1.1 INTRODUCTION

Wind Ridge Power Partners, LLC (the Applicant) is proposing to build the Wild Horse Wind Power Project ("Project"), a renewable energy generation facility that will consist of up to 158 wind turbines and have an installed nameplate capacity of up to 312 megawatts (MW). The Project features a highly energetic, well documented wind resource, state-of-the-art, megawatt-class wind turbine generators, and experienced development and operations teams. The Applicant proposes to construct the Project in central Washington's Kittitas Valley, which has long been known for its vigorous winds. The Project will be built on high open ridge tops between the towns of Kittitas and Vantage in the eastern end of Kittitas Valley. A map showing the Project area location is presented in Exhibit 1-A, 'Project Area Overview'. The Project site has been selected primarily for its energetic wind resource and its access to existing high voltage transmission lines, which have adequate capacity to allow the wind generated power to be integrated into the power grid system.

The Project consists of several prime elements which will be constructed in consecutive phases including roads, foundations, underground and overhead collection system electrical lines, grid interconnection substations, step-up substations, feeder lines running from the on-site step-up substations to the interconnection substations, an operations and maintenance (O&M) center and associated supporting infrastructure and facilities. A permanent footprint of approximately 165 acres of land area will be required to accommodate the proposed turbines and related support facilities. A site layout illustrating these key elements is contained in Exhibit 1-B, 'Project Site Layout'.

The Project is designed to provide low cost renewable electric energy to meet the growing needs of the Northwest. The Project has transmission and interconnection requests under review with the Bonneville Power Administration (BPA) and Puget Sound Energy, and Applicant is in the process of marketing the electrical energy sales into the local and regional power market. The Washington State Energy Facility Site Evaluation Council (EFSEC) has jurisdiction over the evaluation of energy facilities such as the Wild Horse Wind Power Project, and is responsible for making a recommendation to the Governor regarding approval or denial of their siting.

1.2 PURPOSE AND NEED FOR THE PROJECT AND ASSOCIATED FACILITIES

The purpose of the Wild Horse Wind Power Project is to construct and operate a new electrical generation resource using wind energy that will meet a portion of the projected growing regional demands for electricity. In the Pacific Northwest Electric Power Planning and Conservation Act, Congress established that development of renewable resources should be encouraged in the Pacific Northwest (16 USC § 839[1][B]). The Act defines wind power as a renewable resource (§ 839a[16]).

1.2.1 Need for Additional Power Generation Facilities

Recent national and regional forecasts predict increasing consumption of electrical energy will continue into the foreseeable future, requiring development of new generation resources to satisfy the increasing demand. The Energy Information Administration published a national forecast of electrical power through the year 2025. In it, the administration projected that total electricity demand would grow between 1.8 and 1.9% per year from 2001 through 2025. Rapid growth in electricity use for computers, office equipment, and a variety of electrical appliances in the residential and commercial sectors is only partially offset by improved efficiency in these electrical applications (U.S. Energy Information Administration 2003).

The Western Electricity Coordinating Council (WECC) forecasts electricity demand in the western United States. According to WECC's most recent coordination plan, the 2001-2011 summer peak demand requirement is predicted to increase at a compound rate of 2.5% per year (WECC 2002).

Based on data published by the Northwest Power and Conservation Council (NWPCC), electricity demand for the Council's four-state Pacific Northwest planning region (Washington, Oregon, Idaho, and Montana) was 20,080 average MW in 2000 (NWPCC 2003).

As shown in Table 1-1, the Council's recently revised 20-year demand forecast projects that electricity demand in the region will grow from 20,080 average MW in 2000 to 25,423 average MW by 2025 (medium forecast), an average annual growth rate of just less than 1% per year. While the Council's forecast indicates that the most likely range of demand growth (between the medium-low and medium-high forecasts) is between 0.4 and 1.50% per year, the low to high forecast range used by the Council recognizes that growth as low as -0.5% per year or as high as 2.4% per year is possible, although relatively unlikely (NWPCC 2003).

Table 1-1: Projected Pacific Northwest Electricity Demand, 2000-2025					
Forecast Scenario	Electricity Demand (Average Megawatts)			Growth Rates (% Change)	
	2000	**2015**	**2025**	**2000-2015**	**2000-2025**
Low	20,080	17,489	17,822	-0.92	-0.48
Medium Low	20,080	19,942	21,934	-0.05	0.35
Medium	20,080	22,105	25,423	0.64	0.95
Medium High	20,080	24,200	29,138	1.25	1.50
High	20,080	27,687	35,897	2.16	2.35

Source: NWPCC 2003

Generated power typically requires interconnection with a high-voltage electrical transmission system for delivery to purchasing retail utilities. The Applicant has submitted requests for transmission interconnection services for the Project to both Puget Sound Energy (PSE) and Bonneville Power Administration (BPA). The Project would connect to either the PSE or BPA transmission systems that run in close proximity to the Project site along of the following lines:

- Puget Sound Energy's Intermountain Power 115kV line, portions of which will be upgraded to 230 kV and intertie to Mid-C;
- Bonneville's Grand Coulee to Olympia 287-kV line;
- Bonneville's Columbia to Covington 230-kV line.

In summary, electrical consumers in the Northwest need increased power production to serve the predicted long-term increasing demand and high-voltage transmission lines to deliver the power.

1.2.2 Wind Power Project Purpose and Need

Washington and the Northwest region face a growing medium and long term demand for power. Many regional utilities are currently seeking to acquire new generating resources to meet their loads. More specifically, several regional utilities, including Avista, Puget Sound Energy (PSE), and PacifiCorp (doing business as Pacific Power in Washington) have all completed detailed studies and demand forecasts of their own systems as part of their Integrated Resource Plans (IRP) or Least Cost Plans (LCP) process with oversight from the WUTC (Washington Utilities and Transportation Commission). As a result of their formal IRP or LCP processes, PSE, PacifiCorp and Avista have issued Requests for Proposals (RFPs) specifically for wind power and/or other renewable resources. Avista is seeking to acquire 50 MW, PSE is seeking to acquire at least 150 MW and PacifiCorp is seeking to acquire 500 MW. There is thus a regional demand for wind generated energy that greatly exceeds the existing regional supply.

The proposed Wild Horse Wind Power Project is intended to help meet this growing regional demand for renewable, wind-generated electricity.

1.2.3 Transmission Feeder Line Purpose and Need

In order to deliver the energy generated by the Project to customers, the Project must be interconnected with the high voltage transmission grid. The nearest existing transmission lines of the appropriate voltage for interconnecting a project of this size are the PSE 115kV Intermountain Power line to the south of the Project site and the BPA Schultz to Vantage 500 kV line west of the Project site. In order to interconnect with these existing transmission lines, it is necessary to construct new feeder lines between the Project site and these existing lines.

1.3 DECISIONS TO BE MADE

This Application for Site Certification document will be used by EFSEC to develop a draft Environmental Impact Statement (DEIS) and to review the proposed Project.

EFSEC has jurisdiction over all of the evaluation and licensing steps for siting major energy facilities in the State of Washington. Once approved by the Governor, EFSEC's Site Certification Agreement acts as an "umbrella" authorization that incorporates the requirements of all State laws and regulations. Through its review EFSEC coordinates the comments and interests of State agencies that participate in the EFSEC review process. EFSEC will issue the Final Environmental Impact Statement (FEIS) and make a recommendation to the Governor to approve or deny the Wild Horse Wind Power Project.

1.4 DESCRIPTION OF ALTERNATIVES

1.4.1 Proposed Action

The proposed action is to construct and operate a wind power project located on high open ridge tops between the towns of Kittitas and Vantage at a site located in the Kittitas Valley. The Wild Horse Wind Power Project (the "Project") will include wind turbine generators (WTGs) that will be constructed in rows along the open ridge tops of Whiskey Dick Mountain. The size and number of wind turbines to be used for the Project depends on a number of factors including wind turbine economics and availability at the time of construction. The resulting nameplate capacity of the Project will depend on the final model and nameplate rating of turbine selected. In order to examine the full range of potential impacts from the Project, this Application for Site Certification (ASC) defines and evaluates the full range of possible turbines from the smallest turbines and towers to the tallest turbines and towers. Additionally, a most likely turbine scenario has been studied to evaluate and examine the most likely Project impacts. The Project configurations are summarized as follows:

- <u>Most Likely Scenario: 136 WTGs with 70.5 meter rotors</u>:
  The Most Likely Case scenario represents the most likely Project configuration, using WTGs with a generator nameplate rating of 1.5 MW and a rotor diameter of 70.5 meters. Up to 136 turbines of this size would be used for a total nameplate capacity of 204 MW.

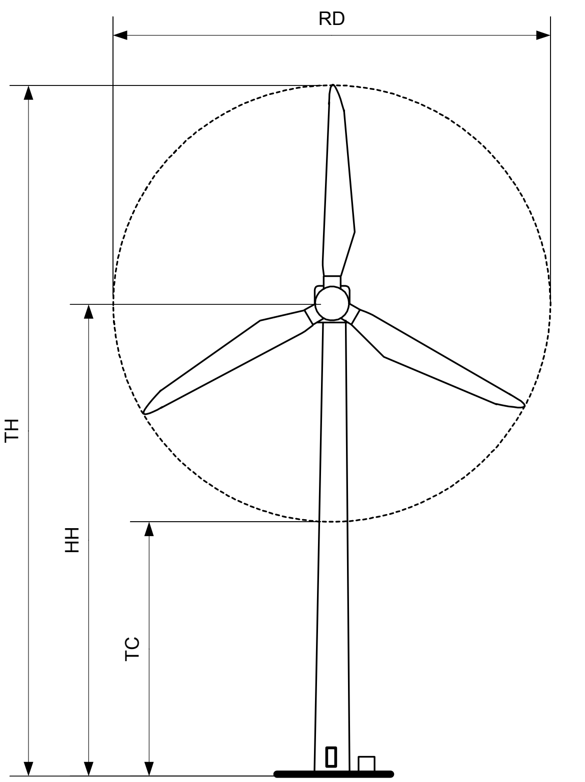
- <u>Small WTG Scenario: 158 WTGs with 60 meter rotors</u>:
  The Small WTG scenario represents a Project configuration that would utilize a larger number of smaller WTGs with 60 meter diameter rotors and a generator nameplate rating of 1 MW. Up to 158 small turbines would be used for a total nameplate capacity of 158 MW.

- <u>Large WTG Scenario: 104 WTGs with 90 meter rotors</u>:
  The Large WTG scenario represents the Project configuration that would utilize fewer, larger capacity WTGs with a generator nameplate rating of 3.0 MW and a 90 meter diameter rotor. Up to 104 large turbines would be used for a total nameplate capacity of 312 MW.

Figure 1.4.1-1 illustrates the range of turbines examined under this ASC which is also summarized in Table 1.4.1-1. The study work performed to support this ASC is similar to that done for transmission line projects which study a defined corridor with various tower or pole sizes. For the Project however, there will not be a mix of turbine sizes, but rather, one consistent size of turbine and tower used. Regardless of the size of turbine used, the Project will occupy a permanent footprint of approximately 165 acres of land.

Table 1.4.1-1 Project Scenario Summary			
	MOST LIKELY Scenario 70.5 m Rotor	**SMALL WTG Scenario 60 meter Rotor**	**LARGE WTG Scenario 90 meter Rotor**
Turbine Nameplate	1.5 MW	1 MW	3 MW
Number of WTGs	136	158	104
Project Nameplate	204 MW	158 MW	312 MW
Total Permanent Footprint Approx.	165 acres	165 acres	165 acres
Miles of Road Approx.	32 miles	32 miles	32 miles

Figure 1.4.1-1 Wind Turbine Dimensions



	MAX	MIN	Dimension
HH	80 m/262 ft.	46 m/151 ft.	Hub Height
RD	90 m/295 ft.	60 m/197 ft.	Rotor Diameter
TC	40 m/131 ft.	15 m/49 ft.	Tip Clearance
TH	125 m/410 ft.	76 m/249 ft.	Tip Height

The facilities, equipment, and features to be installed as part of the Project include:

- approximately 17 miles of new roads,
- improvements to roughly 15 miles of existing roads,
- approximately 27 miles of underground 34.5-kV collection system power lines,
- approximately 2 miles of overhead 34.5-kV collection system power lines,
- approximately 14 miles of overhead 230-kV transmission feeder lines,
- one or two step-up substations,
- one interconnection substation,
- an operations and maintenance (O&M) facility of approximately 5,000 square feet,
- parking area for the O&M facility approximately 300' x 300',
- a visitor's kiosk,
- up to six permanent meteorological towers.

The Project will be constructed across a land area of approximately 8,600 acres in Kittitas County, although the actual permanent facility footprint will comprise approximately 165 acres of land under any of the scenarios. This is because there is no change to the length or width of the Project component footprints, including the roads, substations, O&M facilities, rock quarries, underground or overhead lines, permanent met towers, batch plant, or rock crusher under the different scenarios. Such components comprise the vast majority of acreage impacted by the Project, and because they remain unchanged under all scenarios, the total acreage and construction quantities are very similar under all scenarios. The acreages and construction quantities are very similar under all scenarios because the scenarios utilize the same beginning and end points for each turbine row corridor. For a specific comparison of the relative areas impacted under each scenario, refer to Table 3.1.2-2: Comparison of Area Impacts of the Proposed Scenarios.

Similar to the environmental analysis performed for gas power projects which examine the full range of potential emissions such as SOx, NOx, CO and CO2 from various sizes and types of gas turbines, 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. Within each Section of Chapter 3 of this ASC, 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 WTGs.

The Applicant requests that the Project be permitted to allow construction and operation within the entire range of turbine size and numbers presented, for which the impacts have been fully analyzed. This will enable the Applicant to choose the best wind turbine for the Project, based on technical and commercial considerations at the time of construction.

1.4.2 Alternatives Considered

1.4.2.1 Project Alternatives

Consideration was given to the following alternatives:

- Alternative power generation technology,
- Alternative wind turbine design,

Details of the consideration of these alternatives and the reasons for their rejection are given in Section 2.3, 'Alternatives'.

1.4.2.2 Site Alternatives

As described in Section 1.2, 'Purpose and Need for the Project and Associated Facilities', the objective of the Wild Horse Wind Power Project is to construct and operate a wind energy generation resource to meet a portion of the projected growing regional demand for new energy resources. The Energy Information Administration projects that total electricity demand would grow between 1.8 and 1.9% per year from 2001 through 2025. The Western Electricity Coordinating Council (WECC) forecasts the 2001-2011 summer peak demand requirement to increase at a compound rate of 2.5% per year (WECC 2002). Based on data published by the Northwest Power and Conservation Council (NWPCC), electricity demand for the Council's four-state Pacific Northwest planning region (Washington, Oregon, Idaho, and Montana) was 20,080 average MW in 2000 (NWPCC 2003).

Washington and the Northwest region face a growing medium and long term demand for power. Many regional utilities are currently seeking to acquire new generating resources to meet their loads. More specifically, several regional utilities, including Avista, Puget Sound Energy (PSE), and PacifiCorp (doing business as Pacific Power in Washington) have all completed detailed studies and demand forecasts of their own systems as part of their Integrated Resource Plan (IRP) or Least Cost Plan (LCP) process with oversight from the WUTC (Washington Utilities and Transportation Commission). As a result of their formal IRP or LCP processes, PSE , PacifiCorp and Avista have issued Requests for Proposals (RFPs) specifically for wind power and/or other renewable resources. Avista is seeking to acquire 50 MW, PSE is seeking to acquire 150 MW and Pacificorp is seeking to acquire 500 MW. There is thus a regional demand for wind generated energy that greatly exceeds the existing regional supply.

The proposed Project is intended to help meet this growing regional demand for renewable, wind-generated electricity.

The Kittitas Valley Wind Power Project is not considered a reasonable alternative to the Wild Horse Project since neither Project, on its own, can meet the forecasted or immediately requested demand for power in the region. Also, neither Project could be increased in size, on its own, to generate the same amount of energy output as can be cost-effectively generated by constructing both projects. Therefore, doubling the size of one project is not a reasonable alternative to constructing both projects.

1.4.2.3 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 uses, green houses, 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 some combination of user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Base load demand would likely be filled through the 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 base load 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 or "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 2.3.2-1 presents the basic parameters of a hypothetical 67 aMW natural gas-fired combustion turbine.

1.5 SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

1.5.1 Introduction

The proposed Project has been designed to minimize all types of impacts to the natural and human environment, as described in Section 2.3, 'Alternatives.' Table 1.5.2-1 provides a summary of proposed mitigations for all elements of possible impact in terms of studies to avoid impacts, Project design features, construction practices and operations practices.

1.5.2 Additional Mitigation for Project Impacts to Habitat, Vegetation, and Wildlife

The Applicant has proposed to mitigate for all permanent and temporary impacts to habitat caused by the Project in accordance with the ratios outlined in the WDFW Wind Power Guidelines (WDFW, August 2003). A mitigation parcel has been identified within the 8,600-acre Project area. The mitigation parcel is T18N, R21E, Section 27, except for the portion of this section that will be developed as part of the Project. String 'L' follows a ridgeline that bisects Section 27 from north to south. The area set aside for Project mitigation is estimated at approximately 600 acres. This is more than the required replacement habitat under the WDFW Wind Power Guidelines. The Applicant has agreed to fence this parcel to eliminate livestock grazing, assuming the land ownership and grazing practices of adjacent properties at the time the Project goes into operation will require fencing to remove livestock from this parcel. In addition to Section 27, the Applicant is proposing to fence several springs within the Project area to eliminate livestock degradation. Fencing used for the mitigation parcel and the springs will be designed to keep livestock out but allow game species to cross. The Applicant intends to coordinate with Washington Department of Fish and Wildlife (WDFW) regarding fence specifications.

View of Whiskey Dick Creek in proposed mitigation parcel

As noted above, WDFW has prepared a set of guidelines for wind power projects east of the Cascades in order to provide guidance for siting and mitigation. These guidelines were followed during selection of Section 27 as a mitigation site for the Project. Section 27 provides opportunity for "like-kind" replacement habitat of equal or higher habitat value than the impacted area and it occurs in the same geographical region as the impacted habitat. Furthermore, since the Applicant has an option to purchase the property if the Project goes forward, the Applicant can provide legal protection and protection from degradation for the life of the Project. Consistent with WDFW's guidelines, permanent impacts to habitat would be replaced at a ratio equal to or greater than 1:1 for grassland and 2:1 for shrub-steppe.

Additional benefits of Section 27 as a mitigation parcel for the Project include:

- Protection of a segment of Whiskey Dick Creek
- Continuity of habitat with adjacent state lands
- Preservation of a diversity of habitats

Use of Section 27 as a mitigation parcel would result in protection of an approximately 1-mile segment of Whiskey Dick Creek near its headwaters. Protection of waterways and their adjacent riparian habitat provide significant benefits above and beyond replacement of "like-kind" habitat at agreed upon ratios. Protection of this segment of Whiskey Dick Creek provides benefits for water quality, wildlife, and species diversity. In addition, Section 27 is adjacent to state-owned lands. WDNR administers Section 34 to the south and WDFW administers Section 26 to the east. Use of Section 27 for mitigation will provide continuity of habitat with these adjacent state-owned sections. Finally, a variety of habitat types that occur in the general Project area are found in Section 27, so a diversity of habitat types would be preserved. These include shrub-steppe (moderate and dense), herbaceous, herbaceous/rock outcrop, and woody riparian.

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
EARTH
Seismic Hazards - Current engineering standards (UBC) will be used in the design of the Project facilities. These standards require that under the design earthquake, the factors of safety or resistance factors used in design exceed certain values. This factor of safety is introduced to account for uncertainties in the design process and to ensure that performance is acceptable. Application of the UBC in Project design will provide adequate protection for the Project facilities and ensure protection measures for human safety, given the relatively low level of risk for the site. No faults, either active or potentially active, have been mapped in or near the Project site. Based on the lack of faults in the vicinity and the lack of historic seismicity, earthquakes are not considered to pose a significant hazard to the proposed Project.
Volcanic Hazards - In the event that a volcanic eruption would damage or impact Project facilities, the Project facilities would be shut down until safe operating conditions return. If an eruption occurred during construction, a temporary shut-down would most likely be required to protect equipment and human health.
Erosion - Erosivity of area soils would be mitigated by factors such as grade (i.e., the

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
majority of soils that would be disturbed by the Project are located on grades of 20 percent or less) and the fact that area soils are well-drained.
Erosion - A detailed construction Storm Water Pollution Prevention Plan (SWPPP) will be developed for the Project to help minimize the potential for discharge of pollutants from the site during construction activities. The SWPPP will be designed to meet the requirements of the Washington State Department of Ecology General Permit to Discharge Storm water through its storm water pollution control program (Chapter 173-220 WAC) associated with construction activities.
Erosion - All construction practices will emphasize erosion control over sediment control through such non-quantitative activities as the following: • Straw mulching and vegetating disturbed surfaces; • Retaining original vegetation wherever possible; • Directing surface runoff away from denuded areas; • Keeping runoff velocities low through minimization of slope steepness and length; and • Providing and maintaining stabilized construction entrances.
Landslides - In general, the Project is located in relatively low-gradient topography with a relatively thin veneer of soil that overlies basaltic bedrock. Therefore, risk of a landslide appears to be minimal overall. If slope failure were to occur, the turbine strings are typically situated at a distance from steep slopes and the turbines and their associated foundation structures would not be affected.
Unique Features - In the unlikely event that unique physical or geological features were discovered on-site during construction, construction personnel would stop work at that location and notify the project manager. The project manager would immediately contact appropriate officials at the state historic preservation office to determine an appropriate response.
Contaminated Soils - Applicant commissioned KTA of Seattle, WA to conduct a Phase I Environmental Site Assessment (ESA) of property to be developed. This assessment revealed no evidence of environmental impairment within the Project area. Based on these findings, it is not anticipated that any environmental contamination will be encountered during construction or operation of the Project. In the unlikely event that contaminated soils are encountered, Applicant will coordinate with appropriate personnel at Department of Ecology.
AIR QUALITY
Emissions - All vehicles used during construction will comply with applicable Federal and state air quality regulations.
Emissions - Operational measures such as limiting engine idling time and shutting down equipment when not in use will be implemented.

