the project, as there are other viable interconnection options available (i.e., PSE.). In the event that the Applicant decides to interconnect with the BPA system, BPA will utilize the SEPA EIS developed by EFSEC and BPA's own transmission system NEPA EIS to evaluate the impacts of the project under NEPA.

USFWS

The Applicant's wildlife and plant consultant, WEST, Inc. has consulted with USFWS regarding the potential occurrence of federally listed threatened or endangered species within the project area. This consultation is described in detail in Section 3.4, "Vegetation and Wetlands," and Section 3.5, "Wildlife."

2.11.4 Tribal Contacts

Yakama Nation

Lithic Analysts, the Applicant's cultural resources consultant, sent a letter on March 5, 2003, to Mr. Johnson Meninick, (Cultural Resources Director of the Yakama Nation), notifying the Yakama Nation of the location of the proposed project and the planned cultural resource surveys to be conducted at the project site. The Applicant followed up with a subsequent letter on June 30, 2003 to Mr. Meninick initiating formal consultation with the Yakama Nation and inviting the tribe to offer comments on the project's potential effects and to assist in identifying any previously unrecorded cultural resources which that might be located in the project area. On August 19, 2003, the Applicant forwarded Mr. Meninick a copy of the draft Cultural Resources Assessment and Archaeological Survey for the proposed project site, prepared by Lithic Analysts. Copies of this correspondence are included in Appendix A. Lithic Analysts also contacted Mr. David Powell (Yakama Nation ceded lands archaeologist) regarding the cultural resources surveys to be conducted at the project site and offered to allow Mr. Powell and/or other tribal representatives to participate in the field surveys. However, Mr. Powell declined because of scheduling conflicts. No written response was received from the Yakama Nation regarding any of these communications. Consultation is continuing and copies of the final report will be forwarded to the Yakama Nation.

Confederated Tribes of the Colville Reservation

Lithic Analysts, the Applicant's cultural resources consultant, sent a letter on March 5, 2003, to Adelin Fredin, Tribal Historic Preservation Officer of the Confederated Tribes of the Colville Reservation (CCT), notifying the CCT of the location of the proposed project and the planned cultural resource surveys to be conducted at the project site. The Applicant followed up with a subsequent letter on June 30, 2003 to Ms. Camille Pleasants, Interim Tribal Historical Cultural Preservation Officer of the CCT, initiating formal consultation with the CCT and inviting the tribe to offer comments on the project's potential effects and to assist in identifying any previously unrecorded cultural resources which might be located in the project area. On August 13, 2003, Lithic Analysts contacted Guy Moura (CCT) by phone to advise that a copy of the draft Cultural Resources Assessment and Archaeological Survey was completed and that a copy was being forward to CCT. Also, on August 13, 2003, the Applicant forwarded Ms. Pleasants a copy of the draft Cultural Resources assessment and Archaeological Survey for the proposed project site, prepared by Lithic Analysts.

On September 19, 2003, Ms. Pleasants sent a comment letter to the Applicant in response to the draft cultural resources assessment and surveys conducted at the Site. On October 17, 2003, the Applicant sent a letter to Ms. Pleasants in response to her comment letter. On December 16, 2003, the Applicant forwarded Ms. Pleasants an updated draft Cultural Resources Assessment and Archaeological Survey. On January 5, 2004, Ms. Pleasants sent a comment letter to the Applicant in response to the December 16 letter and draft Cultural Resources Assessment and Archaeological Survey.

Lithic Analysts contacted Donald Shannon, CCT Traditional Cultural Property Project Supervisor, by phone on January 13, 2004. On January 14, 2004, Ms. Pleasants sent a comment letter to the Applicant in response to the phone call of January 13. On January 19, 2004, the Applicant arranged a meeting to be held on February 19, 2004 with the CCT, the Applicant, Lithic Analysts and EFSEC. Donald Shannon called the Applicant on January 23, 2004, to express concerns that cultural resource site- specific information should be removed from EFSEC web site.

The February 19, 2004 meeting was attended by the Applicant and representatives of EFSEC and CCT. The Applicant is responding to CCT's concerns and discussions are continuing.

Consultation is continuing and copies of the final report will be forwarded to the Confederated Tribes of the Colville Reservation.

Wanapum Tribe

Lithic Analysts, the Applicant's cultural resources consultant, sent a letter on March 5, 2003, to Lenora Seelatsee of the Wanapum Tribe, notifying the tribe of the location of the proposed project and the planned cultural resource surveys to be conducted at the project site. To date, the Wanapum have neither replied to the letter nor expressed any concern with the project. The Applicant indicated that a copy of the cultural resources survey report will be forwarded to them.

Spokane Tribe

On March 30, 2004, EFSEC notified Honorable Warren Syler of the Spokane Tribe regarding submittal of the WHWPP Application for Site Certification. On June 8, 2004, The Spokane tribe notified EFSEC that it would allow earth-disturbing activities on the project site, provided that if any artifacts are found, the Tribe will be contacted immediately and all work cease on the site.

2.12 Potential for Future Activities

No expansions or additional activities are currently planned for this site. However, expansion of the project would require simply extending roads and collector cable to serve additional turbines. If market, technology or other conditions evolve in a manner that encourages expansion, there is potential for adding additional wind turbines within or adjacent to the existing project boundary in the future, subject to landowner consent and regulatory approval.

The Applicant plans to enter into lease agreements for project facilities with landowners for periods of 25 to 30 years and anticipates a term of 20 to 30 years for a Power Purchase Agreement (PPA) for the project's output. The Applicant has no plans for repowering at this time. The decision whether to repower the project would depend on such factors as: expiration date of the existing PPA; negotiation of new or extended PPA; market rates for electricity at the time; pricing of new wind turbines at the time; landowner consent; and regulatory approval.