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
Emissions - Carpooling among construction workers will be encouraged to minimize construction-related traffic and associated emissions.
Dust - Traffic speeds on unpaved access roads will be kept to 25 mph to minimize generation of dust.
Dust - Dust control systems shall be in place and maintained in good operating conditions during all periods of rock crusher and batch plant operation. A water mist will be applied near all emission points along the crushing circuit to control dust. The crusher and batch plant will be shut down when the wind is strong enough that best efforts to keep dust from leaving the pit area are not effective. Stockpiles shall be located to minimize exposure to wind. During cement transfer to the silo, silo exhaust shall be controlled by a properly designed and operated fabric filter device (baghouse). These measures are anticipated to eliminate the possibility of dust plumes within the Project area.
Dust - Dust suppression will be performed around batch plant and rock crushing facilities to prevent buildup of fine materials.
Dust - Disturbed areas will be replanted or graveled to reduce wind-blown dust.
Dust - Active dust suppression will be implemented on construction access roads, parking areas and staging areas, possibly using water-based dust suppression materials in compliance with state and local regulations.
Dust - Erosion control measures will be implemented to limit deposition of silt to roadways.
Operations - No mitigation is proposed for Project operations as there will be no air or odor emissions.
WATER RESOURCES
Ground Water - All excavation and facilities shall be relatively shallow and will not exceed a maximum of 35 feet in depth for the turbine foundations. The roads, tower foundations and other facilities are sufficiently above the water table to avoid any significant impacts to subsurface hydrology and will have no direct effect on groundwater quantity, quality, and flow direction in the immediate area below the proposed facilities. There will be no well installed to service the operation and maintenance facility. Project roads will be designed and surfaced to eliminate impacts to groundwater.
Surface Water - No Project facilities or transmission feeder line poles or trails will be built in or near any streambed, riparian corridor or wetlands. There is one stream, Parke Creek, that the BPA feeder line crosses. To avoid any impacts, the transmission feeder poles will be located at least 200 feet back from the stream bank on either side and no heavy equipment will be used in the stream bed or riparian corridor for construction.
Surface Water - A formal Storm Water Pollution Prevention Plan (SWPPP) specifying the types of erosion control methods that will be used at the site will be designed and

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
submitted to EFSEC for approval prior to construction. After construction is completed, temporarily disturbed areas will be returned as closely as possible to their original state. This excludes the access roads, crane pads, rock quarries, O&M facilities, and parking areas, which will remain in place for the life of the facility. On-site construction management will monitor the area for erosion and implement additional control measures if necessary.
Surface Water - Operational BMPs will be adopted, as part of the SWPPP, to implement good housekeeping, preventive and corrective maintenance procedures, steps for spill prevention and emergency cleanup, employee training programs, and inspection and record keeping practices, as necessary, to prevent storm water pollution. Examples of good operational housekeeping practices, which will be employed by the Project, include the following: • Prompt cleanup and removal of spillage; • Regular pickup and disposal of garbage; • Regular sweeping of floors; • HAZMAT data sheet cataloguing and recording; and • Proper storage of containers.
No Discharge - Operation of the Project will not require the use of any water for cooling or any other use aside from the limited needs of the Operations and Maintenance facility (substantially less than 1,000 gallons per day). There will be no industrial wastewater stream from the facility (only domestic type wastewater from the O&M building which will discharge to an on-site septic system) and thus no wastewater will be used or discharged for Project operations.
Conservation - Environmentally benign dust palliatives such as lignin may be added to water to improve the efficacy of dust suppression and reduce water use during construction.
VEGETATION AND WETLANDS
Studies to Avoid Impacts - The Applicant has commissioned extensive studies by qualified biologists at the Project site to avoid impacts to sensitive populations. These studies, results of which are included as Exhibit 12, include: • Rare plant surveys; • Habitat mapping; The results and recommendations of these studies have been incorporated into the proposed design, construction, operation and mitigation for the Project.
Project Area Habitats - The Applicant has proposed to mitigate for all permanent and temporary impacts to habitat caused by the Project in accordance with the ratios outlined in the WDFW Wind Power Guidelines (WDFW, August 2003). The area set aside for Project mitigation is approximately 600 acres. This is more than the required replacement habitat under the WDFW Wind Power Guidelines. The Applicant has agreed

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
to fence this parcel to eliminate livestock grazing, assuming the land ownership and grazing practices of adjacent properties at the time the Project goes into operation requires fencing to remove livestock from this parcel. In addition to the parcel above, the Applicant is proposing to fence several springs within the Project area to eliminate livestock degradation. Fencing used for the mitigation parcel and the springs will be designed to keep livestock out but allow game species to cross. The Applicant intends to coordinate with Washington Department of Fish and Wildlife (WDFW) regarding fence specifications.
Unique Species - The only unique species or rare plant that may be impacted by the Project is hedgehog cactus, a Washington State Review list species. Access to the site will be controlled during both construction and operations, which should provide greater protection than is currently afforded to this species. As collection of this species for gardens has been cited as a reason for its decline, if such collection becomes a problem at the Project site, the Applicant will post a sign at the visitors' kiosk indicating that collection of any plants in the Project area is prohibited.
Critical Areas/Priority Habitats - Since no Kittitas County critical areas will be impacted by the Project, no mitigation is recommended. Shrub steppe is considered a priority habitat by WDFW. The Applicant has selected a mitigation site that exceeds the WDFW's guidelines for mitigation of shrub steppe for wind power projects east of the Cascades.
Wetlands - There are a few Class 3 wetlands in the form of seeps and springs within the Project area, however, all Project facilities will be located a considerable distance from them to prevent any impacts to these wetlands.
Noxious Weeds - To avoid, minimize, or reduce the impacts of noxious weeds, the following mitigation measures will be implemented: • The contractor will clean construction vehicles prior to bringing them in to the Project area from outside areas. • Disturbed areas will be revegetated as quickly as possible with native species. • Revegetation seed mixes will be selected in consultation with WDFW and Kittitas County Noxious Weed Control Board. • If hay is used for sediment control or other purposes, hay bales will be certified weed free. • Access to the site will be controlled which may result in a lower level of disturbance and fewer opportunities for noxious weeds to be introduced and/or spread than is currently the case. Noxious weeds that may establish themselves as a result of the Project will be actively controlled in consultation with the Kittitas County Weed Control Board.
Construction - Construction personnel will be required to avoid driving over or otherwise disturbing areas outside the designated construction areas, and an environmental monitor during construction will be designated to monitor construction

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
activities and ensure compliance with mitigation measures.
AGRICULTURAL CROPS AND LIVESTOCK
Noxious Weeds - As described above in 'Vegetation and Wetlands', an active noxious weed control program will be implemented, in consultation with the Kittitas County Noxious Weed Control Board during both construction and operations to effectively prevent and minimize the introduction and/or spread of invasive species.
Livestock - The land area that will be temporarily disturbed during construction is approximately 360 acres. Of this area, approximately 7.5 acres will be cleared of vegetation. These temporarily disturbed areas will be reseeded after construction with an appropriate native seed mix and is expected to recover over time, particularly given that disturbance corridors are largely linear in nature.
Livestock - The Applicant has agreed to allow controlled hunting within the Project area in coordination with the WDFW in order to allow management of the elk and deer populations and to prevent creation of a sanctuary effect that could lead to greater agricultural damage from big game to farms and ranches in the area.
WILDLIFE
Studies to Avoid Impacts - The Applicant has commissioned extensive studies by qualified biologists of wildlife at the Project site to avoid impacts to sensitive populations. These studies, results of which are included as Exhibit 14, include: • Habitat mapping; • Avian use point count surveys; • Aerial raptor nest surveys; • Sage grouse surveys • Big game surveys; • Non-avian wildlife surveys; The results and recommendations of these studies have been incorporated into the proposed design, construction, operation and mitigation for the Project.
Project Design - The proposed design of the Project incorporates numerous features to avoid and/or minimize impacts to plants and wildlife. These features are based on site surveys, experience at other wind power projects, and recommendations from consultants performing studies at the site. Features of the Project that are designed to avoid or minimize impacts to wildlife include the following: • Avoidance of construction in sensitive areas such as streams, riparian zones, wetlands, forested areas; • Avoidance of placing wind turbines in prominent saddles along the main Whiskey Dick Ridge to minimize potential impacts to raptors; • Minimization of new road construction by improving and using existing roads and trails instead of constructing new roads; • Choice of underground (vs. overhead) electrical collection lines wherever feasible

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
to minimize perching locations and electrocution hazards to birds; • Choice of turbines with low RPM and use of tubular towers to minimize risk of bird collision with turbine blades and towers; • Use of bird flight diverters on guyed permanent meteorological towers or use of unguyed permanent meteorological towers to minimize potential for avian collisions with guy wires; • Equipping all overhead power lines with raptor perch guards to minimize risks to raptors; and • Spacing of all overhead power line conductors to minimize potential for raptor electrocution.
Project Design - The Project layout (Exhibit 1-B) has been designed to avoid any impacts to streams and riparian areas. Roads, underground cables, turbine foundations, transmission poles and other associated infrastructure will not be located within any riparian areas or streams. In addition, the proposed construction activities for the transmission feeder lines will not involve the use of any heavy equipment in stream beds or riparian areas.
Construction - Applicant proposes the use of construction techniques and Best Management Practices (BMPs) to minimize potential impacts to wildlife. These include the following: • Use of BMPs to minimize construction-related surface water runoff and soil erosion • Use of certified "weed free" straw bales during construction to avoid introduction of noxious or invasive weeds; • Flagging of any sensitive habitat areas (e.g. springs, raptor nests, wetlands, etc.) near proposed areas of construction activity and designation of such areas as "off limits" to all construction personnel; • Development and implementation of a fire control plan, in coordination with local fire districts, to minimize risk of accidental fire during construction and respond effectively to any fire that might occur; • Establishment and enforcement of reasonable driving speed limits (max 25 mph) during construction to minimize potential for road kills; • Proper storage and management of all wastes generated during construction; • Require construction personnel to avoid driving over or otherwise disturbing areas outside the designated construction areas; • Limit construction activities during winter months to minimize impacts to wintering big game • Designation of an environmental monitor during construction to monitor construction activities and ensure compliance with mitigation measures.
Habitat - Temporarily disturbed areas that have been cleared of vegetation will be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed to accelerate the revegetation of these areas and to the prevent spread of noxious weeds. The Applicant will consult with Washington Department of

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
Fish and Wildlife regarding the appropriate seed mixes for the Project area.
Post-Construction Monitoring - The Applicant proposes to develop a post construction monitoring plan for the Project to quantify impacts to avian species and to assess the adequacy of mitigation measures implemented. The monitoring plan will include the following components: 1) fatality monitoring involving standardized carcass searches, scavenger removal trials, searcher efficiency trials, and reporting of incidental fatalities by maintenance personnel and others; and 2) a minimum of one breeding season raptor nest survey of the study area and a 1 mile buffer to locate and monitoring active raptor nests potentially affected by the construction and operation of the Project. The protocol for the fatality monitoring study will be similar to protocols used at the Vansycle Wind Plant in northeastern Oregon (Erickson *et al.,* 2000) and the Stateline Wind Plant in Washington and Oregon (FPL *et al.,* 2001). The Applicant proposes to convene a Technical Advisory Committee (TAC) to evaluate the mitigation and monitoring program and determine the need for further studies or mitigation measures. The TAC will be composed of representatives from Washington Department of Fish and Wildlife, EFSEC, Kittitas County, local interest groups (e.g., Kittitas Audubon Society), Project landowners, and the Applicant. The role of the TAC will be to review results of monitoring studies to evaluate impacts to wildlife and habitat, and address issues that arise regarding wildlife impacts during operation of the Project. The post-construction monitoring plan will be developed in coordination with the TAC.
Operations - During Project operations, appropriate operational BMPs will be implemented to minimize impacts to plants and animals. These include the following: • Implementation of a fire control plan, in coordination with local fire districts, to avoid accidental wildfires and respond effectively to any fire that might occur; • Establishment and enforcement of reasonable driving speed limits (max 25 mph) during operations to minimize potential for road kills; • Operational BMPs to minimize storm water runoff and soil erosion; • Implementation of an effective noxious weed control program, in coordination with the Kittitas County Noxious Weed Control Board, to control the spread and prevent the introduction of noxious weeds; • Identification and removal of all carcasses of livestock, big game, etc. from within the Project that may attract foraging bald eagles or other raptors; • Control public access to the site to minimize disturbance impacts to wildlife, especially in the winter months; • Allow limited and controlled hunting on the site and allow WDFW access to the site to manage big game herds and minimize big game damage to nearby agricultural lands.
FISHERIES
Project Design - The Project layout (Exhibit 1-B) has been designed to avoid any

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
impacts to streams and riparian areas. Roads, underground cables, turbine foundations, transmission poles and other associated infrastructure will not be located within any riparian areas or streams. BMPs will be initiated to retain sediment from disturbed areas and minimize areas of disturbance.
Construction - The proposed construction activities for the transmission feeder lines will not involve the use of any heavy equipment in stream beds or riparian areas.
ENERGY AND NATURAL RESOURCES
Conservation - During construction, conservation measures will include recycling of construction wastes where possible and encouragement of carpooling among construction workers to reduce emissions and traffic.
Conservation - Several conservation measures will be undertaken during operations: • The O&M facility will utilize station power for electricity needs. • Water usage at the site will be closely monitored during operations due to the limited capacity of the on-site water storage tank. • Carpooling and among operations workers will be encouraged. • Recycling of waste office paper and aluminum will be encouraged.
NOISE
Project Design - Overall, modern wind turbines are typically quiet, especially when compared to their combustion-based alternatives. The noise generated by wind turbines is likely to be most noticeable when wind speeds are low (8-10 mph) at receptors. Wind turbine noise tends to be masked by other background sources (i.e., the sound generated by the wind) at higher wind speeds. Project will comply with WAC 173-60-040, 'Noise Levels'.
Project Design - Audible noise from the high voltage transmission feeder line(s) will comply with the level specified in 173-60-040 WAC (see Table 3.9.1-3). Lines owned by the Bonneville Power Administration (BPA) will comply with the BPA's limits, namely an L_{50} level of 50 dBA at the edge of the right-of-way (Perry, D., Bonneville Power Administration, "Sound Level Limits from BPA Facilities", BPA memorandum, May 26, 1982.)
Project Design - Substation transformers and high voltage switching equipment shall be specified or designed to comply with the level specified in 173-60-040 WAC (see Table 3.9.1-3) namely the 70 dBA limit at all Class C EDNA (industrial/agricultural) property lines and 60 dBA at all residences (Class A EDNA).
Construction - All noise-generating construction activities will be conducted between the hours of 7 a.m. and 10 p.m. and are therefore exempt from the limits presented in Table 3.9.1-3 (per 173-60-050 WAC). Blasting is anticipated for the foundations and potentially some road areas. Blasting will be conducted only between the hours of 7 a.m. and 10 p.m. and is anticipated to occur over a period of eight weeks. Blasting activities are specifically exempted from the noise regulations (per WAC 173-60-050 (1)(c)).

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
LAND USE
Project Design - The primary land use in the area, livestock grazing, can continue around Project facilities and transmission feeder lines. Land use impacts associated with construction and operation of the Project and associated transmission feeder lines will be negligible because they will not impair or impact current land uses, change land use patterns, or be incompatible with existing uses or zoning ordinances.
Compliance - The proposed Project is not presently in compliance with local land use plans and zoning ordinances. The Applicant will make application for change in, or permission under, Kittitas County land use plans and zoning ordinances and will make all reasonable efforts to resolve the noncompliance. In the event the Applicant's reasonable efforts fail to achieve compliance, Applicant will apply to EFSEC for preemption of such plans and ordinance pursuant to Chapter 463-28 WAC.
VISUAL RESOURCES / LIGHT AND GLARE
Turbine Appearance - The wind turbine towers, nacelles, and rotors used will be uniform and will conform to the highest standards of industrial design to present a trim, uncluttered, aesthetically attractive appearance.
Turbine Color - Turbines will have neutral gray finish to minimize contrast with the sky backdrop.
Turbine Reflectivity - A low-reflectivity finish will be used for all surfaces of the turbines to minimize the reflections that can call attention to structures in a landscape setting.
Turbine Activity - Because of the wind conditions at the site and the high level of reliability of the equipment being used, the rotors will be turning approximately 80-85% of the time, minimizing the amount of time that turbines will appear to be non-operational, a condition that the public often finds to be unattractive.
Turbine Lighting - The only exterior lighting on the turbines will be the aviation warning lighting required by the FAA. It will be kept to the minimum required intensity to meet FAA standards. It is anticipated that the FAA will soon be issuing new standards for marking of wind turbines that will entail lighting far fewer turbines in a large wind farm than is now required, and having all the lights synchronized. These potential regulatory changes are being closely monitored, and if, as is likely, they are made before Project construction begins, the aviation safety marking lighting will be designed to meet these standards.
Turbine Shadow Flicker - The Project is not expected to result in any shadow flicker effects for any sensitive receptors due to the distance between the nearest receptors (houses) and the Project's wind turbines. The closest house is almost 2 miles from the nearest proposed wind turbine, which is well beyond the distance at which shadow flicker can cause impacts. A detailed discussion and analysis of the Project's potential to create

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
shadow flicker, including the results of modeling performed by Wind Engineers, is included as Exhibit 9, 'Shadow Flicker Briefing.'
Equipment Color - The small cabinets containing pad-mounted equipment that will be located at the base of each turbine will have an earth-tone finish to help them blend into the surrounding ground plane.
Electrical System Visibility - Nearly all of the Project's electrical collection system will be located underground, eliminating visual impacts.
Electrical System Appearance - On the small segment of the electrical collection system that will be above ground, simple wooden poles, non-specular conductors (i.e. conductors that have a low level of reflectivity), and non-reflective and non-refractive insulators will be used. This line parallels two sets of overhead high voltage transmission lines and an existing gravel road.
Roads - To the extent feasible, existing road alignments will be used to provide access to the turbines, minimizing the amount of additional surface disturbance required. Where possible, access road widths will be restricted to 20 feet (approximately half of all access road miles.) The access roads will have a gravel surface and will have grades of no more than 15%, minimizing erosion and its visual effects.
Facilities - The O&M facility building will have a low-reflectivity earth-tone finish to maximize its visual integration into the surrounding landscape.
Facilities - The parking areas at the O&M facility will be covered with gravel, rather than asphalt, to minimize contrast with the site's soil colors.
Facilities - Outdoor night lighting at the O&M facility and the substation(s) will be kept to the minimum required for safety and security, sensors and switches will be used to keep lighting turned off when not required, and all lights will be hooded and directed to minimize backscatter and off-site light dispersion.
Substation - At the substation(s), all equipment will have a low reflectivity neutral gray finish to minimize visual salience.
Substation - All insulators in the substations and on takeoff towers will be non-reflective and non-refractive.
Substation - The control buildings located at each substation would have a low-reflectivity earth-tone finish.
Substation - The chain link fences surrounding the substations will have a dulled, darkened finish to reduce their contrast with the surroundings.
Construction - During the construction period, active dust suppression will be implemented to minimize the creation of dust clouds.
Construction - When construction is complete, areas disturbed during the construction

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
process will be reseeded to facilitate their return to natural appearing conditions.
POPULATION, HOUSING, AND ECONOMICS
Population and Housing - There will not be a significant increase in population or housing demands due to the small number of workers (14-18) required for operations. There appears to be an adequate supply of temporary housing available to accommodate non-local workers during construction; therefore, no mitigation measures are proposed.
Economics - The Project is projected to result in an estimated $1.6 million per year in added income and 26-30 additional jobs in Kittitas County. The overall socioeconomic impact of the Project will be strongly positive for Kittitas County in terms of increased property tax base and employment opportunities, thus no mitigation measures are planned for population, housing, and economics.
PUBLIC SERVICES AND UTILITIES/RECREATION
Fire, Police, EMS - The Applicant will provide all police, fire, and emergency medical personnel with emergency response details for the Project including detailed maps of the Project site access roads, Applicant contact information, procedures for rescue operations to the nacelles, and location of the rescue basket.
Fire - Potential impacts to fire services will be mitigated by the following: • Applicant has initiated discussion with local fire district(s) regarding a contract for fire protection services during construction; • Provisions for special training of fire district personnel for fires related to wind turbines, and for EMS personnel in how to use a rescue basket that will be kept at the operations and maintenance facility for the purpose of removing injured employees from the towers; • Providing detailed maps to fire districts that show all access roads to the Project; • Providing keys to a master lock system to emergency responders that will enable emergency personnel to unlock gates that would otherwise limit access to the Project; • Use of spark arresters on all power equipment (e.g., cutting torches and cutting tools), when necessary due to extreme fire danger conditions; • Informing workers at the Project of emergency contact phone numbers and training them in emergency response procedures; • Carrying fire extinguishers in all maintenance vehicles.
Operations - During operation of the Project, impacts to local services and utilities are expected to be insignificant. However, emergency preparedness planning will be implemented to reduce potential impacts in the event of an emergency. No additional mitigation will be required.
Taxes - Potential impacts to public services and utilities will be mitigated by the tax revenues generated by the Project.

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
CULTURAL RESOURCES
Studies to Avoid Impacts - A cultural resources evaluation was implemented to identify and assess any potential impact on cultural resources located within the Project area.
Project Design - The recommended 100 foot setback around all documented culturally sensitive areas will be implemented for all design scenarios. It is anticipated that by following this guideline, no impacts to culturally sensitive areas will occur under any of the proposed scenarios.
TRAFFIC AND TRANSPORTATION
Construction - During construction, roadways and intersections in the vicinity of the Project site will provide an acceptable level of passage for traffic, even during the evening peak periods. However, the following mitigation measures are proposed to further reduce the impact of Project construction on roadway traffic in the region: • The Applicant will prepare a Traffic Management Plan with the construction contractor outlining steps for minimizing construction traffic impacts; • The Applicant will provide notice to adjacent landowners when construction takes place to help minimize access disruptions; • The Applicant will provide proper road signage and warnings of "Equipment on Road," "Truck Access," or "Road Crossings;" • When slow or oversized wide loads are being hauled, advance signage and traffic diversion equipment will be used to improve traffic safety. Pilot cars will be used as DOT codes dictate depending on load size and weight; • The Applicant will construct necessary site access roads and entrance driveways that will be able to service truck movements of legal weight; • The Applicant will encourage carpooling for the construction workforce to reduce traffic volume; • In consultation with Kittitas County, the Applicant will provide detour plans and warning signs in advance of any traffic disturbances; • The Applicant will employ flaggers as necessary to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents; • One travel lane will be maintained at all times.
Operations - Because Project operation and maintenance will not significantly affect traffic and transportation, no mitigation is proposed.
HEALTH AND SAFETY
Project Design - Primary among the means of preventing hazards will be adherence to appropriate design and construction protocols such as IEC 61400-1. This will assure that the load assumptions, design, construction standards and safety features are in accordance with industry norms and benefit from the experience of many manufacturers and operators. A second important form of prevention is establishing a skilled workforce and implementing effective facility-wide maintenance, surveillance, and security programs.

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
Project Design - Every hazard decreases as some function of distance. Therefore, hazards are reduced or eliminated by prohibiting or controlling presence in the area potentially affected by the hazard.
Project Design - Wind turbine generators are equipped with multiple safety systems as standard equipment. As examples: rotor speed is controlled by a redundant pitch control system and a backup disk brake system; critical components have multiple temperature sensors and a control system to shut the system down and take it off-line if an overheat condition is detected.
Lightning - The WTGs are equipped with an engineered lightning protection system that connects the blades, nacelle, and tower to the earthing system at the base of the tower. As the rotor blades are nonmetallic, they normally do not act well as a discharge path for lightning, however, as the highest point of the turbine, the blades sometimes provide the path of least resistance for a lightning strike. In order to protect the blades, they are constructed with an internal copper conductor extending from the blade tip down to the rotor hub which is connected to the main shaft and establishes a path through the gearbox, nacelle bed frame etc. to the tower base right down to the grounding system embedded underground. An additional lightning rod extends above the wind vane and anemometer at the rear of the nacelle. Both the rear lightning rod and blades have conductive paths to the nacelle bed frame that in turn connects to the tower. The tower base is connected to the earthing system at diametrically opposed points.
Tower Collapse - The selected wind turbine generator/ tower combination will be subjected to engineering review to assure that the design and construction standards are appropriate for the Project. This review will include consideration of code requirements under various loading conditions and give a high degree of confidence of structural adequacy of the towers. The turbines are more than 9,000 feet from the nearest residence and more than 2 miles from the nearest public road and as such, a reasonable set-back requirement of at least one tip height is far exceeded in the Project location and design.
Blade Throw - Certification of the wind turbine to the requirements of IEC 61400-1 will assure that the static, dynamic and defined-life fatigue stresses in the blade will not be exceeded under the combined load cases expected at the Project site. The standard includes safety factors for normal, abnormal, fatigue and construction loads. This certification, together with regular periodic inspections, will give a high level of assurance against blade failure in operation. The turbines are more than 9,000 feet from the nearest residence and more than 2 miles from the nearest public road and as such, a reasonable set-back requirement of at least one tip height is far exceeded in the Project location and design.
Ice Throw - Ice throw over 100 meters (328 feet) has not been documented as a hazard and no ice throw injury has ever been reported from operating wind projects. Certain manufacturers have heated rotor blades in development testing. This would not be a practical consideration for the proposed facility due to the low hazard and low frequency of icing. The turbines are more than 9,000 feet from the nearest residence and more than

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
2 miles from the nearest public road and as such, a reasonable set-back requirement of at least one tip height or at least 100 meters is far exceeded in the Project location and design.
Explosions - To avoid uncontrolled explosions during blasting for excavation work, only state licensed explosive specialist contractors are allowed to perform this work – explosives require special detonation equipment with safety lockouts, vegetation will be cleared from the general footprint area surrounding the excavation zone to be blasted, and standby water spray trucks and fire suppression equipment will be present during blasting activities.
Fire - Location of transformers and electrical equipment below ground will harden them against tower collapse, blade throw and vandalism, thereby reducing the fire hazard.
Fire - In order to prevent electrical fires, all equipment used is designed to meet NEC and NFPA standards. Graveled areas with no vegetation will surround substation, fused switch risers on overhead pole line, junction boxes and pad switches. A fire suppressing, rock filled, oil containment trough will surround the substation transformer.
Fire - In normal operation, regular maintenance, including review of real time and stored temperature sensor readings, will highlight developing problems and facilitate prevention of equipment-caused fire. Large wind generators have such systems as standard equipment.
Fire - In order to avoid fires caused by dry vegetation in contact with hot exhaust catalytic converters under vehicles, no gas powered vehicles will be allowed outside of graveled areas, mainly diesel vehicles (i.e. w/o catalytic converters) will be used on site, and high clearance vehicles will be used on site if used off-road.
Fire - During the construction period, it will be necessary to give all workers fire safety training and to implement a work plan that minimizes the risk of fire. Appropriate fire suppression equipment will be available to designated employees trained in its use.
Fire - During construction, portable generators will not be allowed to operate on open grass areas, and generators will be fitted with spark arrestors on the exhaust system.
Fire - In areas where there are torches or field welding present, the immediate surrounding area will be wetted with a water sprayer and fire suppression equipment will be present at location of welder/torch activity.
Fire - Smoking will be restricted to designated areas (outdoor gravel covered areas).
Fire - As general fire prevention measures, all on-site service vehicles will be fitted with fire extinguishers; fire station boxes with shovels, water tank sprayers, etc. will be installed at multiple locations on-site along roadways during summer fire season.
Security - The Site Project Manager will work with a security contractor to develop a

Table 1.5.2-1; Summary of Impacts and Mitigation Measures
plan to effectively monitor the overall site during construction including drive-around security and specific check points. The security inspection and monitoring plan will 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. Much of the security monitoring activities will be straight forward since all site access ways will be accessible from paved and well maintained county roads.
Security - Site visitors including vendor equipment personnel, maintenance contractors, material suppliers and all other third parties will require permission for access from authorized Project staff prior to entrance. The Plant Operations Manager, or designee, will grant access to any critical areas of the site on an as-needed basis. Site access will be controlled and all visitors or contractors on the site will be required to carry an identification pass.
Security - Construction materials will be stored at the individual turbines locations, or at the lay-down area around the perimeter of the Operations and Maintenance (O&M) facility and site construction trailers. Temporary fencing with a locked gate will 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 will be removed and the area re-seeded with an appropriate seed mix.
Security - Both the O&M facility and the main substation will be equipped with outdoor lighting and motion sensor lighting. The substation will 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 will all have secure, lockable doors.
Security - The plant operations group will prepare a detailed security plan to be implemented to protect the security of the Project and Project personnel.
Emergency Response - On-site emergency plans will be prepared to protect the public health, safety and environment on and off the Project site in the case of a major natural disaster or industrial accident relating to or affecting the Project. The Applicant shall prepare the plans and be responsible for implementing the plans with its operations team in coordination with the local emergency response support functions. The plans will describe the emergency response procedures to be implemented during various emergency situations that may affect the Project or the surrounding community or environment.

1.6 CUMULATIVE IMPACTS

Although the environmental impacts of proposed power projects are typically evaluated on an individual basis, the recent number of wind power generation applications in Kittitas County has prompted EFSEC to consider potential cumulative impacts. The Kittitas Valley, Wild Horse, and Desert Claim wind power projects are three similar but independent developments being proposed in Kittitas County that are being permitted through separate processes—Kittitas Valley and Wild Horse through EFSEC and Desert Claim through Kittitas County. The Kittitas Valley and Desert Claim projects are relatively close to each other (within 1.6 miles at the closest point), while the Wild Horse Project is 14 miles from the Desert Claim project and 21 miles from the Kittitas Valley project. SEPA requires consideration of cumulative impacts. A brief description of the Desert Claim and Kittitas Valley projects is provided in Section 3.17, 'Cumulative Impacts'. Potential cumulative impacts associated with the Kittitas Valley, Wild Horse, and Desert Claim wind power projects are addressed in Section 3.17 for each resource topic, and are summarized below.

1.6.1 Earth Resources

Significant cumulative impacts on soil, topography, and geology resulting from construction of the three proposed wind power projects in Kittitas County are not anticipated. Impacts on earth resources from development of the three wind power projects would generally be confined to localized, temporary erosion impacts from ground disturbance during construction. The intensity of impacts on near-surface soils would be within the construction footprint for the respective project and would not be overlapping in geographic extent and the impacts of the respective projects would not represent the potential for significant cumulative impacts on earth resources.

Cut and fill would be required to construct access roads, tower foundations, transformer pads, and other project facilities. Each project will require large amounts of gravel for road and foundation construction, but because the Wild Horse Project will utilize on-site rock pits to supply gravel, the cumulative impact on local resources will be reduced.

1.6.2 Vegetation, Wetlands, Wildlife, and Fisheries

1.6.2.1 Vegetation

Implementation of all three proposed wind power projects would result in the loss of vegetation through clearing and ground disturbance, including the potential loss of lithosols, a unique habitat often associated with the shrub-steppe region. The combined figures for the three projects amount to approximately 336 total acres of existing vegetation lost, including approximately 170 acres of shrub-steppe and approximately 100 acres of lithosol habitat. In the context of the three wind power project areas that collectively cover approximately 17,000 acres, the approximate 2 percent loss of vegetation at each project site would not be considered an adverse cumulative effect. This combined loss of vegetation would similarly not be considered cumulatively adverse in a more regional context. However, the precise regional extent of lithosol habitat is not quantitatively known. Therefore, it is difficult to assess the specific magnitude of cumulative lithosol impacts at the three wind power project sites within the context of the surrounding region.

No federally listed rare plants were identified at either the Kittitas Valley or Wild Horse project sites. One Washington State listed species, hedgehog cactus, was found extensively in lithosolic habitats at the Wild Horse Project site, but less than 10% of the individuals identified during a rare plant survey are considered at risk from direct impact from the Wild Horse Project.

Field surveys of wet meadow habitats at the Desert Claim project site resulted in no findings of Ute ladies'-tresses, an orchid that is federally listed as endangered. No other rare plants protected by either the federal or state governments were found in searches of the areas of likely disturbance in the Desert Claim project area (Kittitas County 2003a). The minimal potential impacts of the proposed wind projects on rare plants would not represent a significant cumulative impact on any species.

1.6.2.2 Wetlands

Cumulative impacts on wetlands could result from directly filling or grading of wetland systems, as well as from indirect effects caused by stormwater runoff, increased pollutant loading, and water quality degradation, which in turn could result in loss of wetland diversity and reduced wetland functions and values. The Kittitas Valley project would disturb between approximately 135 and 185 square feet of one small potential wetland system at the project site. Construction activities would temporarily disturb approximately 16 acres of wetland area at the Desert Claim site, while the permanent project footprint would overlap with an area estimated at 9 acres.

No wetlands were identified within a 164-foot buffer around the planned locations for Wild Horse Project facilities; therefore, no impacts on wetlands are anticipated for that Project. The collective effects of these projects would be minor as a result of wetland avoidance and/or required mitigation for wetlands that could not be avoided, and are not expected to extend to downstream surface waters or wetlands. Therefore, there would not be a potential for significant cumulative effects on wetland resources.

1.6.2.3 Wildlife

Some temporary displacement of wintering mule deer and elk is anticipated from winter construction activities in the three wind projects. If tolerance thresholds during wind power project maintenance activities are exceeded, some animals are likely to be displaced and use areas away from the wind project development areas. However, cumulative impacts on wintering mule deer and elk for all projects are expected to be low.

The estimated combined raptor mortality rate for the three wind power projects would be approximately 14 raptor fatalities per year with 361 combined turbines, and 15 raptor fatalities per year with 391 combined turbines. Given the distances between the Wild Horse, Kittitas Valley, and Desert Claim projects, and the typical home ranges of the raptors at risk for collision at the three projects, the same individual breeding raptors that use the Kittitas Valley and Desert Claim project areas are not expected to use the Wild Horse Project area

The cumulative impacts on bald eagle winter habitat from all projects would be small. During project operation, bald eagles that occupy the area near the Yakima River would be at some risk for collision with turbines. Assuming risk of collision is proportional to use, one bald eagle fatality between the Kittitas Valley and Desert Claim projects might occur every two to three years. There was no observed use at the Wild Horse Project area. Based on these estimates, the cumulative effects of this low level of mortality on the increasing winter bald eagle population in the Kittitas Valley and the state of Washington would not be measurable.

It is expected that passerines would make up the largest proportion of bird fatalities for the three projects combined. Based on the mortality estimates from other wind projects studied, combined passerine mortality for the three projects would range from 430 to 740 fatalities per year. This level of mortality is not expected to have any population-level consequences for individual species.

Using mortality estimates from other operating wind projects (one to two bat fatalities per turbine per year), total annual bat mortality for all three wind power projects in Kittitas County is expected to range from 361 to 782 bat fatalities. However, the significance of bat mortality from the three projects is hard to predict because there is very little information available regarding the size of bat populations. Studies suggest, however, that resident bats do not appear to be significantly affected by wind turbines (Johnson et al. 2003; Gruver 2002) because nearly all observations were during the fall migration period.

Development of the Desert Claim project would result in minor disturbance or displacement impacts on streams and riparian zones in the project area; because none of the affected streams are known to contain fish communities, direct impacts on fish resources from this project are expected to be negligible or nonexistent. The effects of the respective projects would be negligible in three localized areas of Kittitas County and would not extend to downstream waters, therefore there would not be a potential for significant cumulative effects on fishery resources.

1.6.2.4 Fisheries

No impacts on fish habitat or fish species associated with construction and operation of the Kittitas Valley project are anticipated. Similarly, the Wild Horse Project would not result in adverse impacts on fish or fish habitat on-site or in downstream areas.

1.6.3 Water Resources

Cumulative effects to surface water resources could result from increases in the amount of impervious surfaces that in turn could alter the amount and quality of drainage to area creeks and other water features. However, because the three projects are sufficiently distant from each other and are located in different tributary watersheds, there would not be combined effects from multiple projects on the same stream. The minor, localized effects of each project would occur within the drainages of minor tributaries to the Yakima River and the Columbia River and at a distance of at least several miles upstream from either river. Therefore, significant cumulative effects on water resources within the Upper Yakima River basin or the northeastern portion of the Kittitas Valley are not expected, even if all three projects were constructed.

1.6.4 Health and Safety

The potential for exposure to fuel and non-fuel hazardous substances would increase, particularly during the construction period if construction periods were to overlap. However, the effects would be localized in the area of the spill, and would not be likely to result in an adverse cumulative impact.

The greatest fire risk for each project would occur during the construction period, because of the level of activity and the numbers of workers and equipment active at that time. The greatest cumulative fire risk would occur if and when construction schedules for two, or all three, of the projects overlapped. With implementation of strict fire protection and prevention measures, the cumulative risk of potential fires associated with construction of the three proposed wind turbine projects should be minimized.

Certain fire risks specific to wind energy projects would also exist during the operating period for each project. However, specific measures to counteract or manage these risks would be implemented during project operation. For example, the project facilities would be continually monitored, the project areas would be regularly patrolled, and access to the project areas would be limited. Therefore, the concurrent operation of the three proposed wind power projects would not likely pose a cumulatively significant increased fire risk.

Site-specific health and safety concerns associated with wind energy production include the potential for ice to be thrown from rotating blades, blades to disengage and be thrown from the tower, and tower collapse during extreme weather conditions. These potential health and safety impacts from the three projects would be localized in nature and would not be expected to be cumulatively significant.

Potential shadow flicker impacts from the three proposed wind power projects would be limited to the immediate vicinity (approximately 2,000 feet) of the wind turbines within each respective project area. Some residences that are close to turbine locations for the Desert Claim or Kittitas Valley projects would be subject to shadow flicker for varying numbers of hours per year. These impacts would be limited to a number of discrete locations that are well separated from each other, and would not constitute a cumulative impact from these two proposed projects.

The electric and magnetic fields associated with the three proposed wind power projects would be less than those produced by electrical facilities already present in the vicinity of the respective project areas, and would diminish to background levels at distances within which public exposure could occur. Therefore, there would not be cumulative exposure impacts from development of multiple wind energy projects.

1.6.5 Energy and Natural Resources

When combined with other planned wind projects in the region, construction activity associated with the Wild Horse Project would contribute to local energy demands. The combined demands of the three projects for fuel and construction materials would cumulatively contribute to the local and regional demand for, and irreversible expenditures of, nonrenewable resources on a temporary basis.

The three proposed wind power projects would provide a combined nameplate capacity of approximately 565 MW of electricity (under the most likely scenario for development of the Kittitas Valley and Wild Horse projects). Assuming long-term operation of the three projects at a typical wind power project capacity factor of 33 percent, combined they would produce approximately 186 average MW of electricity on a long-term basis. That collective energy output would represent a substantial increase in the amount of electricity currently produced within Kittitas County. Operation of the three projects would also cumulatively add to the capacity, production, and availability of renewable energy sources in Washington state and the greater Pacific Northwest, and would provide a sustainable, renewable source of electric power supply to supplement the region’s existing hydroelectric, nuclear, and coal or gas-fired power projects, although it would represent a relatively small addition to the total regional electricity supply.

1.6.6 Land Use and Recreation

Development of the Wild Horse Project concurrent with the proposed Desert Claim and Kittitas Valley wind projects would result in conversion of approximately 336 acres of open space and rangeland uses in central Kittitas County for wind energy production. In the short-term, proposed wind energy facilities would not collectively disrupt or change the underlying land use pattern of this portion of the county. The three projects would also require either Kittitas County approval for a rezone and Comprehensive Plan amendment, or EFSEC review and governor approval, to allow development of a wind power facility. Temporary population increases associated with construction workers from all three projects could cumulatively increase demand for and use of local and regional recreation resources during overlapping construction periods, but those are not expected to be significant.

1.6.7 Socioeconomics

The proposed projects could contribute to increases in temporary and permanent job opportunities and populations in the region. The majority of cumulative population and housing impacts would be temporary and would occur during construction. Assuming that all three projects are constructed simultaneously, temporary population increases resulting from construction work forces could result in cumulative effects to the local housing supply. However, it appears that the study area has an adequate supply of temporary housing to accommodate the potential cumulative increase in construction workers from outside the area.

The three wind power projects would increase retail sales and overall economic activity in the area, as well as employment opportunities for residents of Kittitas County. The three projects would also significantly increase the amount of annual property tax revenue to the affected taxing districts in Kittitas County..

1.6.8 Cultural Resources

Constructing the three proposed wind power projects would result in ground disturbance that could potentially impact identified and unidentified prehistoric and/or historic sites, as well as cause impacts on traditional cultural properties. Cultural resource surveys of the Kittitas Valley and Wild Horse wind power projects have been conducted and no direct impacts to cultural resource sites are anticipated. Tribal representatives of the Yakama Nation have expressed concern about the cumulative effect wind power projects. Efforts to bring together wind farm applicants, government agencies, and tribal representatives to discuss these and other issues of concern are ongoing.

1.6.9 Visual Resources

There are a number of locations in the Kittitas Valley where the Desert Claim project could be seen in the foreground to middle ground and the Kittitas Valley project could be seen in the middle ground to background. Because the Wild Horse Project is located far from the other two projects and in an entirely different portion of the landscape, it has limited potential to be seen in the same view as the other two projects. Travelers on Interstate 90 (I-90), however, would be likely to recall having seen a collection of wind turbines a few minutes before seeing more wind turbines. This progressive realization could leave the impression with some viewers that wind turbines are plentiful in Kittitas

Valley. The development of the three proposed wind power projects would also cumulatively contribute to increased nighttime lighting in the Kittitas Valley.

1.6.10 Transportation

If construction occurs simultaneously for the Kittitas Valley and Wild Horse projects, the segment of I-90 immediately west of Exit 106 (to US 97) may temporarily carry construction traffic for both projects. The combined construction traffic volumes of both the Kittitas Valley and Wild Horse projects during the PM peak would cause this segment of I-90 to operate at level-of-service (LOS) B. This is acceptable by county and State standards, and it is anticipated that the LOS would return to background conditions (LOS A) once the projects are completed.

With the addition of the Desert Claim project, the total peak-hour trips if all three proposed projects were under construction simultaneously would result in an operating condition that is still within the numerical range for LOS B. Therefore, the additive effect of the potential Desert Claim construction traffic would not result in a significant cumulative impact on the operating condition for I-90 during the construction period. However, if turbine components or offsite gravel materials were delivered to multiple projects at the same time, there could be increased delays or additional detours within the area near the Desert Claim and Kittitas Valley projects.

Development of multiple wind farms in the Kittitas Valley area would likely result in a larger total number of tourists visiting wind project facilities, relative to the level of activity with a single project. However, the tourist traffic would likely be localized to the individual areas around the projects and would not likely be additive or cumulative (i.e., it is likely that most tourists interested in wind energy would visit any one of the projects, but would not visit two or all three projects).

1.6.11 Air Quality

Gravel needed for construction of the Kittitas Valley and Desert Claim projects would likely be transported from offsite sources. This activity could result in a temporary increase in localized cumulative air quality impacts on travel routes shared by the two projects, but not at a broader, countywide level. This potential impact would be greatest if construction activities for the Kittitas Valley and Desert Claim projects overlapped and occurred during periods of peak winds.

The air emissions from contemporaneous construction of multiple wind projects would be additive in terms of their contribution to total regional pollutant loads. However, it is not anticipated that the incremental impact of the aggregated air emissions from construction of multiple wind power projects would be sufficient for regional air pollutant concentrations to temporarily exceed the applicable air quality standards.

No significant aggregated air pollutant concentrations that would exceed national or Washington State ambient air quality standards are anticipated. In addition, the generation of electricity through the three proposed wind power projects would avoid cumulative emissions of regulated pollutants from other fossil fuelled sources of power that would have otherwise been built or operated to produce an equivalent amount of electricity.

1.6.12 Noise

Construction noise generated by the three wind power projects would be temporary in nature, and would primarily be from operation of construction equipment and vehicles. The magnitude of this temporary cumulative impact would depend upon the timing of construction activities but any adverse effects would be limited to the area immediately surrounding each construction site.

The Kittitas Valley and Desert Claim projects are a sufficient distance apart that residents near the Desert Claim project would not also experience elevated noise levels from operation of Kittitas Valley project facilities, and vice versa. Noise modeling results for both projects indicate that receptors located between the two projects would be unlikely to experience noticeable increases in noise levels as a combined effect of project operations. Given the distances that separate the Wild Horse Project from the Desert Claim and Kittitas Valley sites, Wild Horse Project operations would not contribute to cumulative noise impacts in the region.

1.6.13 Public Services and Utilities

Concurrent development of the three projects could create additional demand for law enforcement, fire protection, and emergency medical service response during both construction and operations and maintenance phases. The level of impact would depend on the timing of concurrent construction activities as well as the availability of emergency response resources at the time of an incident.

Increased permanent worker populations required to operate the three proposed wind farms could contribute to increased cumulative demands for school services in central and eastern Kittitas County. However, local residents would liekly fill a portion of the operations jobs and it is unlikely that all of the in-migrants would locate in the same school district. Therefore, no significant cumulative adverse impacts on schools are anticipated from project operation.

Cumulative impacts on utility service providers would consist primarily of cumulative increases in the demand for solid waste disposal services. However, this increased demand is not anticipated to be significant with respect to either collection capability or the capacity of the County's construction and demolition waste disposal site. No long-term cumulative impacts on regional water and wastewater treatment plants are anticipated because water and wastewater demands would be limited to temporary needs generated during construction activities and those from operations and maintenance staff.

No significant cumulative impacts on electricity or telecommunications are anticipated. Based on the distances between residences and the respective project facilities, there does not appear to be a potential for cumulatively significant interference impacts on radio and television reception in the areas near the proposed wind power projects.

1.7 PUBLIC INVOLVEMENT/CONSULTATION/COORDINATION

The Applicant has consulted extensively with local, state, and federal agencies and tribal representatives during the development of the proposed Project, including:

- Local Agencies: Kittitas County Planning Staff, Kittitas County Public Works Department, Ellensburg Fire District #2, Kittitas School District
- State Agencies: WDFW: Regional Staff and Managers, DNR, WSDOT
- Federal Agencies: BPA, USFWS, FAA
- Tribal Governments: Yakama Nation, Confederated Tribes of the Colville Reservation, Wanapum Tribe

Details and dates of meetings and correspondence are contained in Section 2.6, 'Coordination and Consultation with Agencies, Indian Tribes, The Public and Non-Governmental Organizations'.

The formal public involvement process required under SEPA will commence once EFSEC issues a Determination of Significance and begins the development of an Draft Environmental Impact Statement (DEIS).

1.8 ISSUES TO BE RESOLVED

Although most of the issues associated with this proposal have been clearly identified and assessed, or will be addressed in some clearly defined action plan in the future, there are some that have not been totally resolved or that may require further analysis. This section summarizes those issues consistent with SEPA.

1.8.1 Compliance with local land use plans and zoning ordinances

The proposed Project is not presently in compliance with local land use plans and zoning ordinances. The Applicant will make application for change in, or permission under, Kittitas County land use plans and zoning ordinances and will make all reasonable efforts to resolve the noncompliance. In the event the Applicant's reasonable efforts fail to achieve compliance, Applicant will apply to EFSEC for preemption of such plans and ordinance pursuant to Chapter 463-28 WAC.

2.1 INTRODUCTION

This application for a Site Certification Agreement is made for the construction and operation of the Wild Horse Wind Power Project herein referred to as the "Project" and the associated transmission feeder lines allowing the Project to interconnect with the high voltage transmission grid. The Applicant for the Site Certification Agreement is Wind Ridge Power Partners, LLC.

2.1.1 Wind Ridge Power Partners, LLC

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. Wind Ridge Power Partners, LLC is 100% owned by Zilkha Renewable Energy. Wind Ridge Power Partner'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

Applicant will designate a local contact in the future, with whom EFSEC may interact; until then contacts with Applicant should be as follows:

Contact Regarding this Application:

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

2.1.2 Zilkha Renewable Energy, LLC

Zilkha Renewable Energy is a privately owned company focused on the development, construction and operation of commercial scale wind power projects. Zilkha Renewable

2.2 DESCRIPTION OF PROPOSED PROJECT

2.2.1 Project Summary / Introduction

The Wild Horse Wind Power Project ("Project") is to be constructed in central Washington's Kittitas Valley, which has long been known for its vigorous winds. The Project will be built on high open ridge tops between the towns of Kittitas and Vantage in the eastern end of Kittitas Valley. Maps showing the Project location are presented in Section 2.2.2, 'Project Location' and in Exhibit 1-A, 'Project Area Overview'. The Project site has been selected primarily for its energetic wind resource and its access to existing high voltage transmission lines which have adequate capacity to allow the wind generated power to be integrated into the power grid system.

The Project consists of several prime elements which will be constructed in consecutive phases including 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), an operations and maintenance (O&M) center and associated supporting infrastructure and facilities. The entire Project area encompasses approximately 8,600 acres. A permanent footprint of approximately 165 acres of land area will be required to accommodate the proposed turbines and related support facilities. A site layout illustrating these key elements is contained in Exhibit 1-B, 'Project Site Layout'. Turbines will be located on open rangeland in areas that are currently zoned as Forest and Range and Commercial Agriculture by Kittitas County.

The Project is designed to provide low cost renewable electric energy to meet the growing needs of the Northwest. The Project has transmission and interconnection requests under review with the Bonneville Power Administration (BPA) and Puget Sound Energy, and is in the process of marketing the electrical energy into the local and regional power market.

The expected service life of the Project is 20 years. Well-maintained wind power plants operating according to industry standard practices are capable of service lives longer than 20 years. However, due to the rapid advancement in wind turbine technology, it is likely that after 20 years, the turbines would be replaced under a re-powering program similar to what has happened to several of the earlier wind power projects in Europe and California.

Detailed descriptions of the types of activities required to construct the Project, and the plan for managing the Project during construction and operations, are contained in Sections 2.2.5, 'Construction Methodology', and Section 4.4, 'Construction Management', respectively.

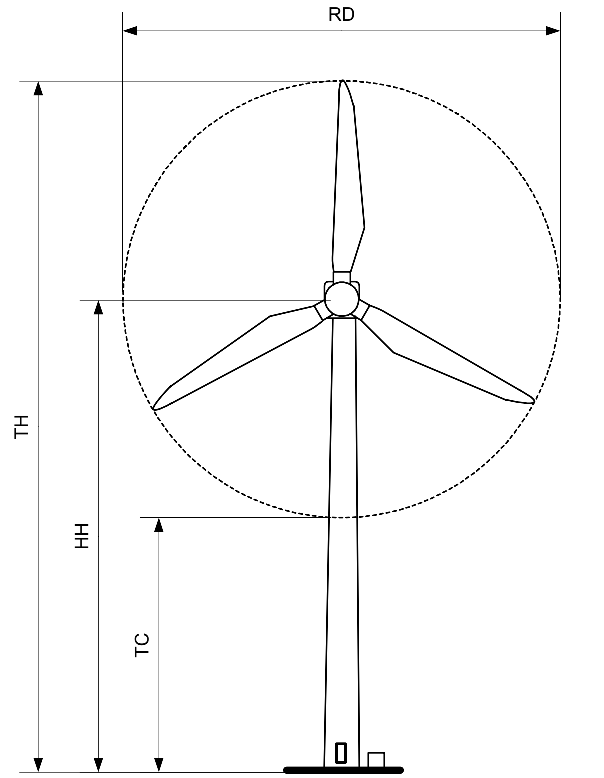
2.2.1.1 Project Feeder Lines

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 Puget Sound Energy (PSE) transmission system. It is anticipated that only one feeder line would be built, however, 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 Exhibit 1-B 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 below in Section 2.2.3.10, 'Project Transmission Feeder Lines'.

Power from the Project is fed to step-up substations indicated as the BPA or PSE step-up substation on the Site Layout in Exhibit 1-B. The step-up substations connect to the respective BPA or PSE feeder line which run 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 Bonneville Power Administration (BPA) high-voltage transmission lines identified as 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.

The Project's BPA feeder line is located on land owned by a single private landowner, and Applicant has negotiated an easement option with the landowner. The route of the BPA feeder line is currently zoned Forest and Range by Kittitas County. The PSE feeder line is also located on privately owned land currently zoned Forest and Range and Agriculture 20 by Kittitas County. The Applicant has negotiated easement options with the private landowners on whose land the PSE feeder line would be located.

Figure 2.2.1-1 Wind Turbine Dimensions



	MAX	MIN	Dimension
HH	80 m/262 ft.	46 m/151 ft.	Hub Height
RD	90 m/295 ft.	60 m/197 ft.	Rotor Diameter
TC	40 m/131 ft.	15 m/49 ft.	Tip Clearance
TH	125 m/410 ft.	76 m/249 ft.	Tip Height

<u>*Project Turbine Scenarios*</u>

The Project will consist of up to 158 wind turbines and have an installed nameplate capacity of up to 312 megawatts (MW). The Project will utilize 3-bladed wind turbines on tubular steel towers each ranging 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 2.2.1-1. 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 3 MW is used, up to 104 units would be installed for a Project capacity of 312 MW. The Project Site Layout in Exhibit 1-B 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.

Regardless of which size of turbine is finally selected for the Project, the turbines will 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. Exhibit 1-D illustrates the Project site layout with the smaller sized turbine scenario (60 meter rotor diameter) and Exhibit 1-E illustrates the Project site layout with larger turbines (90 meter rotor diameter). A summary of the Project Scenarios is tabulated below in Table 2.2.1-1 and a scale diagram comparing the various turbines sizes to one of the nearby BPA transmission towers is contained in Exhibit 1-F.

The size and type of turbine used for the Project will largely depend on the safety, history, 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. Requests for proposals (RFPs) for wind energy from utilities are designed to procure delivered energy from a wind power facility to their grid. RFPs are designed to encourage competitive pricing and as such they are not specifically designed to limit proposals to a specific size or type, make or model of wind turbine.

Due to the fact that there may be variances discovered at the time of performing a final site survey of the exact locations of the Project facilities, some flexibility in determining the facility locations is required to allow for in-field practicalities and conditions at the time of construction. Generally, it will not be necessary to relocate roads significantly from their location shown on the Site Layout; however, the exact location of the turbines along the planned roadways may need to be altered slightly from the shown plan in Exhibit 1-B due to a number of factors including:

- The results of the geotechnical investigations at each surveyed turbine location may reveal underground voids, land slide planes, or fault line locations. In this case, the turbine location may need to be altered or eliminated;
- The final on-site field survey with the meteorologists may dictate that turbines be spaced slightly closer together in some areas and further apart in other areas;
- If, at the time of construction, a turbine with a larger rotor diameter (e.g. 90 meters) is to be used, the turbine spacing will be increased and the overall number of turbines would be reduced;

- If, at the time of construction, a turbine with a smaller rotor diameter (e.g. 60 meters) is to be used, the turbine spacing will be decreased and the overall number of turbines would be increased;
- The final field surveys of communication microwave paths may require that some turbine locations be adjusted slightly to avoid line-of-sight interferences.

With the range of turbines that are proposed for use on the Project with rotor diameters ranging from 60 to 90 meters (197 to 295 feet), turbine locations would not vary from their shown locations by more than 105 meters (350 feet). Due to the distant proximity of the turbine sites to any public roads, power lines, property lines of non-participating landowners or residences the adjustments which may need to be made at the time of construction are insignificant.

2.2.1.2 Scope of Proposed Site Certificate

Similar to the environmental analysis performed for gas power projects which examine the full range of potential emissions such as SOx, NOx, CO and CO2 from various sizes and types of gas turbines, 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. Within each section of Chapter 3 of this ASC, 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 WTGs.

The Applicant requests that the Project be permitted to allow construction and operation within the entire range of turbine size and numbers presented, for which the impacts have been fully analyzed. This will enable the Applicant to choose the best wind turbine for the Project, based on technical and commercial considerations at the time of construction.

While the final selection of the precise model of wind turbine to be used for the Project has not yet been made, the Applicant has evaluated the potential impacts of the full range of turbine sizes and numbers that are proposed for the Project. The differences in terms of environmental impacts of the various scenarios (i.e. the final selection of larger or smaller rotor diameter wind turbines within the range described above) are minimal for some elements of the environment and non-existent for other elements of the environment, as described below. Nevertheless, the impacts of the proposed scenarios are addressed in detail for elements of the environment in relevant sections within Chapter 3. Where applicable, these differences have been summarized in a table within relevant sections of Chapter 3.

Under the different design scenarios, there is no dimensional change to the length or width of the main Project components that constitute its footprint. The footprints of the roadways, substations, O&M facilities, rock quarries, underground and overhead lines, permanent met towers, batch plant, and rock crusher remain the same size and in the same locations under each scenario. These components comprise the vast majority of acreage impacted by the Project, and because they remain unchanged under all scenarios, the total acreage and construction quantities are the same under all scenarios. Regardless of the number of turbines, roadways have the same beginning and end points for each turbine string road. The footprint at each turbine pad location is slightly different in size for the different sizes of wind turbines. Large turbines 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 are slightly larger for larger turbines, there are fewer turbines for the large turbine scenario and the resulting overall resulting Project footprint is the same regardless of the turbine size as shown in Table 3.1.2-2. Construction impacts are also substantially similar under the different design scenarios. There is no significant change to peak and total earthmoving quantities, or to peak and total production volumes at the batch plant or rock crusher as described in Section 3.1.2.6, 'Comparison of Impacts of the Proposed Scenarios'.

Table 2.2.1-1 Project Scenario Summary

	Most Likely Scenario	**Large WTG Scenario**	**Small WTG Scenario**
Turbine Nameplate	1.5 MW	1 MW	3 MW
Number of WTGs	136	158	104
Project Nameplate	204 MW	158 MW	312 MW
Total Permanent Footprint Approx.	165 acres	165 acres	165 acres
Miles of Road Approx.	32 miles	32 miles	32 miles

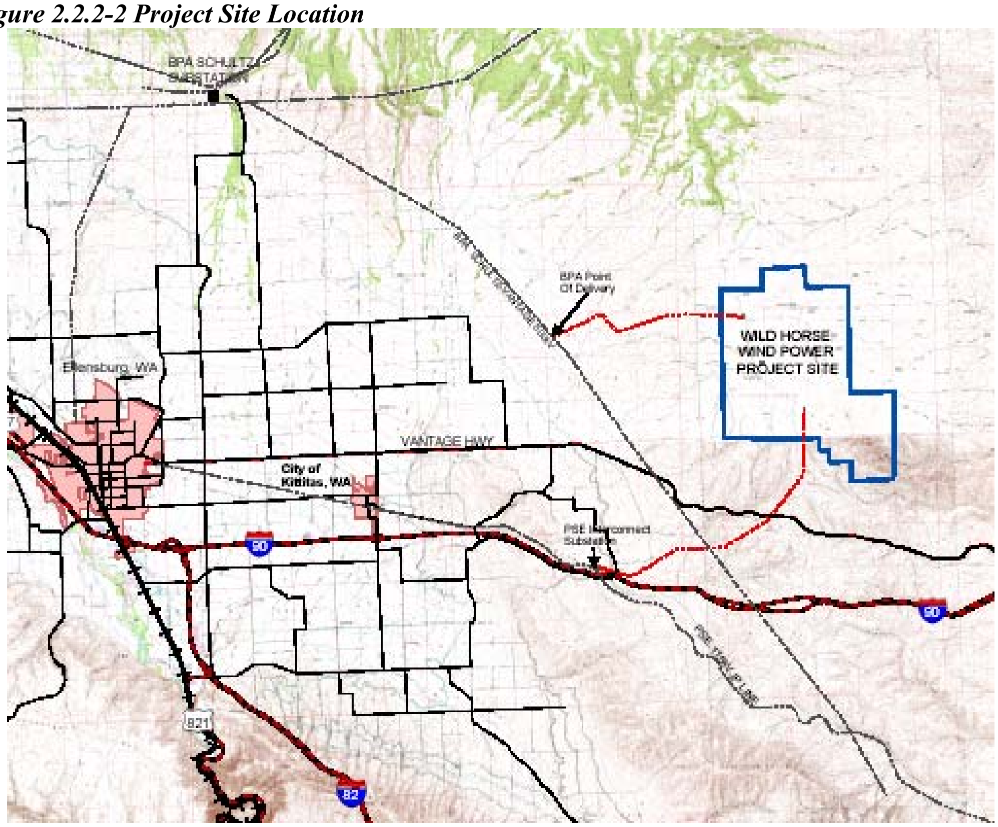
2.2.2 Project Location

Maps showing the locations of Kittitas County and the Project are presented in Figures 2.2.2-1 and 2.2.2.-2, respectively. Exhibit 1-A, 'Project Area Overview' also illustrates the Project site location. The Project will 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 area's strong westerly winds are compressed as they pass by Whiskey Dick Mountain at an elevation of 3,873 feet above mean sea level, and are further accelerated as they pass over the site's ridge tops. 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 itself and the

Figure 2.2.2-1: Location of Kittitas County, Washington

Columbia River located 10 miles to the east.

Figure 2.2.2-2 Project Site Location



2.2.2.1 Land Ownership

The Project will be located primarily on range land 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 in the process of 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. WDFW has authorized the Applicant to include this parcel of WDFW land in this Application, see Exhibit 30-C.

All proposed Project facilities are in areas currently zoned as Forest and Range, or Commercial Agriculture by Kittitas County as shown in Exhibit 17, 'Project Area Zoning Designation', which shows the current zoning for entire surrounding area. The site extends over an area of approximately 8,600 acres, while the overall site footprint is approximately 165 acres.

2.2.2.2 Proximity to Residences and Recreational Areas

Exhibits 1-B and 1-C, ‘Project Site Layout’ illustrate all of the key Project facilities on a topographic map and on an aerial photo map, respectively. Exhibit 15-A, ‘Residences In Project Vicinity’, illustrates the relative location of nearby residences to the Project and feeder lines. The nearest residence to the Project lies approximately 1 ¾ miles to the south near Vantage Highway. The nearest residence to the PSE feeder line is approximately ¼ mile distant, and the nearest residence to the BPA feeder line is approximately ½ mile from the line. Exhibit 22, ‘Recreational Areas Surrounding Project Site’, illustrates the local parks and recreational areas within 25 miles of the Project site.

2.2.2.3 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 3.10, ‘Land Use’.

2.2.3 Project Facilities

2.2.3.1 Roads and Civil Construction Work

Access to the Project site will be achieved via an existing private graveled access road which branches from Vantage Highway at a location approximately 11 miles east of the City of Kittitas. Project site roads are designed to allow for heavy equipment to be transported to the Project and will be used throughout the life of the Project to allow access to and from the wind turbines, substations and meteorological monitoring towers. Flat areas, approximately 30 ft. by 60 feet, will be cleared, compacted and graveled as necessary adjacent to each turbine location as a crane pad to facilitate the erection of the wind turbines and towers. Other graveled areas are parking areas near the Project operations and maintenance facility and at a visitor’s kiosk near the site entrance to Vantage Highway, as well as 3 equipment lay-down areas adjacent to the site roads. Three on-site rock quarries are planned to provide gravel for the Project. An on-site concrete batch plant is also planned to be located near the northwest end of the Project site. Exhibit 1-A, ‘Project Site Layout’ illustrates the location of the Project facilities. No Project facilities are to be built in or near any wetlands. All facilities will be set back sufficiently from any streams and wetlands to avoid impacts. Construction will not require the use of any heavy equipment in stream beds or riparian areas.

Project Site Roads

The road design has been prepared to minimize the overall disturbance footprint and avoid erosion risks. The Project site is currently crisscrossed with an extensive network of existing roads and, wherever practical, existing roads have been utilized to minimize new ground disturbance. As such, approximately 17 miles of new gravel roads will be constructed and approximately 15 miles of existing roads will be improved for the turbines.

Road Design

The road design will be finalized by an experienced and state licensed civil engineer based on the results of a detailed geotechnical investigation of the surface and subsurface conditions at the Project site. Specific portions of Washington Department of Transportation (WSDOT) standards for road construction and road rock specifications will be used as appropriate to provide a final road design that is adequate for safe and reliable Project construction and on-going operations. The access road and roads between turbine strings will generally consist of a 20 foot wide compacted graveled 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 will be 34 feet wide to accommodate for larger crane equipment to move between the individual turbine sites safely. In areas of steeper grades, a cut and fill design will be implemented to keep grades below 15% to facilitate access and help prevent erosion. Detailed topographic contour maps will be prepared as part of final detailed design prior to construction. The detailed contour maps will be used to clarify special cut and fill areas and to prepare a detailed storm water pollution plan (SWPP) and set of Best Management Practices (BMP) which will be implemented to prevent erosion both during construction and operations.

Figure 2.2.3.1-1 Typical Wind Power Project Gravel Road

On Site Rock Quarries

The amount of cut and fill and the amount of gravel required for road construction is approximately 230,000 cubic yards and is explained more thoroughly in Section 3.1, ‘Earth’. Due to the site’s remote location more than 20 miles from the nearest existing commercial rock quarry and the amount of gravel required for road construction the Project will have 3 on-site rock quarries dedicated to providing gravel for construction as indicated on the Project Site Layout in Exhibit 1-A. During construction, rock will be blasted from the quarries and crushed at a temporary on-site rock crushing facility. Each rock pit will have a footprint of approximately 5 acres and be 10-20 feet in depth. The rock pits will be rehabilitated in accordance with a formal plan approved by EFSEC in consultation with Washington DNR. More details regarding the on site rock pits and rock crushing facilities are contained in Sections 2.2.3.8 and 2.2.3.9, below.

Feeder Line Construction Trails

The Project transmission feeder line(s) will require the installation of a temporary construction trail. The construction trail will be a 12 foot wide swath which is cleared of large boulders to allow high clearance vehicles to pass. The trail will be installed to allow access to support the construction of the feeder lines. Once construction is complete, the trail will be used approximately every 6 months for inspection and maintenance. Native vegetation will be allowed to re-establish over the trails to the extent that 4-wheel-drive vehicle travel remains practical. The PSE feeder line will require approximately 8 miles and the BPA feeder line will require approximately 5 miles of new construction trails. Grading, and erosion control measures such as ditching and rock addition are not anticipated, but may be required at specific locations. No construction is planned in any wetlands. Construction techniques for the transmission feeder line(s) will not require the use of any heavy equipment in stream beds or riparian areas and all transmission poles and/or towers will be set back sufficiently from any streams to avoid impacts.

Figure 2.2.3.2-1 Spread Footing Type Foundation

2.2.3.2 Turbine Tower Foundations

The Project site provides solid subsurface conditions for the turbine foundations. A formal geotechnical investigation will be performed at each tower location prior to construction with a drill rig and ground-penetrating radar to analyze soil conditions and test for voids and homogeneous ground conditions. Depending on the results of the geotechnical investigation, either spread footing type foundation, or a vertical mono-pier foundation, as shown in Figures 2.2.3.2-1 and 2.2.3.2-2 respectively will be used.

Figure 2.2.3.2-2 Mono-Pier Type Foundation

The foundation design will be tailored to suit the soil and subsurface conditions at the various turbine sites. The foundation design will be certified by an experienced and qualified, state-registered structural engineer who has designed several generations of wind turbine towers and foundation systems that have proven themselves well in some of the most aggressive wind regions of the world.

Post tension (PT) rock anchors may be

implemented for the final design of the foundations. PT rock anchors are used frequently in dam, retaining wall, and bridge construction. The determination of whether or not PT anchors are suitable will depend largely on the results of the detailed geotechnical analysis and the design engineer's foundation analysis. The use of rock anchors could reduce the overall excavation size required for the foundations.

2.2.3.3 Wind Turbine Generators and Central Control System

Several wind turbine generators (WTGs) are under evaluation for the Project. Based on these evaluations, a number of wind turbine vendors have been pre-qualified to supply equipment for the Project. All turbines under consideration are well proven, commercially viable utility-scale units with a minimum design life of 20 years under extreme high wind and high turbulence conditions. Over the past two decades, wind turbine manufacturers have rapidly advanced the development of new technology, resulting in the release of newer, larger wind turbines roughly every 2 years. Typically, new turbines are released as variations of earlier models with small increments in size. The current generations of modern wind turbines are in the size range that has been studied for this Application, with a nameplate capacity of 1 to 3 MW and with rotor diameters ranging from 60 to 90 meters. Before a new turbine is released for serial production, prototype units are tested for approximately 2 years. As such, the Project would only use well proven WTGs which have been through at least a 2 year testing period. The typical lead time for procurement of WTGs ranges from 5 to 8 months, and all WTGs under consideration for the Project are now commercially available. Specific model availability will depend on conditions at the manufacturer's production facility at the time a WTG order is placed.

Equipment Selection
A very rigorous approach has been taken in an effort to pre-qualify all key equipment suppliers for the Project, especially the wind turbines. Only equipment that has been proven as utility grade with the an emphasis on safety, reliability and competitive pricing will be utilized. This results in a Project that delivers energy safely and reliably at the most competitive cost possible over the long haul.

Wind Turbine Type Certification
European manufacturers have been required, for many years, to meet rigid standards verifying their design criteria, operational characteristics, supervision of construction, transportation, erection, commissioning, testing and servicing. In Europe, Germanischer Lloyd (GL), Det Norske Veritas (DNV), Wind Test GmbH, and Risø (Denmark) are independent testing laboratories, which administer regulations for the design, approval, and certification of wind energy conversion systems. There are no well-established testing agencies in the US that offer the amount of experience, scrutiny and know-how as the European agencies. For this reason, the Project will implement turbine technology that, as a minimum, complies with the European standards.

The testing processes involved in the approval of design documentation include safety and control system concepts, static and dynamic load assumptions, and associated load case definitions. Once approved, specific components, such as blades, drive trains (hubs, gearing, bearings and generators etc.) safety systems, towers, yaw systems, foundations, electrical installations, will be reviewed and approved according to minimum standards established by these testing agencies. In addition to operating characteristics and design features, the testing agencies review construction supervision procedures, including materials testing, QA reports and procedures, corrosion protection, and others. They also review and set standards for supervision during the transportation, erection and commissioning of the turbines.

Operational testing performed by the agencies includes measurement of power curves, noise emissions, as well as loads and stresses including wind loads imposed on the tower, foundation, drive train, blades, nacelle frame, power quality, etc. Test data are evaluated for plausibility, and compared with the original calculations and mathematical models used for the design.

Neither Germanischer Lloyd, WindTest, Risø, nor DNV will issue its certification unless the turbine design has met minimum design standards and performance levels, both calculated and measured. The approval process also applies to the manufacturers' processes and procedures through ISO 9001.

Due to this arduous approval process, wind turbines designed to European standards have proven to be the most reliable wind energy systems over the past two decades. In Europe, certification pursuant to these standards is mandatory for both permitting and financing. Partly due to these verification programs, lenders in Europe view wind energy equipment in the same way lenders in the United States might view the purchase of heavy construction equipment.

The Project will implement only turbines that have achieved type certification by a reputable and experienced third party verification institute such as DNV, GL, Risø, or WindTest and demonstrate a design life of at least 20 years.

Wind Turbine Basic Configuration
Wind Turbines consist of 3 main physical components that are assembled and erected during construction: the tower, the nacelle (machine house) and the rotor (3-blades).

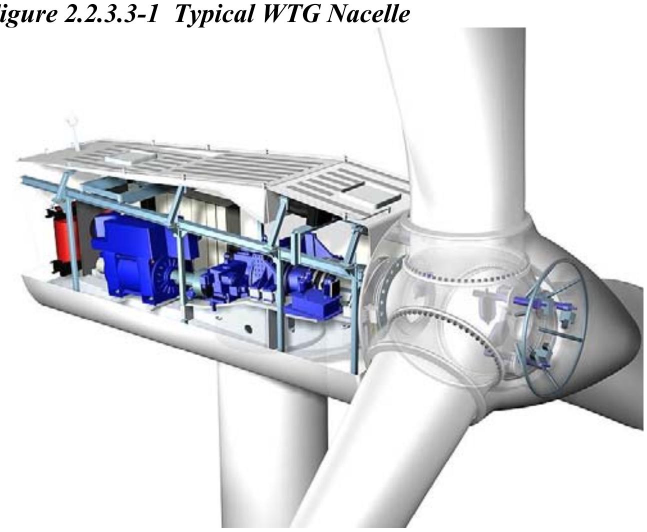
Tower
The WTG tower is a tubular conical steel structure that is manufactured in multiple sections depending on the tower height. Towers for the Project will be fabricated, delivered and erected in 2 or 3 sections each. A service platform at the top of each section allows for access to the tower connecting bolts for routine inspection. An internal ladder runs to the top platform of the tower just below the nacelle. A nacelle ladder extends from the machine bed to the tower top platform allowing nacelle access independent of its orientation. The tower is equipped with interior lighting and a safety glide cable alongside the ladder.

The tower design is certified by experienced and qualified structural engineers who have designed several generations of turbine towers that have proven themselves well in some of the most aggressive wind regions of the world. The towers and foundations are designed for a survival gust wind speed of 90+ mph with the blades pitched in their most vulnerable position. For the cold-weather winter conditions on the Project site, special material specifications are set to ensure that materials do not go below the brittle transition temperature.

Nacelle

Figure 2.2.3.3-1 shows the general arrangement of a typical nacelle that houses the main mechanical components of the WTG. 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.

Figure 2.2.3.3-1 Typical WTG Nacelle



The main components inside the nacelle are the drive train, a gearbox and the generator. On some turbines, the step-up transformer is situated at the rear of the nacelle that eliminates the need for a pad-mounted transformer at the base of the tower.

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. The shell is designed to allow for adequate ventilation to cool internal machinery such as the gearbox and generator.

Drive Train

The rotor blades are all bolted to a central hub. The hub is bolted to the main shaft on a large flange at the front of the nacelle. The main shaft is independently supported by the main bearing at the front of the nacelle. The rotor transmits torque to the main shaft that is coupled to the gearbox. The gearbox increases the rotational speed of the high speed shaft that drives the generator at 1200-1800 RPM to provide electrical power at 60 Hertz (Hz).

Figure 2.2.3.3-2 Rotor Assembly

Rotor Blades

The modern WTGs 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 2.2.3.3-2 illustrates the rotor hub, spinner nose cone and rotor blade assembly on the ground prior to erection. The rotor blades turn quite slowly; typically less than 20 RPM, resulting in a graceful appearance during operation. The rotor blades are typically made from a glass-reinforced polyester composite similar to that used in the marine industry for sophisticated racing hulls. Much of the design and materials experience comes from both the marine and aerospace industries and has been developed and tuned for wind turbines over the past 25 years. The blades are non-metallic, but are equipped with a sophisticated lightning suppression system that is defined in detail below in Section 2.2.3.6, 'Project Grounding System'.

Turbine Control Systems

Wind turbines are equipped with sophisticated computer control systems which are constantly monitoring 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 include nacelle operations as well as power operations. Generally, nacelle functions include yawing the nacelle into the wind, pitching the blades, and applying the brakes if necessary. Power operations controlled at the bus cabinet inside the base of the tower include operations of the main breakers to engage the generator with the grid as well as control of ancillary breakers and systems. The control system is always running and ensures that the machines are operating efficiently and safely.

Heat Dissipation

Cooling to the operating machinery inside the wind turbines, such as the generator and gearbox, is achieved with air cooling. Heat dissipation is very minimal and does not generate adverse impacts. The proposed facility uses wind as its source of energy production and not thermal energy, therefore water sources are not used in the process of heat dissipation. In light of these facts, pursuant to WAC 463-42-115, the Applicant requests a waiver of the information required by WAC 463-42-175, which calls for a description of the heat dissipation systems.

Central SCADA System

Each turbine is connected to a central Supervisory Control and Data Acquisition (SCADA) System as shown schematically in Figure 2.2.3.3-3 through a network of underground fiber optic cable or copper signal wire. In order to prevent stray surges, if copper signal wire is used, the interfaces to the wind turbine and other signal processors are all optically isolated. The SCADA system allows 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. In the event of faults, the SCADA system can also send signals to a fax, pager or cell phone to alert operations staff.

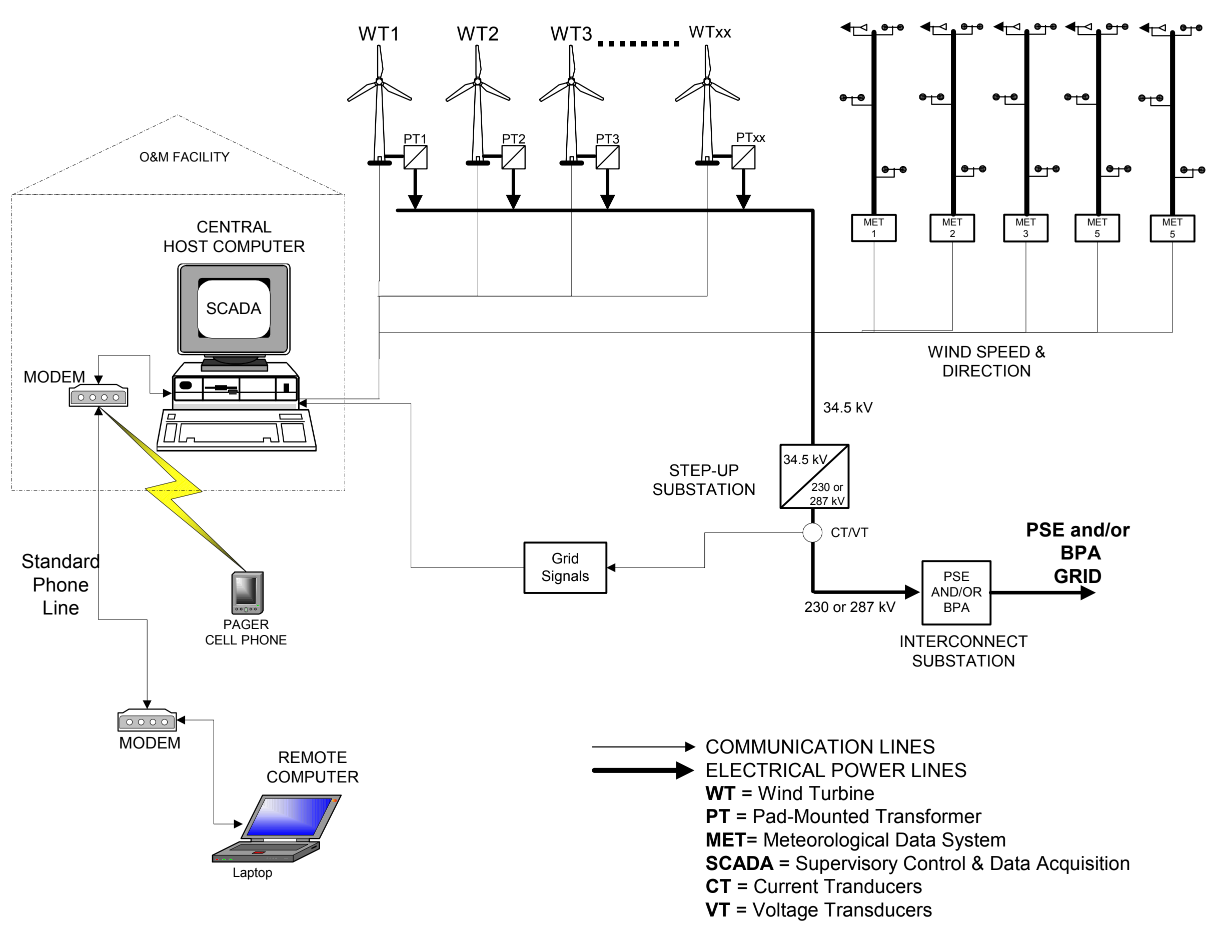
Safety Systems

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.

Braking Systems

The turbines are equipped with two fully independent braking systems that can stop the rotor either acting together or independently. The braking system is designed to be fail-safe, allowing the rotor to be brought to a halt under all foreseeable conditions. The system consists of aerodynamic braking by the rotor blades and by a separate hydraulic disc brake system. Both braking systems operate independently such that if there is a fault with one, the other can still bring the turbine to a halt. Brake pads on the disc brake system are spring loaded against the disc and power is required keep the pads away from the disc. If power is lost, the brakes will be mechanically activated immediately. The aerodynamic braking system is also configured such that if power is lost, it will be activated immediately using back-up battery power or the nitrogen accumulators on the hydraulic system, depending on the turbine's design.

Figure 2.2.3.3-3 Electrical and Central Control System



After an emergency stop is executed, remote restarting is not possible. The turbine must be inspected in-person and the stop-fault must be reset manually before automatic operation will be re-activated.

The turbines are also equipped with a parking brake that is generally used to “park” the rotor while maintenance routines or inspections that require a stationary rotor are performed.

<u>*Climbing Safety*</u>

Normal access to the nacelle is accomplished with a ladder inside the tower. Standard tower hardware includes equipment for safe ladder climbing including lanyards and safety belts for service personnel. All internal ladders and maintenance areas inside the tower and nacelle are equipped with safety provisions for securing lifelines and safety belts and conform to or exceed ANSI 14.3-1974 (Safety Requirements for Ladders). During operations of the Project, maintenance staff always work in pairs inside the wind turbines as part of standard safety practice.

<u>*Turbine Design Life*</u>

The Project will utilize proven utility grade equipment with a minimum design life of 20 years. The most vulnerable equipment are the wear and tear components of the wind turbines. The Project will utilize only well-proven designs that have been approved by reputable third party testing agencies. Modern wind turbines of the type being proposed for the Project have been developed over the past 25 years and have been proven over several generations of equipment. The basic configuration of the 3-bladed up-wind turbine is the best proven and understood turbine configuration available in the industry and the vast majority of all new wind power generation facilities planned, or under construction, in the world utilizes this technology. The wind turbine technology used for the design of the Project has proven to be very reliable, efficient, and lower in electrical energy production cost than other commercially available wind power technologies.

Over the past 25-30 years, more than 56,000 wind turbines have been installed around the world for an installed nameplate capacity of about 34,000 MW. More than 18,000 wind turbines (about 5,000 MW) are installed in the USA and there are more than 380 units (283 MW) of wind turbines currently operating in the state of Washington, near Walla Walla and Kennewick.

Figure 2.2.3.4-1 Typical Pad Mount Transformer (shown during construction before terminations landed)

2.2.3.4 Electrical Collection System Infrastructure

<u>*Electrical Collection System Overview*</u>

Electrical power generated by the

wind turbines is transformed and collected through a network of underground and overhead cables which all terminate at the Project step-up substation. It is most likely that only one substation will be constructed for the Project, however, it is possible that two substations will be installed allowing access to both the BPA and Puget Sound Energy (PSE) systems. The Project Site Layout in Exhibit 1-B shows the general routing paths of the underground and overhead electrical lines as well as the proposed step-up substation locations. Figure 2.2.3.3-3 illustrates the overall electrical collection system schematically.

Turbine Drop Cables

Power from the wind turbines will 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 connect to the generator terminals in the nacelle and pass from the nacelle into the tower where they drop down to a cable support saddle located about 20-40 feet below the top tower platform. From the support saddle, the cables are trained along the side of the tower or along the internal ladder in cable trays or they are hung straight down to the base bus cabinet and breaker panel inside the base of the tower. As the cables are of a special design, and are flexible, the length of cable from the nacelle to the cable support saddle allows the nacelle to freely rotate without damaging the cables. There is sufficient slack on the cable to allow the nacelle to rotate several times. There are also independent over-twist prevention systems and sensors in the wind turbine generator to prevent cable-over-twist.

Figure 2.2.3.4-2 Typical Underground Cable Trench

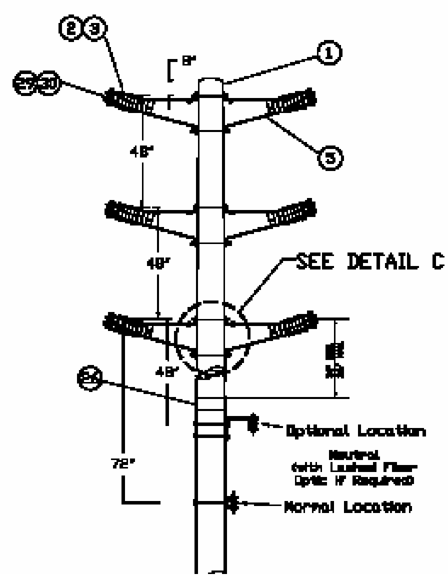
The drop cables are terminated inside the bus cabinet. Another set of cables run from the bus cabinet through conduits in the foundation to the pad transformer which steps the voltage up to 34.5 kilovolts (kV). Some wind turbine generators, such as the Vestas V-80 and V90, have the step-up transformer in the machine house at the top of the tower called the nacelle. For the V80 and V90, the drop cables would be at 34.5kV, the base bus cabinet would be a switchgear breaker panel and no outdoor pad transformer at the tower base would be required.

Pad Transformers and UG Cable

The pad transformers are 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 as shown in Figure 2.2.3.4-2. Alongside the electrical cables will be buried a fiber optic or copper communication line which will tie all of the turbines back to the central control computer as illustrated in Figure 2.2.3.3-3. Due to the rocky conditions at the site, a clean fill material such as sand or fine gravel will be used to cover the cable before the native soil and rock are backfilled over the top.

Figure 2.2.3.4-1 shows a typical pad-mount transformer used at each wind turbine. The pad transformers are generally a loop feed, dead front configuration with bayonet and current limiting fuse systems for protection and safety. Each transformer will be sized to carry its respective load without exceeding a 55 °C temperature rise. The step-up transformer impedance will be optimized based on the facility power output requirements, and feeder circuit breaker interrupting ratings and internal fuses. Protection to the transformer and turbine generator is provided by a switchable breaker at the turbine bus cabinet electrical panel inside the turbine tower.

Figure 2.2.3.4-3 Collection System Overhead Line - Pole Structure



The underground collection cables feed to larger feeder lines that run to the step-up substation(s) as shown schematically in Figure 2.2.3.3-3. At the substation(s), the electrical power from the entire wind plant is stepped up to transmission level at 230 kV or 287 kV (for BPA) and delivered to the point(s) of interconnection.

<u>Collection System Overhead Line</u>

For the short run of overhead collection 34.5 kV power line on the north side of Whiskey Dick Mountain, a dual circuit single pole structure system will is anticipated to be used approximately 60 feet tall as shown in Figure 2.2.3.4-3, a fused, switch-riser pole will be used to run the cables from the underground trench to the overhead conductors.

<u>Junction Boxes and Switch Panels</u>

In locations where two or more sets of underground lines converge, pad mounted junction boxes and/or pad mounted switch panels will be utilized to tie the 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 will be required for the electrical collection system. Both the junction boxes and switch panels look very similar to the pad transformer shown in Figure 2.2.3.4-1 and the anticipated locations of the pad-switches and/or junction boxes are indicated on the Project Site Layout in Exhibit 1-B.

The junction boxes are either steel clad or fiberglass panels with dimensions of roughly 4 feet wide by 6 feet long by 6 feet high, mounted on pad foundations. The pad foundation also has an underground vault about 3 feet deep where the underground cables come in. The junction boxes will also have a buried grounding ring with grounding rods tied to the collection system and a common neutral.

The switch panels are steel clad enclosures, mounted on pad foundations with dimensions of roughly 7 feet wide by 7 feet long by 5 feet high. The switches allow for the de-energization or isolation of particular collector lines and strings of turbines. This isolation allows for maintenance and repair of the collection system as needed without de-energizing the entire Project. The switch panels also have an underground vault about 3 feet deep where the underground cables come in. The switch panels will also have a buried grounding ring with grounding rods tied to the collection system and a common neutral.

The Project will 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).

Operations and Maintenance (O&M) Facility
An O&M facility is planned near the center of the Project site out of sight from Vantage Highway as indicated on the Project Site Layout in Exhibit 1-B. The O&M facility will 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 will have a foundation footprint of approximately 50 ft. by 100 ft. The O&M facility area will be leveled and graded and will serve as a central base. The overall O&M facility area will have a footprint of approximately 2 acres. The final design and architecture of the O&M facility will comply with all required building standards and codes and be determined prior to its construction.

Water Storage Tanks and Septic System
The O&M Facility will include 1 to 2 on-site storage tanks approximately 5,000 gallons in size suitable for potable water to supply the building for domestic use. The O&M building will also have a septic tank.

Figure 2.2.3.5-1 Aerial View of Existing BPA Schultz Substation

2.2.3.5 Interconnection Facilities and Substations

Proximity to Transmission Access
The Applicant has reviewed and evaluated multiple prospective wind energy sites in various areas of the Pacific Northwest. The site for the Wild Horse Wind Power Project was chosen for several reasons including its strong wind resource, compatible land uses and access to suitable transmission lines.

There are several sets of large sized high voltage power lines within 8 miles of the Project site including 2 sets of Bonneville Power Administration (BPA) transmission lines and 1 set of Puget Sound Energy (PSE) transmission lines.

The Project offers excellent interconnection possibilities with both Bonneville Power Administration (BPA) and Puget Sound Energy (PSE) lines. If connected to BPA's system, the Project will 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 will interconnect with PSE's Inter-Mountain Power line (IP line) at 230 kV.

The Project substation and transmission facilities will consist of 1 or 2 step-up substations (indicated as the BPA and PSE step-up substations on the Site Layout in Exhibit 1-B), the PSE and BPA interconnection substations, and 1 to 2 feeder lines running from the step-up substation(s) to the interconnection substation(s). There is the possibility that power will be fed to both the BPA and the PSE systems resulting in the requirement for 2 step-up substations, 2 interconnection substations and 2 separate feeder lines.

The step-up substations are located on the Project site whereas the interconnection substations are located close to the existing BPA and PSE power lines respectively where interconnection takes place. 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 Exhibits 1-A and 1-B. Ownership and operation of both the BPA and PSE feeder lines as shown in Exhibits 1-A and 1-B are anticipated to remain under the Project.

BPA Interconnection

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. If connecting to the BPA system, BPA will 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 document and reviewed by the public and interested agencies under a joint NEPA/SEPA process. The Project's viability does not depend on the interconnection with BPA since interconnection can also be achieved with the PSE system.

Step-Up Substations

The main function of the step-up substation is 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 basic elements of the step-up substation facilities are a control house, a bank of 1 or 2 main transformers, outdoor breakers, capacitor banks, relaying equipment, high voltage bus work, steel support structures, an underground grounding grid and overhead lightning suppression conductors. All of the main outdoor electrical equipment and control house will be installed on concrete foundations that are designed for the soil conditions at the substation sites. The exact footprint of the substations will depend largely on the utility requirements, the number of turbines used and the resulting Project nameplate capacity which will 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.

Figure 2.2.3.5-2 Typical Step-Up Substation

The substation(s) will have one or two transformers which need to be filled with mineral oil on site, as they are delivered without oil in the tank. As part of the commissioning process of the main transformer(s), they will be filled and tested. The substation design will 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 will be poured as part of the transformer concrete foundation, be set as a bentonite base, or will consist of a heavy oil resistant membrane buried around the perimeter of the transformer foundation. The trough and/or membrane will drain into a common collection sump area equipped with a sump pump designed to pump rain water out of the trough to the surrounding area away from any natural drainages. In order to prevent the sump from pumping oil out to the surrounding area, it will be fitted with an oil detection shut-off sensor which will shut off the sump when oil is detected. A fail-safe system with redundancy is built to the sump controls since the transformers are also equipped with oil level sensors. If the oil level inside a transformer drops due to a leak in the transformer tank, it will also shut off the sump pump system to prevent it from pumping oil and an alarm will be activated at the substation and at the main wind project control (SCADA) system.

Interconnection Substations

The main function of the interconnection substation is to mechanically terminate the Project feeder lines to the utility grid and to provide fault protection. The basic elements of the interconnection substation facilities are a main outdoor control cabinet, outdoor breakers, capacitor banks, relaying equipment, high voltage bus work, steel support structures, an underground grounding grid and overhead lightning suppression conductors. All of the main outdoor electrical equipment and control house will be installed on concrete foundations that are designed for the soil conditions at the substation sites. The exact footprint of the substations will 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) will be very similar to the step-up substation(s) without the transformers, but with more steel poles structures and more high voltage switch breakers.

A typical one-line diagram showing both the interconnection and step-up substation(s) which would be used as a preliminary outline for the Project is included in Exhibit 2. Final adjustments to the substation and interconnect are generally made during design review with the interconnecting utility and their system protection engineers to accommodate for conditions on the grid at the time of construction.

The plant electrical system will be designed and constructed in accordance with the guidelines of the National Electric Code (NEC), National Fire Protection Agency (NFPA) and utility requirements. 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 in Section 2.2.6, 'Project Construction Schedule and Work Force'.

Transmission System Impact Studies (SIS)

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

Stand-By Power Consumption

The Project will generate power output approximately 80% of the time and will consume a small amount of power from the grid during periods of low wind. Unlike traditional power plants, the Project does not consume a large amount of power for start-up. Each wind turbine comes on line at random depending upon the local wind speed at each turbine location and power consumption is generally that used for the auxiliary systems at each turbine. 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 will consume less than 1% of what it generates to support auxiliary systems with stand-by power.

Substation Transformers

The Substation is designed to work with either one or two main transformers. The step-up transformer impedances will be optimized based on the facility power output requirements and the protection requirements set forth by the utility to match the circuit breaker interrupting ratings. The transformers will be liquid-type with cooling fins and fans. Each transformer will be sized to carry its respective load without exceeding a 55 °C temperature rise. The quantity of mineral oil in each transformer is included in Section 3.16, 'Health and Safety - Spill Prevention Plan and Control'.

Capacitor Banks and Power Factor/Voltage Control
Capacitor banks will be installed at each wind turbine in a bus cabinet inside the base of each tower as well as in a central bank at the substation. The capacitor banks at the substation will be sized and configured depending on the utility's requirements and needs for switching and control. Generally, a remote terminal unit (RTU) is installed which allows the utility to switch banks on or off depending the requirements at their systems operations center. Capacitor banks have been included in the one-line diagram in Exhibit 2. The System Impact Study and Facility Impact Study work together with applicable IEEE standards will identify all provisions that will be required to maintain voltage stability and adequate system protection of the utility grid.

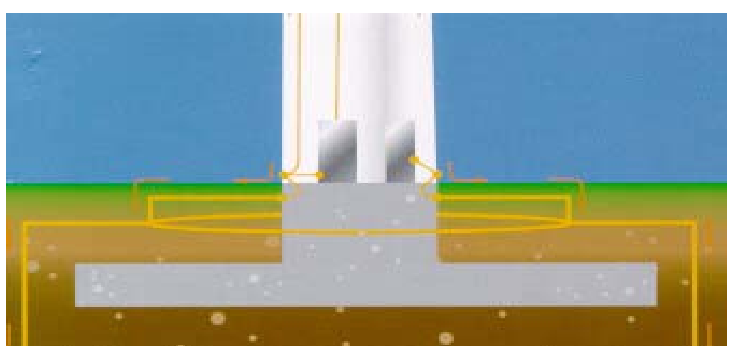
Protective Relaying
The substation central relay control cabinet generally houses all of the protective relaying devices. Protective relays are used for switchyard control, indication, metering, recording, instrumentation and annunciation. The relays provide protection of both the utility's and the wind plant's electrical systems by automatically detecting and acting to isolate faulted, or overloaded, equipment and lines. This protection will help to minimize equipment damage and limit the extent of associated system outages in the event of electrical faults, lightning strikes, etc.

Lighting
The substation will 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 3.11, 'Visual Resources - Light and Glare', for additional details.

2.2.3.6 Project Grounding System

The Project has an extensive grounding system. In order to achieve a strong level of grounding, a number of provisions are engineered into the Project's grounding system and the electrical system design.

Figure 2.2.3.6-1 Turbine Earthing System at Tower Base



Each turbine has a buried grounding ring of bare copper around the outer perimeter of the tower with 4 grounding rods, which is connected to the tower base and also to an additional grounding ring with 1-2 grounding rods which is buried around the base of the adjacent pad transformer. The pad transformers are generally a grounded "Wye" type unit. The neutral of each pad transformer is connected to the grounding rings and also to the grounding system of the wind turbine. If the soil is too rocky for the grounding rods, a hole is drilled, the rod is placed in the hole and it is filled with a designated bentonite mix to ensure a surrounding ground contact. The grounding system is measured and must have a maximum resistance of 10 Ohms.

Turbine Lightning Protection and Grounding System

The WTGs are equipped with an engineered lightning protection system that connects the blades, nacelle, and tower to the earthing system at the base of the tower.

As above the wind vane and anemometer at the rear of the nacelle. Both the rear lightning rod and blades have conductive paths to the nacelle bed frame that in turn connects to the tower. The tower base is connected to the earthing system at diametrically opposed points. Figures 2.2.3.6-1 and 2.2.3.6-2 show the general arrangement of the earthing system with respect to the tower and foundation.

Figure 2.2.3.6-2 WTG Lightning Diversion Paths

The earthing system consists of a copper ring conductor connected to earthing rods driven down into the ground at diametrically opposed points outside of the foundation. The earthing system, with a resistance of less than 10 Ohms, provides a firm grounding path to divert harmful stray surge voltages away from the turbine.

The controllers and communication interfaces to the wind farm central control system are through fiber optic cables and optical signal conversion systems protecting these systems from stray surges.

Underground Collection System Grounding

The underground 34.5 kV cables will have a concentric neutral conductor shielding or will be buried with a bare copper wire in the trench to act as the neutral. The neutrals on the cable runs are terminated to the ground terminal at each pad transformer and, pursuant to National Electric Code (NEC) requirements, are tied to buried grounding rods at every ¼ mile. Additionally, at the junction boxes, pad switches and at the substation, the underground cable neutrals are tied to the common grounding system. In effect, the grounding system ties the tips of the blades of each turbine back to an extensive grounding network all the way back to the substation grounding grid. The detailed geotechnical investigation performed prior to final design will include testing to measure the soil's electrical and insulative properties to ensure that the grounding system and electrical design is adequate.

Substation Grounding System

The electrical system is susceptible to ground faults, lightning and switching surges that may result in high voltage which can constitute a hazard to site personnel and electrical equipment, including protective relaying equipment. The substation will be designed and constructed to have a robust grounding grid which will divert stray surges and faults. Generally, the substation grounding grid consists of heavy gauge bare copper conductor buried in a grid fashion and welded to a series of multiple underground grounding rods. Direct lightning strike protection will be provided by the use of overhead shield wires and lightning masts connected to tops of the steel dead-end structure poles which run to the switchyard ground grid. Overhead shield wires will be high strength steel wires arranged to provide shield zones of protection.

2.2.3.7 Meteorological Monitoring Station Towers

The Project design includes five permanent meteorological (met) towers that are fitted with multiple sensors to track and monitor wind speed and direction and temperatures. The met towers will be connected to the wind plant's central SCADA system as shown in Figure 2.2.3.3-3. The permanent towers will consist of a central lattice structure supported by 3 to 4 sets of guy wires and will be as tall as the hub height (HH) of the WTGs as shown in Figure 2.2.1-1 which is 46-80 meters (151-262 ft.).

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

Figure 2.3.7-1 Met Tower

2.2.3.8 Rock Quarries and Rock Crushing Facilities

Site Proximity to Existing Gravel and Concrete Sources

Due to the relatively large amounts of gravel and concrete required for the Project and the remote location of the Project site away from any existing rock quarries or concrete batch plants, three temporary rock quarries and one temporary concrete batch plant will be established on the Project site during construction. The use of existing off-site rock pits and concrete mixing plants 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 are planned for the Project. Each rock quarry will have a disturbance footprint of approximately 5 acres and the depth will 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. Applicant anticipates that all three temporary on-site quarries could be operational concurrently depending on the material requirements of each construction phase.

Each quarry location is indicated on the Project Site Layout in Exhibit 1-B. Preliminary geotechnical analyses from 15 test pits throughout the site indicate that excavating equipment will likely encounter a very hard (R5) basalt layer at a depth between 1-3 feet. Following blasting to fracture and loosen the basalt, rock will be transported to the rock crusher. The majority of the crushed rock will 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 will be conducted under the auspices of professionally trained and certified explosives experts and will 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" in Section 2.2.5.3 'Site Preparation and Road Construction', for more details about explosives work on-site.

A reclamation plan for the proposed rock quarries will be submitted to EFSEC for review and approval prior to construction and will 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 is contained in Section 3.1.4, 'Earth – Mitigation Measures'.

Portable Rock Crusher
The primary construction-related portable equipment required for the Project is the rock crusher to create road construction material and a concrete batch plant for mixing cement. The rock crusher will be located at one of the three on-site quarry pits for the duration of the construction period and will have an average capacity of approximately 20,000 tons per day and a peak capacity of 30,000 tons per day. The crusher will operate during Project construction hours, 5 to 6 days per week during daylight hours for approximately 2 to 3 months during construction. The crusher will be located in an area approximately 500' by 500' in size, surrounded by a 1' high earth berm to contain water runoff. This area will be sprayed by a water truck several times each day for dust suppression. The crusher contains several dust-suppression features including screens and water-spray. Effective dust-control measures will be operating at all emission points during operation, including start-up and shut-down periods. During periods of sustained high winds contractors will shut down operation of the rock crusher if reduced visibility poses a safety hazard. At no point will emissions exceed the 20% opacity for three minutes in any single hour, which is the state maximum threshold. Exhibit 7 contains a Temporary

Air Quality Department of Ecology permit application for the type of rock crushing equipment anticipated for the Project. More details regarding dust suppression are contained in Section 3.2, 'Air Quality'.

The crusher will be provided by a local supplier and will require a stand-alone 40-60 kW generator unit that will draw fuel from a fuel storage tank approximately 1,000 gallons in size cradled in a containment seat. The crusher will consume approximately 30,000 to 50,000 gallons of water per day, drawn from a 20,000 gallon adjacent water storage tank that will be replenished 2 to 3 times daily. The average rate of water usage for the rock crusher is approximately 60-80 gallons per minute and the peak rate will be up to 125 gallons per minute. The equipment will be a licensed system with a current WA Department of Ecology (DOE) Temporary Air Quality permit, similar to that contained in Exhibit 7.

2.2.3.9 Concrete Batch Plant

The cement batch plant will be located on-site at a central location within an area approximately 500' by 500' in size, surrounded by a 1' high earth berm to contain water runoff. It will have a daily production capacity of approximately 600 cubic yards per day and will 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 will be provided by a local supplier and will require a stand-alone generator unit approximately 250 kW in size that will draw fuel from a self-contained, fail-safe storage tank of approximately 1,000 gallons. The batch plant will consume approximately 20,000 to 40,000 gallons of water per day, drawn from a 20,000 gallon adjacent water storage tank that will be replenished as needed. The batch plant will also carry an operating permit from the WA DOE.

The batch plant will utilize outdoor stockpiles of sand and aggregate. These stockpiles will be located to minimize exposure to wind. Cement will be discharged via screw conveyor directly into an elevated storage silo without outdoor storage. Construction managers will exercise good housekeeping practices and conduct regular cleanings of the plant, storage and stockpile areas to minimize buildup of fine materials.

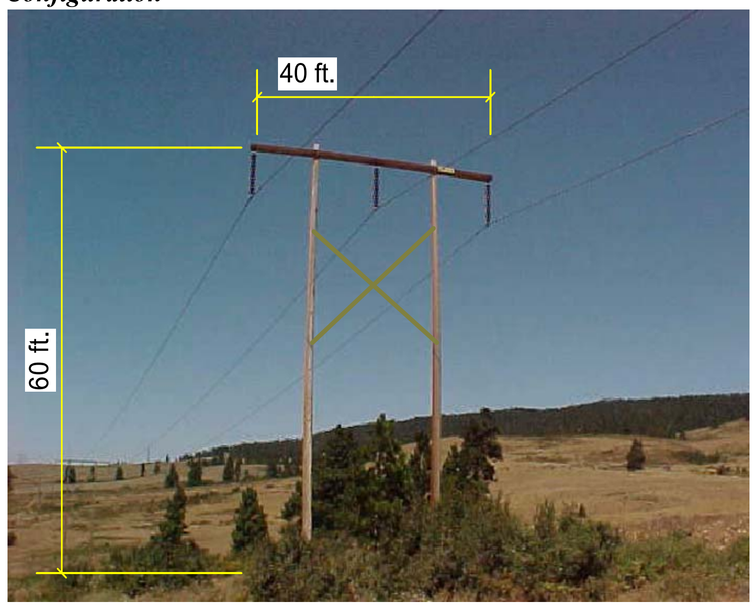
Following completion of construction activities the Applicant's contractor will rehabilitate the sites by dragging the top of both of the 500' x 500' crushing and batch plant areas with a blade machine and re-seeding the area with a designated mixture of native grasses.

2.2.3.10 Project Transmission Feeder Lines

Power from the Project will be fed from the on-site step-up substation(s) through a feeder line(s) to the interconnection substation(s). The feeder line(s) will 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. Figure 2.2.3.10-1 shows the typical pole line configuration anticipated for the feeder line(s). The line design will 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) will be constructed along a 150 foot wide right of way easement secured for the Project. The schedule and plan for construction of the feeder line(s) is described in detail in Section 2.2.5, 'Construction Methodology'.

Figure 2.2.3.10-1 Typical Wood Pole H-Frame Feeder Line Configuration



<u>*Project Feeder Line to PSE*</u>

For interconnection with PSE, the Project feeder line will run south from the on-site PSE step-up substation to the PSE interconnect substation and will 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 are required, one over Vantage Highway and one over Stevens Road Exhibit 1-B, 'Project Site Layout'.

<u>*Project Feeder Line to BPA*</u>

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 Exhibit 1-B, Project Site Layout'. If connecting 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 its existing Schultz substation as well as a new 230 or 287 kV line between the BPA POI and BPA POD which are not subject to EFSEC's jurisdiction. 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 document and reviewed by the public and interested agencies under a joint NEPA/SEPA process. The Project's viability does not depend on the interconnection with BPA since interconnection can also be achieved with the PSE system.

2.2.4 Design Criteria for Protection From Natural Hazards

Introduction
The Project design has been prepared to handle all natural hazards that could reasonably be expected at the site including wind, rain (heavy erosion), snow, ice and lightning storms, wild fires, and geologic hazards, such as seismic hazards (earthquakes), volcanic eruptions, and landslides. Tsunamis are not considered hazards to the site because of the Projects' high elevation on ridgelines and large distance to the nearest ocean. Because Project facilities would be located significantly outside the floodplain of the Columbia River (the closest road or turbine location to the Columbia River is more than 10 miles and 2,400 feet in elevation above the level of the river) and other water bodies, the risk of flood impacts is insignificant and is therefore not discussed here.

The following section describes the types of potential natural hazards that could occur in the area, the probability of the event occurring at the Project site, and special design measures used to protect the Project from the hazard.

2.2.4.1 Storm Design

Wind Storms
Extreme gust wind speeds have been measured and calculated for Ellensburg in a report prepared by Wantz and Sinclair 1981, J. Appl. Meteor., 20, 1044-1411, which indicates that the 100 year expected peak gust is 73 mph which is at hurricane level. The design case for all facility equipment, specifically the turbines and towers, are designed to withstand wind loads far in excess of this gust level. The tower design is certified by experienced and qualified structural engineers who have designed several generations of turbine towers that have proven themselves well in some of the most aggressive wind regions of the world. The towers and foundations are designed for a survival gust wind speed of 90+ mph with the blades pitched in their most vulnerable position.

Ice and Snow Storms
Ice storms are a relatively rare event at the Project Site (approximately 4-5 days per year as indicated by Nierenberg, 2003 in Exhibit 27). Overhead collector lines, transmission feeder lines and the wind turbine and met tower anemometers and wind vanes are the only elements of the Project facilities which are susceptible to ice loading.

Overhead power lines are designed to met the recommended loads by National Electric Safety Code (NESC). Section 25 of the NESC provides general wind and ice loading maps and methods for determining the resulting design loads on structures and conductors. These methods closely follow the American Society of Civil Engineers (ASCE) Manual 7. Local experience will also guide the designers to determine the maximum wind and the maximum ice loading that might be anticipated in this area.

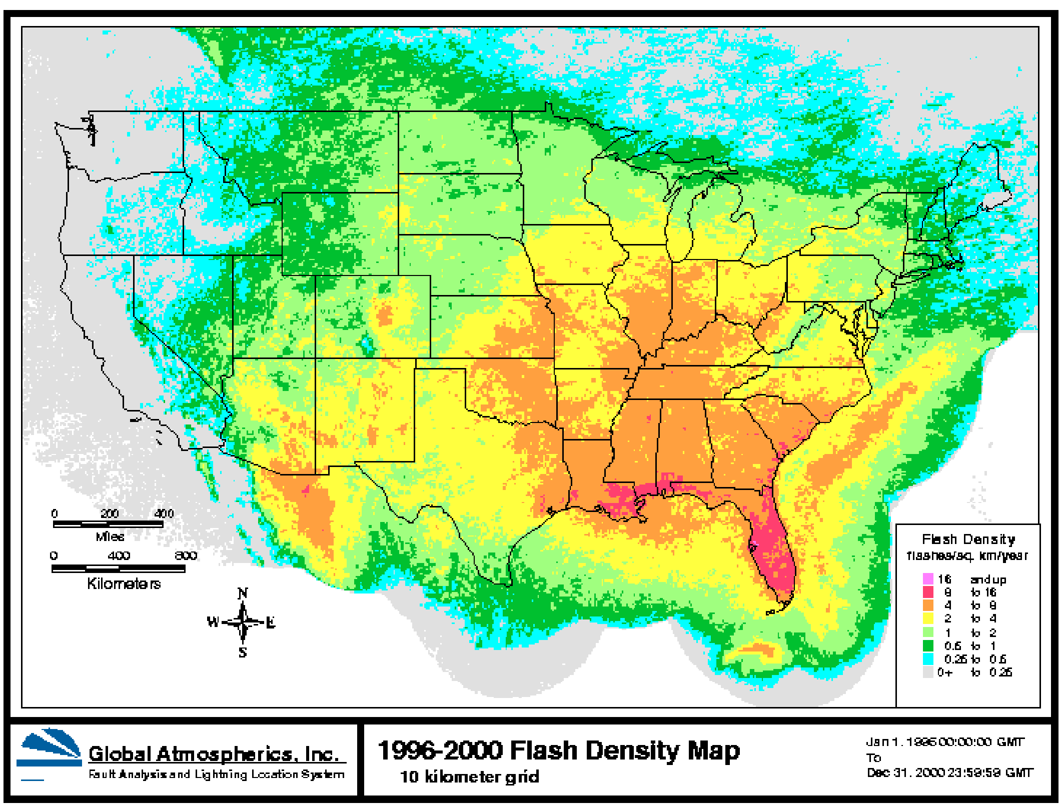
Section 26 of the NESC provides the strength requirements for the structural system, including foundations. The embedment and backfill for all poles, and the installation of guys and anchors, will be designed to the strength of the area soils. Sufficient geotechnical investigations will be conducted to characterize soils for this purpose.

Wind turbine anemometers and wind vanes will be heated units to prevent freezing. Also, for the cold-weather winter conditions on the Project site, special material specifications are set for material under load, especially towers, etc. to ensure that materials do not go below the brittle transition temperature.

Lightning Storms

As shown in the flash density map in Figure 2.2.4.1-1 below, the Kittitas Valley and interior Washington in general, is not a highly lightning prone area. In fact, this area falls in the second lowest of eight categories of lightning intensity. The map is based on data from lightning flash sensors installed nation-wide over a four-year period. Despite the low incident occurrence of lightning at the Project site, the Project has been designed with an extensive grounding system to divert stray surges to the ground. Additionally, all critical electrical and control systems at both the substation and wind turbines are fitted with MOVE type lightning suppressors for lightning protection.

Figure 2.2.4.1-1 Lightning Flash Density Map of the US



2.2.4.2 Seismic Hazards

The seismic hazards in the region results from three seismic sources: interplate (subduction) events, intraslab events, and crustal events. Each of these events has different causes, and therefore produces earthquakes with different characteristics (that is, peak ground accelerations, response spectra, and duration of strong shaking).

Two of the potential seismic sources, subduction and intraslab events, are related to the subduction of the Juan De Fuca plate beneath the North American plate. Subduction events occur as a result of movement at the interface of these two tectonic plates. Intraslab events originate in the subducting tectonic plate, away from its edges, when built-up stresses in the subducting plate are released. These source mechanisms are referred to as the Cascadia Subduction Zone (CSZ) source mechanism. The CSZ originates off the coast of Oregon and Washington and subducts beneath both states. The two source mechanisms associated with the CSZ currently are thought to be capable of producing moment magnitudes of approximately 9.0 and 7.5, respectively (Geomatrix, 1995).

Earthquakes caused by movements along shallow crustal faults, generally in the upper 10 to 15 miles of the crust, result in the third source mechanism. In Washington, these movements occur on the crust of the North American tectonic plate when built-up stresses near the surface are released. According to the Washington Division of Geology and Earth Resources (WDGER), all earthquakes recorded in eastern Washington have been shallow, with most measured at depths less than 3.7 miles.

Construction Earthquake Hazard Protection Measures
The State of Washington's current regulations for design use the 1997 Uniform Building Code (UBC). Pertinent design codes as they relate to geology, seismicity, and near surface soils are in Chapter 16, Divisions IV and V, Earthquake Design and Soil Profile Types, respectively (UBC, 1997). All facilities for the Project must be designed to at least these minimum standards.

Current engineering standards (UBC) will be used in the design of the Project facilities. These standards require that under the design earthquake, the factors of safety or resistance factors used in design exceed certain values. This factor of safety is introduced to account for uncertainties in the design process and to ensure that performance is acceptable. Application of the UBC in Project design will provide adequate protection for the Project facilities and ensure protection measures for human safety, given the relatively low level of risk for the site.

As noted in Section 3.1, 'Earth', based on lack of historic seismicity, earthquakes are not considered to pose a significant hazard to the proposed Project and further investigation or other mitigation measures are not warranted.

The Project area is not considered susceptible to liquefaction or lateral spreading, because liquefaction and lateral spreading require loose, saturated soils. The Project site is underlain by bedrock well above the water table. In addition, the probability of a significant earthquake event occurring during the construction activities is extremely remote. Seismic impact hazard during construction is negligible. The probability that the crustal faults in the region are active is relatively low, and, therefore, the potential for fault offsets during a large earthquake also appears to be very low.

2.2.4.3 Landslide Avoidance

Most Project facilities are not located on unstable slopes or landslide-prone terrain. The turbines are located on top of ridges and relatively flat areas, and not on slopes. Therefore, sliding of the materials is not expected. However, a large landslide is mapped on the south side of Whiskey Dick Mountain, as indicated on the map provided in Exhibit 4, 'Geotechnical Data Report'. (also see Section 3.1, 'Earth'). The location of this slide and its mechanisms of behavior could affect final turbine locations in the vicinity of the C and D strings and prior to construction a detailed geotechnical investigation including ground penetrating radar (GPR) and geotechnical drilling will be performed as necessary at each turbine location to determine if turbine locations should move slightly or be eliminated.

Field observations in this area indicated hummocky, disturbed terrain and springs. Prior to construction of the Project, further detailed site investigations utilizing ground penetrating radar (GPR) and geotechnical drilling will be conducted to delineate the limits of potential landslide area to ensure that the turbines are not placed in potentially unstable terrain. Turbine foundations anchored in or adjacent to unstable terrain or areas of past landslides have the potential for failure. At the present time, the distance separating wind turbines and their facilities (approximately 800 feet, minimum) from the mapped landslide boundary appears to be adequate. However, further exploration and evaluation of wind turbine loads and subsurface stability in this area will be conducted in order to provide final recommendations for minimum safe setback distances from slide areas.

In general, the Project is located in relatively low-gradient topography with a thin veneer of soil that overlies basaltic bedrock. Therefore, risk of a landslide appears to be minimal overall, aside from the area of concern discussed in the above paragraph. Observations of the site conducted during the geotechnical investigation and geologic site reconnaissance indicate that potential landslide-prone terrain is not visually apparent on the Project site in the vicinity of the proposed wind turbines. If slope failure were to occur, the turbine strings are typically situated at a distance from steep slopes and the turbines and their associated foundation structures would not be affected.

In the event that facilities such as roads are constructed below slopes steeper than 21 to 30 degrees, soil movement and rock fall from alluvium overburden exposed along road cut banks could impact these roads if the cut bank slope were to fail (i.e., during an earthquake or from seasonal freeze/thaw action and slope raveling). However, the proposed site layout does not include any roads below such steep slopes. The road that traverses the north side of Whiskey Dick Mountain was constructed with minor cuts and fills, but no areas of instability were observed during site visits. Furthermore, because Project access roads are used infrequently during operations, the risk associated with rock fall and/or slope movement to a vehicle and driver is low.

2.2.4.4 Volcanic Hazard Design

Within the State of Washington, the USGS recognizes five volcanoes as either active or potentially active: Mount Baker, Glacier Peak, Mount Rainier, Mount Adams, and Mount St. Helens. In the last 200 years, only Mount St. Helens has erupted more than once (USGS, 2000a). Impacts on the Project from volcanic activity can be either direct or indirect.

Direct impacts include the effects of lava flows, blast, ash fall, and avalanches of volcanic products (Waldron, 1989). Indirect effects include mudflows, flooding, and sedimentation (Waldron, 1989). Data accumulated as a result of the 1980 Mount St. Helens eruption indicate that there could be ash fallout in the geographic region surrounding the Project site if one of the five regional volcanoes were to erupt.

To help protect against the blast of dust and ash to the Project, all outdoor Project facilities key for operation are coated with corrosion resistant coatings. The turbine rotor blades and other fiberglass shrouds such as on the nacelles are very resilient to wind blown dust and precipitation. The turbines also have a closed loop air cooling system within a closed nacelle. As such, internal electrical equipment and machinery is not exposed to outside air and wind blown dust. Cooling air is drawn up from within the tower which has venting and filtering in the tower doors.

2.2.4.5 Erosion Control Design

Heavy Rain Storms: Erosion Potential
A detailed construction Storm Water Pollution Prevention Plan (SWPPP) will be developed for the Project to help minimize the potential for discharge of pollutants from the site during construction activities. The SWPPP will be designed to meet the requirements of the Washington State Department of Ecology General Permit to Discharge Storm water through its storm water pollution control program (Chapter 173-220 WAC) associated with construction activities.

The SWPPP will include both structural and non-structural best management practices (BMPs). Examples of structural BMPs could include the installation of silt curtains and/or other physical controls to divert flows from exposed soils, or otherwise limit runoff and pollutants from exposed areas of the site. Examples of non structural BMPs include management practices such implementation of materials handling, disposal requirements and spill prevention methods.

The SWPPP will be prepared and provided to EFSEC for review and approval, along with detailed Project grading plan design by the Engineering, Procurement and Construction (EPC) Contractor when design level topographic surveying and mapping is prepared for the Project site. Implementation of the construction BMPs is carried out by the EPC Contractor, with supervison by the Project's resident Site Environmental Protection Manager (SEPMA) who will be responsible for implementing the SWPPP.

Site-specific BMPs will be identified on the construction plans for the site slopes, construction activities, weather conditions, and vegetative buffers. The sequence and methods of construction activities will be controlled to limit erosion. Clearing, excavation, and grading will be limited to the minimum areas necessary for construction of the Project. Surface protection measures, such as erosion control blankets or straw matting, also may be required prior to final disturbance and restoration if potential for erosion is high.

A reclamation plan for the proposed rock quarries will be submitted to EFSEC for review and approval prior to construction.

All construction practices will emphasize erosion control over sediment control through such activities as the following:

- Straw mulching and vegetating disturbed surfaces;
- Retaining original vegetation wherever possible;
- Directing surface runoff away from denuded areas;
- Keeping runoff velocities low through minimization of slope steepness and length; and
- Providing and maintaining stabilized construction entrances.

A more detailed description of the materials, methods and approaches used as part of the BMP for effective storm water pollution prevention and erosion control is provided in Section 3.3.2, 'Water Resources-Impacts of the Proposed Action - Construction'.

2.2.4.6 Fire Restraint Design

In order protect against the threat of wild fires, the turbines, transformers, substations and all other Project facilities are surrounded by graveled areas by design and weed and vegetation control is managed as part of regular operations. The roads themselves act as fire breaks and help restrain the spread of fire.

2.2.4.7 Transmission Feeder Line Design for Natural Hazards

The transmission line structures and conductors, along with the guys and anchors, will be designed together as a structural system that safely supports conductor tensions and all anticipated environmental loads. The transmission line design will comply in all respects with the current edition of the National Electrical Safety Code (NESC), also known as American National Standards Institute C2. At this writing, the current edition is NESC-2002 Edition (ANSI C2-2002), and this standard is revised approximately every three years.

Wind and Ice Storm Loads
Section 25 of the NESC provides general wind and ice loading maps and methods for determining the resulting design loads on structures and conductors. These methods closely follow the American Society of Civil Engineers (ASCE) Manual 7. Local experience will also guide the designers to determine the maximum wind and the maximum ice loading that might be anticipated in this area.

Section 26 of the NESC provides the strength requirements for the structural system, including foundations. The embedment and backfill for all poles, and the installation of guys and anchors, will be designed to the strength of the area soils. Sufficient geotechnical investigations will be conducted to characterize soils for this purpose.

Seismic Hazard Design
Transmission lines are not rigid structural systems, and because of this, they have prven to be resistant to seismic damage. Seismic movements of structures and conductors tend to be damped by energy dissipating deflections of poles, insulators, and conductors. NESC Rule 250 A.4 stipulates the following: "The structural capacity provided by meeting the loading and strength requirements of Sections 25 and 26 provides sufficient capability to resist earthquake ground motions."

2.2.5 Construction Methodology

2.2.5.1 Introduction

The Project's wind turbines, site roads, underground cables, and other supporting infrastructure are located on ridge tops with good wind exposure and not in wetlands or watercourses. Environmental mitigation activities include the installation of erosion, drainage, and storm water systems along disturbed slopes. No special water rerouting or dewatering is required or anticipated for construction, as described in Section 3.3.2.1, 'Water Resources – Impacts of the Proposed Action - Construction'. Several pieces of large construction equipment will be required to complete Project construction as described in each of the sections below regarding the specific phase and discipline of construction.

The construction of the Wild Horse Wind Power Project will be performed in a manner that will incorporate the impact mitigation methods outlined in other sections of this application, including, but not limited to erosion control measures (see Section 3.3, 'Water Resources'); emission controls (see Section 3.2, 'Air Quality'); surface-water control measures (see Section 3.3. 'Water Resources'); spillage prevention and control measures (see Section 3.16, 'Health and Safety'); traffic control measures (see Section 3.15, 'Traffic and Transportation'); and other construction practice measures (see Section 3.13, 'Public Services and Utilities/Recreation') that will minimize the Project's impact on the environment and the surrounding area.

Project construction will be performed in several stages and will 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;
- Plant commissioning and energization.

The Applicant intends to enter into two primary agreements for the construction of the Project including an agreement for the supply, erection and commissioning of the wind turbines as well as an Engineering, Procurement and Construction ('EPC') contract for the construction of the balance of plant ('BOP') which includes all other Project facilities and infrastructure such as the roads, electrical collection system, substation (s), O&M Facility, etc.

Existing Conditions

The Project will be located on open rangeland which is zoned as Forest & Range and Commercial Agriculture by Kittitas County. The Project area has undergone thorough examination by wildlife and plant biologists to map and study the types of areas that will be disturbed by Project construction. An aerial view of the Project site layout is contained in Exhibit 1-C which illustrates the overall land types and proximity of the Project facilities to slopes and creek beds. The Project site is predominantly grassland and sparse to moderate shrub steppe with thin soil coverage due to high wind erosion and exposed fractured basalt. No wetlands or known jurisdictional waters have been identified in areas where Project facilities will be constructed.

2.2.5.2 Detailed Design and Specifications

Field Survey and Geotechnical Investigations:

Before construction can commence, a site survey will be performed to stake out the exact location of the wind turbines, the site roads, electrical cables, access entryways from public roads, substation areas, etc.

Once the surveys are complete, a detailed geotechnical investigation will be performed to identify subsurface conditions which will dictate much of the design work of the roads, foundations, underground trenching and electrical grounding systems. Typically, the geotechnical investigation involves a drill rig which 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. Testing is also done to measure the soil's electrical properties to ensure proper grounding system design. A geotechnical investigation is generally performed at each turbine location, at the substation location and at the O&M building location.

Design and Construction Specifications:
Using all of the data that has been gathered for the Project including geotechnical information, environmental and climatic conditions, site topography, etc., the Applicant's engineering group will establish a set of site-specific construction specifications for the various portions of the Project. The design specifications are based on well proven and established sets of construction standards set forth by the approriate standard industry practice groups such as the American Concrete Institute (ACI), Institute for Electrical and Electronic Engineers (IEEE), National Electric Code (NEC), National Fire Protection Agency (NFPA), and Construction Standards Institute (CSI), etc. The design and construction specifications are custom tailored for site-specific conditions by technical staff and engineers. The Project engineering team will also ensure that all aspects of the specifications as well as the actual on-site construction comply with all of the applicable federal, state and local codes and good industry practice.

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

2.2.5.3 Site Preparation and Road Construction

Construction activities will begin with site preparation, including the construction of Project site access entry ways from public roads, rough grading of the roads, 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 Exhibit 1-B.

The Project roads will be gravel surfaced and generally designed with a low profile without ditches to allow storm water pass over top. Road construction will be performed in multiple passes starting with the rough grading and leveling of the roadway areas. Once rough grade is achieved, base rock will be spread and compacted to create a road base. A capping rock will then be spread over the road base and roll-compacted to finished grade.

Once heavy construction is complete, a final pass will be made with the grading equipment to level-out road surfaces and more capping rock will be spread and compacted in areas where needed. Water bars, similar to speed bumps, will 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 will be done in accordance with a formal Storm Water Pollution Prevention Plan for the Project as outlined in Section 3.3.2, 'Water Resources'.

Water bars and sunken grades have been chosen over paved drainage channels across the roadways. Paved drainage channels have several disadvantages compared to water bars or sunken grades: (1) They tend to clog up with the road gravel and road capping rock fines; (2) They tend to wash-out along their sides creating a gap step between the road surface and the paved barrier hindering the access of larger vehicles with low-boy type trailers; (3) They tend not to dissipate the energy in the flowing water as it sheds from the road surface, causing it to accelerate and washout at the exit ends unless additional rock dams and silt fencing provisions are made. Water bars or sunken grades will be used to facilitate water shedding in steeper grade areas and rock dams with silt fencing or straw bales along with a re-seeding program will be used as the exit path of the water bars to prevent storm water pollution. During construction, areas with steeper grades which are prone to washout will be designed to shed water in one direction to a collection ditch fitted with rock dams and silt fencing or straw bales. Water bars will be graded into place once construction is complete.

The Project is located on open rangeland. Excavated soil and rock that arises through grading will be spread across the site to the natural grade and will be reseeded with native grasses to control erosion by water and wind. Larger excavated rocks will be used for reclamation of the gravel pits.

Project road construction will 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 3.2.2, 'Air Quality-Impacts of the Proposed Action - Emissions' contains a description of anticipated on site construction vehicles. Storm water controls, such as hay bales and diversion ditches in some areas will control storm water runoff during construction. Access from Vantage Highway will have a controlled gate.

<u>Blasting Activities</u>

Blasting will be required throughout the construction phase of the Project. Blasting will be required at each of the three on-site gravel pits once the top layers of rock have been removed. Applicant expects that multiple charges would be set initially to fracture rock. This blasting would occur prior to assembly of the rock crusher on-site. Blasting will be conducted by licensed explosives professionals and will observe applicable regulations and industry best practices.

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. Air quality impact estimates used in this application, are conservative and call for blasting at all WTG foundation sites to excavate 240 cubic yards of material from each. Applicant expects that actual blasting requirements will be significantly less than this estimate. Applicant estimates that an average of 2 to 3 WTG foundations will be completed each day during the foundation construction phase, with a peak rate of 4 WTG foundations per day.

2.2.5.4 Foundation Construction

The Project will require numerous foundations including bases for each turbine and pad transformer, the substation equipment and the O&M facility. Often, separate subcontractors are mobilized for each type of foundation they specialize in constructing.

Once the roads are complete for a particular row of turbines, turbine foundation construction will commence on that completed road section. Foundation construction occurs in several stages including drilling, blasting and hole excavation, outer form setting, rebar and bolt cage assembly, casting and finishing of the concrete, removal of the forms, backfilling and compacting, construction of the pad transformer foundation, and foundation site area restoration.

Excavation and foundation construction will be conducted in a manner that will minimize the size and duration of excavated areas required to install foundations. Portions of the work may require over excavation and/or shoring. Foundation work for a given excavation will commence after excavation of the area is complete. Backfill for the foundations will be installed immediately after approval by the engineer's field inspectors. The Applicant plans on using on-site excavated materials for backfill to the extent possible.

Based on preliminary calculations and depending on the type of foundation design used, approximately 125 cubic yards of excavated rock and soil will remain from each turbine foundation excavation. The excess soils not used as backfill for the foundations will be used to level out low spots on the crane pads and roads consistent with the surounding grade and reseeded with a designated seed mix of around the edges of the disturbed areas. Larger cobbles and rock will be crushed into smaller rock for use as backfill or road material. All excavation and foundation construction work will be done in accordance to a formal Storm Water Pollution Prevention Plan (SWPPP) for the Project as outlined in Section 3.3.2, 'Water Resources-Impacts of the Proposed Action - Construction'.

The foundation work requires the use of several pieces of heavy machinery including track-hoe excavators, drill rigs, front-end loaders, dump trucks, transportation trucks for materials, cranes and boom trucks for off-loading and assembly, compactors, concrete trucks, concrete pump trucks, backhoes and small skid-steer type loaders. Foundation work will not require the use of any trucks for de-watering, as no de-watering is expected.

2.2.5.5 Electrical Collection System Construction

Once the roads, turbine foundations, and transformer pads are complete for a particular row of turbines, underground cables will be installed on that completed road section. First of all, a trench is cut to the required depth with a rock trencher. Due to the rocky conditions at the site, clean fill will be placed above and below the cables for the first several inches of fill to prevent cable pinching. All cables and trenches are inspected before backfilling. Once the clean fill is covering the cables, the excavated material is then used to complete the backfilling. In areas where solid rock is encountered close to the surface, blasting will be done or a shallower trench will be cut using rock cutting equipment and the cables will be covered with a concrete slurry mix to protect the cables and comply with code and engineering specifications.

The high voltage underground cables are fed through the trenches and into conduits at the pad transformers at each turbine. The cables run to the pad transformers' high voltage (34.5 kV) compartment and are connected to the terminals. Low voltage cables are fed through another set of underground conduits from the pad transformer to the bus cabinet inside the base of the wind turbine tower. The low voltage cable will be terminated at each end and the whole system will be inspected and tested prior to energization.

The short runs of overhead pole collector line on the north side of Whiskey Dick Mountain will require a detailed field survey to determine the exact pole locations. Once the survey and design work are done, the installation of poles and cross-arms to support the conductors can commence. The poles are first assembled and fitted with all of their cross-arms, cable supports and insulator hardware on the ground at each pole location. Holes for each pole will then be excavated or drilled and the poles will be erected and set in place using a small crane or boom truck. Once it is set in place, concrete will be poured in place around the base of the tower, or a clean fill will be compacted around the tower base according to the engineer's specifications. The overhead lines will connect to underground cables at each end through a switchable, visible, lockable riser disconnect with fuses.

Excavated soil and rock that is not reused in backfilling the trenches will 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 will be crushed or used in reclamation of gravel quarries. All excavation, trenching and electrical system construction work will be done in accordance to a formal Storm Water Pollution Prevention Plan (SWPPP) for the Project as outlined in Section 3.3.2, 'Water Resources-Impacts of the Proposed Action - Construction'.

The electrical construction work will require the use of several pieces of heavy machinery including a track-hoe, a rock trencher, rock cutting equipment, front-end loaders, drill rigs for the pole-line, dump trucks for import of clean back fill, transportation trucks for the materials, small cranes and boom trucks for off-loading and setting of the poles and pad transformers, concrete trucks, 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.

2.2.5.6 Substation Construction

The construction schedule for the substation(s) and interconnection facilities is largely dictated by the delivery schedule of major equipment such as the main transformers, breakers, capacitors, outdoor relaying equipment, the control house, etc. The utility (PSE and/or BPA) is generally responsible for the construction of the interconnection facilities, as they will remain under utility control and jurisdiction.

The substation(s) and interconnection facilities construction involves several stages of work including, but not limited to, grading of the area, the construction of several foundations for the 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. All excavation, trenching and electrical system construction work will be done in accordance to a formal Storm Water Pollution Prevention Plan (SWPPP) for the Project as outlined in Section 3.3.2, 'Water Resources-Construction'. Once physical completion is achieved a rigorous inspection and commissioning test plan is executed prior to energization of the substation.

The substation and interconnection facilities construction work requires the use of several pieces of heavy machinery including a bulldozer, drill rig and concrete trucks for the foundations, a trencher, a back-hoe, front-end loaders, dump trucks for import of clean back fill, transportation trucks for the materials, boom trucks and cranes for off-loading of the equipment and materials, concrete trucks for areas needing slurry backfill, man-lift bucket trucks for the steel work and pole-line work, etc.

2.2.5.7 Wind Turbine Assembly and Erection

The wind turbines consist of 3 main components: the towers, the nacelles (machine house) and the rotor blades. Other smaller components include hubs, nose cones, cabling, control panels and tower internal facilities such as lighting, ladders, etc. All turbine components will be delivered to the Project site on flatbed transport trucks and main components will be off-loaded at the individual turbine sites.

Turbine erection is 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 involves 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.

2.2.5.8 Plant Energization and Commissioning (Start-Up)

Plant commissioning follows mechanical completion of the Project. Commissioning of the Project will commence with a detailed plan for testing and energizing the interconnection substation, feeder lines and step-up sustations 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 will be brought on-line one-by-one and then individual turbines will be tested extensively, commissioned and brought on-line one-by-one. Commissioning does not require any heavy machinery to complete.

2.2.5.9 O&M Facility Construction

Construction of the Operations and Maintenance (O&M) Facility will 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.

Construction of the O&M Facility will require the use of concrete trucks, boom trucks for roof truss installation, and light trucks for transportation of materials.

2.2.5.10 Transmission Feeder Line Construction

Transmission Line construction will start with the surveying and staking of the transmission line corridor and tower locations. Once this is complete a construction trail will be cleared to allow for vehicle access and drilling of the holes for the poles will commence. Once the holes are excavated, the poles will be delivered, hardware will be assembled on the poles on the ground and the pole structures will be erected into place and stabilized in the holes with backfill and compaction or a slurry mix concrete as required.

Once construction is complete, disturbed areas will be reseeded to control erosion by water and wind. All construction clean-up work and permanent erosion control measures will be done in accordance with a formal Storm Water Pollution Prevention Plan (SWPPP) for the Project as outlined in Section 3.3.2, 'Water Resources-Impacts of the Proposed Action - Construction'.

Construction of the feeder lines will require the use of several pieces of heavy machinery including a back-hoe, 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.

2.2.5.11 Project Construction Clean Up

Since Project clean up generally consists of landscaping and earthwork, it is very weather and season sensitive. Landscaping clean up is generally completed during the first allowable and suitable weather conditions after all of the heavy construction activities have been completed. Disturbed areas outside of the graveled areas will be reseeded to control erosion by water and wind. All construction clean up work and permanent erosion control measures will be done in accordance to a formal Storm Water Pollution

Prevention Plan (SWPPP) for the Project as outlined in Section 3.3.2, 'Water Resources-Impacts of the Proposed Action - Construction'.

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

2.2.6 Project Construction Schedule and Workforce

2.2.6.1 Introduction

The construction of the Wild Horse Wind Power Project will be performed in several stages and will include the following main elements and activities:

- Grading of the field construction office area (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(s);
- Plant commissioning and energization.

The Applicant intends to enter into two primary agreements for the construction of the Project: including an agreement for the supply, erection and commissioning of the wind turbines as well as an Engineering, Procurement and Construction ('EPC') contract for the construction of the balance of plant ('BOP') which includes all other Project facilities and infrastructure such as the roads, electrical collection system, substation, O&M Facility, etc.

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

The construction schedule will closely follow the construction methodologies discussed below in Section 2.2.5, 'Construction Methodology'.

2.2.6.2 Construction Schedule, Activities and Milestones

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. These long lead-time items will be ordered as soon as possible immediately following obtaining site certification from EFSEC. WTG vendor and model selection will be determined following qualification of vendors and development of detailed site engineering and meteorological analyses. Following successful completion of this process, Applicant will begin negotiations and enter into a Turbine Supply Agreement from the final vendor. The process of qualification and negotiation is expected to take approximately four months in total, and will be substantially complete prior to issuance of the site certificate.

The proposed Project construction schedule summary showing the major tasks and key milestones is included below in Table 2.2.6.2-1. Also shown in Table 2.2.6.2-1 is the number of expected on-site personnel to perform each of the key tasks. It is expected that Project construction will occur over a period of approximately 12 months from the time of site certification to commercial operation and will require the involvement of about 250 personnel. A detailed construction schedule is being developed - these estimates reflect reasonable assumptions based on the currently available data.

Table 2.2.6.2-1 Proposed Project Construction Schedule Summary

	TASK / MILESTONE	Start	Finish	Approx. On-Site Manpower 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**

Project Schedule with Different Turbine Sizes

The construction schedule would not be significantly affected by the selection of different WTG sizes or manufacturers. Ordering, delivery, and installation times for each size WTG from each manufacturer are substantially similar. The amount of road construction required under each scenario is the same. The installation of larger or smaller numbers of WTG's will impact the construction schedule as shown in table 2.2.6.2-2.

Table 2.2.6.2-2: WTG Alternative Configuration Impacts on Construction Schedule			
	Most Likely Scenario	**Large WTG Scenario**	**Small WTG Scenario**
Number of WTG's	136	104	158
Total Road mileage	31.7	31.7	31.7
Construction/ Erection days	45	35	53
Variance from Most Likely Scenario (days)	0	-11	7

Notes:

Assumes foundation construction/ erection of 3 WTG/day

The maximum variance under the different scenarios is less than two weeks.

2.2.6.3 Construction Workforce and Employment Levels

The amount of craft and noncraft employment is outlined in Table 2.2.6.3-1 "Labor Force Mix". Overall, the Project anticipates the involvement of about 250 on-site personnel.

Table 2.2.6.3-1 Construction Labor Force Mix (Approximate # 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 Punchlist Clean-Up	1	1	3	10	**15**
TOTALS	**31**	**44**	**102**	**76**	**253**

Table 2.2.6.3-2 "Construction Labor Resource Loading" presents the estimated total workforce resource loading, by month, for the construction of the Project. At peak, it is expected that about 160 personnel will 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 will be housed and how they will travel to the Project site is included in Section 3.12.2, 'Population, Housing and Economics – Impacts of the Proposed Action - Construction'. It is anticipated that roughly half of all construction worker vehicles will be parked at the O&M facility location and the other half will 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 will result in about one third of construction workers carpooling to and from the Project site.

Table 2.2.6.3-2 Construction Labor Resource Loading (Approximate # Personnel)

Month Before Commercial Operation	Project Management &Engineers	Field Technical Staff	Skilled Labor & Equipment Operators	Unskilled Labor	TOTAL
14	6	0	0	0	**6**
13	6	12	0	0	**18**
12	5	5	15	5	**30**
11	8	9	38	35	**90**
10	10	12	61	47	**130**
9	10	12	61	47	**130**
8	10	10	54	46	**120**
7	10	10	54	46	**120**
6	14	16	69	61	**160**
5	14	19	38	19	**90**
4	9	16	30	15	**70**
3	9	16	30	15	**70**
2	9	16	30	15	**70**
1	5	10	15	0	**30**
0	5	10	15	0	**30**
CLEAN UP	1	1	3	10	**15**

2.2.7 Operations and Maintenance

2.2.7.1 Operating Schedule

The Project will be in operation 24 hours per day, 365 days per year. The Operations and Maintenance (O&M) team will staff the Project during core operating hours 8 hours per day, 5 days per week, from 8:00am to 5:00pm with weekend shifts and extended hours as required. The Project's central Supervisory Control and Data Acquisition (SCADA) system stays on-line full time, 24 hours per day, 365 days per year. In the event of turbine or plant facility outages, the SCADA system will send alarm messages to on-call technicians via pager or cell phone to notify them of the outage. The Project will always have a local, on-call local technician who can respond quickly in the event of any emergency notification or critical outage. Operating technicians will rotate the duty of being on-call for outages.

2.2.7.2 O&M Staff

The Project will 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
TOTAL	14-18

* depends on final quantity and type of turbine used

The Operating Technicians will be responsible for all routine maintenance of the WTGs, and therefore no additional staff will be present for routine maintenance operations. Emergency repair staffing would be dictated by the nature and extent of the emergency. The risk of such an emergency that would threaten life or safety is very low at an operating wind power project and has not occurred anywhere to-date.

2.2.7.3 Facility Availability

Typically, the wind blows enough at the Project site to allow the Project to generate power 80% of the time over the course of a year. Availability is defined as the amount of time the Project is ready and capable of producing power. The Wild Horse Wind Power Project will utilize heavy-duty, utility grade equipment. Other wind power projects with similar configurations and grades of high quality, reliable and proven equipment have demonstrated operating availability figures in the mid to high-90% range over the past decade. The availability of wind power projects rivals that of conventional power plants that are generally in the low-90 % to mid-90% range. The Project is expected to operate consistently with an availability in the mid-90% to high-90% percent range. Facility unavailability is due to several factors and generally is classified as scheduled (planned) or unscheduled (forced) outages.

2.2.7.4 Scheduled Maintenance - Planned Outages

The amount of downtime due to scheduled maintenance is generally very predictable from year to year. The proposed Project operating plan includes a planned outage schedule cycle that consists of WTG inspections and maintenance after the first 3 months of operation, a break-in diagnostic inspection, and subsequent services every 6 months. The 6-month service routines generally take a WTG off-line for just one day. The 6-month routines are very rigorous and consist of inspections and testing of all safety systems, inspection of wear-and-tear components such as seals, bearings, bushings, etc., lubrication of the mechanical systems, electronic diagnostics on the control systems, pre-tension verification of mechanical fasteners and overall inspection of the structural components of the WTGs. Blades are inspected and, if heavily soiled, rinsed once per year to maintain overall aerodynamic efficiency. Blade washing is not anticipated as a requirement for the Project since the fall and spring rains will remove most if not all blade soiling.
Electrical equipment such as breakers, relays, transformers, etc. generally require weekly visual inspections, which do not affect overall availability, and testing or calibrations every 1-3 years which may force outages.

Individual WTGs are taken off-line for maintenance, leaving the remaining WTGs in that string fully operational. Maintenance operations at the operating Project would service approximately 17-26 WTGs each month to maintain the 6-month service interval at each WTG.

To the extent practical, the short-term off-line routine maintenance procedures are coordinated with periods of little or no generation (i.e. low wind) as to minimize the impact to the amount of overall generation.

2.2.7.5 Unscheduled Maintenance - Forced Outages

Modern wind power projects generally operate with availabilities in the 95% to 99% range. Several components and systems of an individual wind turbine can be responsible for forced, non-routine outages such as the mechanical, electrical or computer controls. Most of the outages are from auxiliaries and controls and not the heavy rotating machinery. Most developing heavy machinery failures are found prior to failure, during the frequent inspections, so that the failing part is replaced prior to complete failure.

Although the newer control systems have added a high level of detection and diagnostic capability, they normally require frequent minor adjustments in the first few months of operation. As a result, availabilities of a wind power project are generally lower in the first few months until they are fully tuned. Once a wind plant is properly tuned, unplanned outages are generally very rare and downtime is generally limited to the routine service schedule.

The O&M facility is always stocked with sufficient spare parts to support high levels of availability during operation. The modular design of modern wind turbines results in the majority of parts being "quick-change" in configuration, especially in the electrical and control systems. This modularity and the fact that all of the turbines are identical allows for the swapping of components quickly between turbines to quickly determine root causes of failures even if the correct spare part is not readily available in the O&M building. As part of their supply agreements, major turbine equipment vendors guarantee the availability of spare parts for 20 years.

2.2.7.6 Project Capacity Factor

A power project's capacity factor is defined as the amount of energy it generates in a year divided by the amount of energy it could have generated if it operated at full output capacity and remained on-line 100% operating of the time for a full year.

$$\text{Capacity Factor} = \frac{\text{Total Energy Generated (MWh)}}{\text{Project Nameplate (MW)} * \text{8760 hrs/yr}} \quad \text{X } 100\%$$

Fuel burning power plants operate within a wide range of capacity factors ranging from as low as 2-3% for peaking generators, which come on line only to meet super peak demands a few times per year and accommodate for low water years, to as high as 60-80% for some of the primary system generators. Northwest hydro system facilities operate typically with capacity factors in the 40-60% range with the average running at about 50%. More exact figures for Northwest generating facilities can be obtained from the Northwest Power Planning Council's (NWPPC) website at http://www.nwppc.org/energy/powersupply/Default.htm.

As shown on the NWPPC web-site, the Grand Coulee dam indicates a capacity factor of just over 34% over its operating history. The Wild Horse Project is expected to operate with annual capacity factors in the range of 30-40% depending of the amount of wind resource that flows through the Kittitas Valley in a year.

Average Capacity (aMW = average MW)
A power project's average capacity is defined as the average amount of power output a facility generates over a full year. This is the same as:

Average Capacity = Capacity Factor * Nameplate Capacity (MW)

This is also called the "average MW" of a plant. Therefore, the Project will have an average capacity of approximately 30 to 40% of its installed nameplate capacity. With an installed nameplate capacity of 204 MW, the Project will have an average capacity in the range of 30% X 204 aMW = 61.2 MW to 40% X 204 MW = 81.6 aMW. For comparison, Grand Coulee Dam has an average capacity of 34.2% X 6,832.5 MW = 2,335 aMW.

2.2.8 Project Cost Estimates

The Project site presents several items which make the anticipated costs higher than other wind power projects including challenging terrain, relatively long feeder lines and at least 2 substations (one for voltage step-up and one for interconnection). Total project costs, including the equipment, construction, development, financing, permitting, legal, study costs etc. for projects similar to the one being proposed are typically $1,000 per kilowatt of installed nameplate capacity. Therefore Project cost would range from as low as $158 million to $312 million depending on the Project size and is expected to be in the $200 million range as defined in Table 2.2.8-1. Typically for wind power projects, the wind turbines make up 75% to 80% of the Project cost and the remaining portions of construction including soft costs of design and administration, financing, permitting, legal, etc., constitute 20% to 25% of the total cost.

Table 2.2.8-1 Project Cost Summary for Various Project Size Scenarios

	Most Likely Scenario	**Large WTG Scenario**	**Small WTG Scenario**
Turbine Nameplate	1.5 MW	1 MW	3 MW
Number of WTGs	136	158	104
Project Nameplate	204 MW	158 MW	312 MW
Estimated TOTAL COST (in millions)	$ 204	$ 158	$ 343

2.3 ALTERNATIVES

2.3.1 Introduction

2.3.1.1 Alternative Sites

Kittitas Valley and Wild Horse Project Sites not Alternatives to One Another

As described in Section 1.2, 'Purpose and Need for the Project and Associated Facilities', the objective of the Wild Horse Wind Power Project is to construct and operate a wind energy generation resource to meet a portion of the projected growing regional demand for new energy resources. The Energy Information Administration projects that total electricity demand would grow between 1.8 and 1.9% per year from 2001 through 2025. The Western Electricity Coordinating Council (WECC) forecasts the 2001-2011 summer peak demand requirement to increase at a compound rate of 2.5% per year (WECC 2002). Based on data published by the Northwest Power and Conservation Council (NWPCC), electricity demand for the Council's four-state Pacific Northwest planning region (Washington, Oregon, Idaho, and Montana) was 20,080 average MW in 2000 (NWPCC 2003).

Washington and the Northwest region face a growing medium and long term demand for power. Many regional utilities are currently seeking to acquire new generating resources to meet their loads. More specifically, several regional utilities, including Avista, Puget Sound Energy (PSE), and Pacificorp (doing business as Pacific Power in Washington) have all completed detailed studies and demand forecasts of their own systems as part of their Integrated Resource Plan (IRP) or Least Cost Plan (LCP) process with oversight from the WUTC (Washington Utilities and Transportation Commission). As a result of their formal IRP or LCP processes, PSE , Pacificorp and Avista have issued Requests for Proposals (RFPs) specifically for wind power and/or other renewable resources. Avista is seeking to acquire 50 MW, PSE is seeking to acquire 150 MW and Pacificorp is seeking to acquire 500 MW. There is thus a regional demand for wind generated energy that far exceeds the existing regional supply.

The proposed Project is intended to help meet this growing regional demand for renewable, wind-generated electricity.

The Kittitas Valley Wind Power Project is not considered a reasonable alternative to the Wild Horse Wind Power Project since, neither project, on its own, can meet the forecasted or immediately requested demand for power in the region. Also, neither project could be increased in size, on its own, to generate the same amount of energy output as can be cost-effectively generated by constructing both projects. Therefore, doubling the size of one project is not a reasonable alternative to constructing both projects.

Site Evaluation Criteria

The Applicant considered a variety of potential sites in the area for a commercial wind power project but none met all of the relevant criteria. The Applicant's screening criteria for the Project included:

- Documented commercially viable wind resource - in excess of 16 mph annual average wind speed
- Access to high voltage transmission lines (115 to 287 kV) within 10 miles that have sufficient available capacity to carry the Project's output
- Absence of significant environmental constraints (i.e. no threats to endangered species, major archeological resources, critical wetlands, etc.)
- Willing landowner(s) with sufficient acreage to support a 150 -200 MW project
- Accessible site with sufficient road access to permit delivery of large wind turbine components and allow construction of Project infrastructure.
- Appropriate zoning designation (i.e. resource use or agriculture zones rather than residential or commercial zones)

Since none of the other potential Project sites considered by Applicant appeared to meet all of the above criteria, they are not deemed to be viable alternatives to the proposed Project. Most of the potential wind power project sites that were investigated outside of Kittitas County have not been used as a comparative analysis in the analysis of alternatives section of this application mainly because none the alternate sites met all of the above criteria. Furthermore, sites inside of Kittitas County are the only ones considered pertinent in the framework of a comparative analysis of alternatives since the Project affects land use planning only in Kittitas County. Potential wind power project sites outside of Kittitas County would not come under the County's land use planning jurisdiction.

2.3.1.2 Alternative Power Generation Technologies

As their names imply, the Applicant, Wind Ridge Power Partners, LLC, and its parent company, Zilkha Renewable Energy, LLC are engaged in the sole business of developing and operating commercial scale wind power projects. Therefore, the only class of electrical generating technology considered for the Project was wind turbine generators. The Applicant has considered a variety of wind turbine designs and technology, which is discussed below under Alternative Wind Turbine Generator Designs.

2.3.1.3 Alternative Wind Turbine Generator Designs

Several types of wind energy conversion technologies were evaluated for the Project. However, for the application of utility scale electrical power generation, the technology that has demonstrated itself as the most reliable and commercially viable is the 3-bladed, upwind, horizontal axis, propeller-type wind turbine as shown in Figure 2.3.1-1 (turbines labeled (c) and (d)). Figure 2.3.1-1 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 Project contemplates the use of the most successful class of wind turbines which are megawatt-class wind turbines. The choice of this type of turbine also minimizes overall impacts since there are fewer turbines, a smaller overall project footprint, less visual impact, and less avian impacts due to a smaller total Rotor Swept Area and the lower RPM.

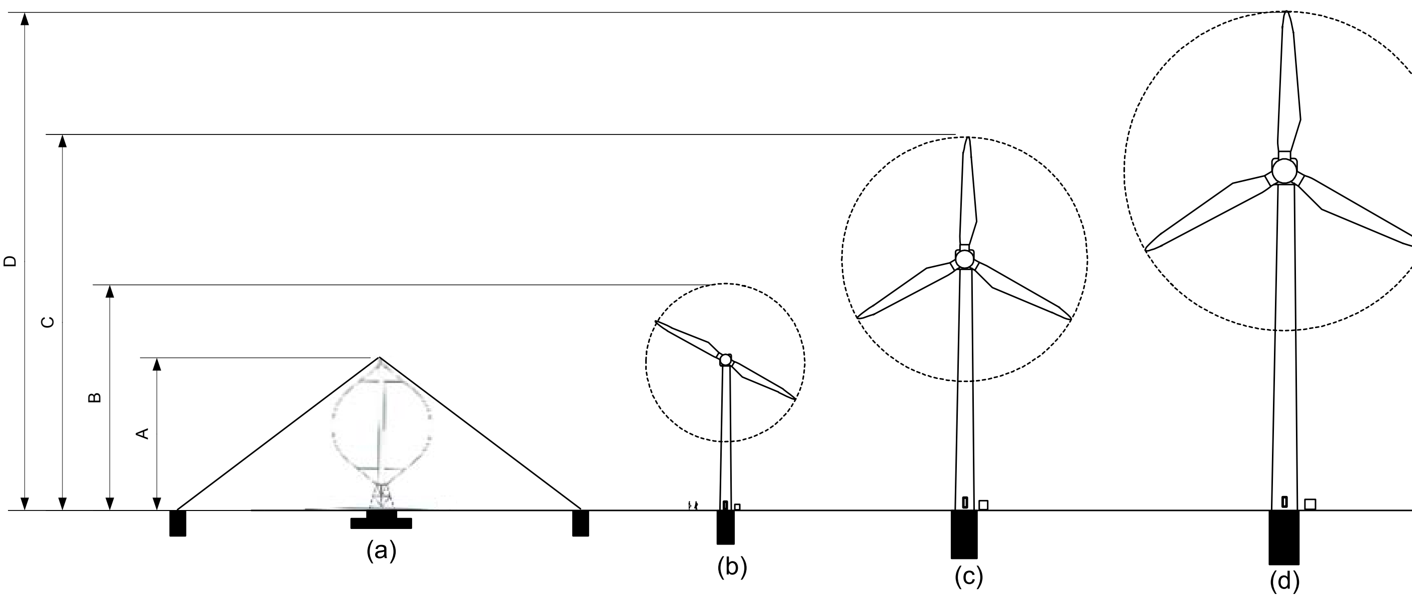


Figure 2.3.1-1: Comparison of Various Wind Turbine Technologies

Table 2.3.1-1 Comparison of Various Wind Turbines

	Type	Typical Generator Size	Typical Size	#. of Units Required for 204 MW	Typical Rotational Speed
a	Darrieus Rotor	50-100 kW	A - 100-150 ft.	2,700-4,000	50-70 RPM
b	2 bladed (downwind)	50-200 kW	B - 150-200 ft.	1,000-4,000	60-90 RPM
c	3 bladed (upwind)	500-750 kW	C - 240-300 ft.	272-408	28-30 RPM
d	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 that invented in the 1920's by French engineer, DGM Darrieus. It is called the Darrieus Wind Turbine, Darrieus Rotor and commonly dubbed the "eggbeater". Figure 2.3.1-1 illustrates both the eggbeater (vertical axis) and the propeller types (horizontal axis - HAWT) of wind turbines. The Wild Horse Wind Power Project will utilize the horizontal axis type of wind turbines.

Figure 2.3.1-2 FloWind Vertical Axis (Darrieus Wind Turbine Located on Thorp Prairie, near Ellensburg WA

The Darrieus turbine was experimented with and used in a number of wind power projects in the 1970's and 1980's including projects in California and even an experimental machine installed by FloWind on Thorp Prairie located near Ellensburg, WA. Figure 2.3.1-2 illustrates the FloWind turbine near Thorp Prairie.

Despite years of diligent design, experimentation and application, the Darrieus turbine never reached the level of full commercial maturity and success that horizontal axis turbines have due to inherent design disadvantages. Over the years, the 3-bladed horizontal axis wind turbine has proven to be the most reliable, efficient, and commercially viable wind power technology.

A few of the advantages of propeller type wind turbines over the eggbeaters are discussed in further detail 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 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.

Cut-in Wind Speed:

VAWTs require a higher level of wind speed to actually start spinning compared to HAWTs. Older VAWT machines were generally "motored-up" by using the generator as a motor to start-up. HAWTs do not require as much wind speed for start-up and most have the advantage of variable pitch blades which allow the turbine to simply change blade pitch to start up. Modern HAWTs do not use the generator to motor-up the rotor.

Variable Pitch:

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

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. The HAWTs contemplated for the Project use free standing tubular steel towers and do not require guy wires.

Turbine Footprint:
VAWTs are generally fitted with 4 sets of guy wires which span out from the top of the central tower and are anchored in foundations as shown in Figure 2.3.1-2. Including the tower base foundation, VAWTs require a total of 5 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 free standing towers use only one main foundation and have a relatively small overall footprint in comparison.

Fatigue Life Cycles:
Due to their design, VAWTs have higher fatigue cycles than HAWTs. As the rotor blades rotate through one full revolution, they pass upwind, downwind and through 2 neutral zones (directly up-wind of the tower and directly downwind of the tower). In contrast the rotor blades on a HAWT do not pass through similar up-wind/downwind neutral zones. As a result, VAWTs are subjected to a far higher number of fatigue load cycles compared to HAWTs which, past operating history shows, has resulted in far more frequent mechanical failures and breakdowns on VAWTs.

Two-Bladed, Downwind Wind Turbines
The most widely used vertical two bladed wind turbines were of the downwind variety and were in the size range of 50-200 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 have not proven to be reliable and commercially viable units.

Figure 2.3.1-3 Two-Bladed Downwind Wind Turbine

The two-bladed turbines require a higher rotational speed to reach optimal aerodynamic efficiency compared to a 3-bladed turbine. Two-bladed rotors are also more difficult to balance and this combined with the downwind tower shadow, results in higher fatigue loads compared to the 3-bladed design. As in the case of Darrieus turbines, two bladed down wind turbines use guy wires, with higher associated avian impacts.

Smaller Wind Turbines
Over the past 20-30 years, wind turbines have become larger and more efficient. The Applicant considered using smaller turbines in the 600 -750 kW range for the Project,

however, this is both less cost effective and would result in a far higher total number of turbines, a larger project footprint and an overall higher impact to the surrounding environment. Use of 600-750 kW turbines would result in more than twice as many total turbines and a greater total Rotor Swept Area to produce the same amount of energy. For example, the total height of the typical 660 kW turbine is about 73% of the total height of the typical 1500 kW turbine, while its total output is only 44% of the output of the 1500 kW turbine. Using more turbines to produce the same amount of energy also results in more turbine foundations, which results in more land area being disturbed.

As the growth trend of the wind energy industry has continued, smaller machines have become less cost efficient. Use of megawatt-class turbines result in lower energy prices than sub-megawatt-class turbines.

2.3.1.4 Design Alternatives to the Proposed Project

The proposed Project layout, Exhibit 1-B, was designed to minimize environmental impacts while maximizing power generation and minimizing cost. The key criteria used 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) are summarized below.

- 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

During the development process, the proposed layout was modified based on the results of the various surveys and studies commissioned by the Applicant, such as cultural resource surveys, telecommunications obstruction analysis, plant and wildlife studies, visual impact assessments, etc.

The proposed layout results in the lowest level of impacts and highest level of energy production at the lowest cost, given the constraints of terrain, technology and existing infrastructure on site (e.g. roads.) All Project infrastructure has been placed to avoid all documented locations of wetlands, streams, cultural resources and other sensitive areas. No construction will take place in any sensitive areas. All possible alternative configurations would result in a greater level of impact or lower level of energy production at a higher cost.

2.3.1.5 Alternatives Initially Considered but Eliminated

As described in the preceding section ‘Design Alternatives to the Proposed Project’, the proposed Project represents the result of a lengthy and iterative process whereby the Applicant has modified the Project layout in response to the results of various studies commissioned to evaluate environmental resources and potential impacts of the Project. The proposed Project layout optimizes energy production while minimizing environmental impacts and avoiding all impacts to sensitive areas.

2.3.1.6 Alternative Transmission Feeder Line Routes

The Applicant has designed a transmission feeder line route that provides the best combination of safety, environmental protection, site access, economic cost, willing landowners, and appropriate zoning. In evaluating alternative routes, a primary consideration involves the willingness of underlying landowners to participate in the Project. Such participation is difficult to estimate without directly contacting the affected landowners, which is not a practical approach for analyzing hypothetical alternatives.

In general, transmission feeder lines should be located on relatively flat land where possible to avoid potential erosion problems with having construction trails along steep slopes. The routes should avoid environmentally sensitive areas such as major archeological resources and potential or known wetlands and should avoid possible impacts to endangered wildlife species. 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 feeder line routes should minimize the overall route length and number of angles or “corners” by building in straight lines where possible. This reduces the number of corner structures which require guy-wires and ground anchors and the resulting amount of temporary and permanent environmental impacts associated with construction is therefore also reduced. Minimizing the number of angles reduces the number of guy-wires and ground anchors required to support transmission towers.

The Applicant examined various transmission feeder line routes and performed a helicopter survey with TriAxis Engineering, as well as with WEST to examine the possible routes. Based on the various factors discussed above, the final route was determined as it is proposed in this Application. 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.

2.3.2 No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this ASC 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, green houses 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 base load 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 or "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 2.3.2-1 presents the basic parameters of a hypothetical 67 aMW natural gas-fired combustion turbine.

Table 2.3.2-1: Potential Annual Environmental Impacts for Hypothetical 67 aMW Gas-Fired Combined Cycle Combustion Turbine Plant			
	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.

2.4 BENEFITS OR DISADVANTAGES OF RESERVING PROJECT APPROVAL FOR A LATER DATE

Delaying the approval of the Project for a late date would have several disadvantages. First, 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 approval of the Project is delayed, these utilities might determine that such 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.

Second, the legislative and executive branches of the State of Washington have both established a variety of policies and goals calling for increasing the percentage of power generated from renewable sources. Washington currently has only two commercial scale operating wind power projects (Nine Canyon and Stateline.) This Project represents a very attractive opportunity to generate substantial amounts of renewable energy at a competitive price. Failure to approve this Project at this time would appear to thwart these established policies and goals. Furthermore, failure to approve this Project at this time could send a negative signal to the wind power development community that might result in fewer wind power projects being proposed and developed.

Finally, several regional utilities have identified a need for renewable wind-generated energy to diversify their resource portfolios. The Project has one of the best wind resources available in the Northwest and thus offers attractive energy pricing that would allow these utilities to meet their portfolio diversification objectives while minimizing costs to their customers. 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. This would be inconsistent with EFSEC's statutory objective of providing abundant low cost power with minimum environmental impacts.

As described in Section 1.4, 'Description of Alternatives' the Applicant has not yet made a final selection of the precise wind turbine model to be used for the Project. The Applicant has defined the specific range of turbine sizes that are under consideration for the Project (minimum 60 meter rotor diameter to a maximum 90 meter rotor diameter.) The Applicant has solicited bids from the world's leading wind turbine manufacturers and intends to make the final selection based on criteria such as proven performance, resulting energy price, and safety and reliability factors. The final selection of turbine model will most likely be made after the Project is approved by the Governor and a power purchase agreement (PPA) has been signed. This is necessary and typical for wind power project development because placing orders for wind turbines typically requires a substantial financial commitment to the turbine manufacturer that can not be justified until construction of the Project is certain to proceed.

The wind turbine industry is highly innovative and rapidly evolving. Performance continues to improve and the resulting energy prices continue to fall. In the case of a project for which EFSEC site certification is requested, the timeframe for review and approval is sufficiently lengthy that the price and performance characteristics of wind turbines available on the market may and likely will evolve over the course of the application review period. It is thus prudent to reserve the final selection of turbine model until the precise price and performance characteristics can be evaluated at the time a permit is approved. This approach will secure the highest performance turbines at the most competitive price.

Many of the leading turbine manufacturers are not based in the US and thus their prices are based on current exchange rates between the US dollar and the currencies of those countries where the turbine manufacturers are based (e.g. Denmark.) At the time final turbine selection is made, such currency fluctuations must be reviewed to determine which turbine model will result in the most competitive energy pricing.

The Applicant has evaluated the potential environmental impacts of the full range of turbine sizes which are being considered for the Project and for which site certification is being sought. The EIS that will be prepared for the Project will fully address the potential impacts of the full range of turbines being considered. Therefore, EFSEC and the public have the opportunity to analyze and consider the range of potential environmental impacts from the full range of turbine sizes being considered. The net difference in potential environmental impacts resulting from the final turbine model selection within the specified range is minor and insignificant. The Applicant intends to notify EFSEC of the final turbine model selection once the selection has been made and, as part of the normal construction approval process, will provide EFSEC with detailed final construction plans that reflect the turbine model selected.

2.5 REGULATIONS AND PERMITS

2.5.1 Table of Applicable Federal, State, and Local Requirements

Table 2.5.1-1 Pertinent Federal, State and Local Codes, Ordinances, Statutes, Rules, regulations and Permits lists the pertinent federal, state and local permits and related requirements pursuant to Chapter 463-42-685 WAC that apply to construction and operation of the Wild Horse Wind Power Project. The table lists the permits or requirements, identifies the permitting agency, and cites the authorizing statute or regulation. The table also identifies the sections in the Application relating to each permit or requirement.

Table 2.5.1-1: Pertinent Federal, State and Local Codes, Ordinances, Statutes, Rules, Regulations and Permits

Permit Or Requirement	**Agency/Code, Ordinance, Statute, Rule, Regulation Or Permit**	**Application Section)**
Federal:		
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."	3.15.2 and 3.11.3.3
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.	3.4.1 and 3.6.3
State:		
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.	NR
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	3.9.1.

Table 2.5.1-1: Pertinent Federal, State and Local Codes, Ordinances, Statutes, Rules, Regulations and Permits		
Permit Or Requirement	**Agency/Code, Ordinance, Statute, Rule, Regulation Or Permit**	**Application Section)**
	Noise Levels.	
Water Quality Storm Water 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.	2.2.4, 3.1.2 and 3.3.2,
Surface Mining	Department of Natural Resources regulates surface mining pursuant to RCW 78.44. RCW 78.44.	2.2.4, 2.6.2 and 3.1.2
Fish And Wildlife	The Washington Department of Fish and Wildlife, pursuant to Chapter 232-12 WAC, designates certain “Priority Habitats”.	3.4 and 3.6
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.	NR
Archaeology and Historic Preservation	Washington State Office of Archaeology and Historic Preservation Archaeological Sites and Resources, Chapter 27.53 RCW.	3.14
Local:		
Comprehensive Plan	Kittitas County Comprehensive Plan, 2000-2020.	2.2.3; 3.10.1 and 3.10.2
Zoning Ordinance.	Kittitas County Code Title 17	2.2.3; 3.10.1 and 3.10.2
Building Codes	Kittitas County Code 14.04 Implements Chapter 19.27 RCW, State Building Code and Chapter 51-40 WAC State Building Code regulations.	NR

Table 2.5.1-1: Pertinent Federal, State and Local Codes, Ordinances, Statutes, Rules, Regulations and Permits		
Permit Or Requirement	**Agency/Code, Ordinance, Statute, Rule, Regulation Or Permit**	**Application Section)**
Sewage Disposal Installation And Design And Septic Tank Cleaning Regulations	Kittitas County Code Title 13.04	NR
Storm Water Management Plan	Kittitas County Code Title 12.70	2.2.4, 3.1.2 and 3.3.2
Noxious Weed Control	Kittitas County Noxious Weed Control Board Noxious Weeds-Control Boards Chapter17.10 RCW.	NR
Critical Areas Review / Determination	Kittitas County Code Title 17A (Critical Areas Ordinance)	3.4.1

Legend: NR means not referenced directly in this section but project compliance required.

2.5.2 Pertinent Federal Statues, Regulations, Rules and Permits

2.5.2.1 Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration"

The Federal Aviation Administration (FAA) requires notification and lighting of objects that might pose a hazard to aviation. The applicable regulation is as follows: 49 USC, Section 44718 and Title 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 objects such as wind turbine generators that may pose a navigation hazard as established using the criteria of 14 CFR 77; and FAA Advisory Circular No. 70/460-2H, relates to the filing of a "Notice of Proposed Construction or Alteration".

Statement of Compliance
The Applicant intends to file a 'Notice of Construction or Alteration' with the regional FAA office in Renton, WA to initiate the "7460" review process. Applicant will provide a copy to EFSEC once a final determination is made.

After a determination by the FAA is made, Applicant intends to submit a revised 'Notice of Proposed Construction or Alteration' as necessary to the FAA based on the final, approved Project site layout and proposed turbine size and will comply with all requirements of the FAA. The FAA's aeronautical studies state that, for certain turbines, a 'Notice of Actual Construction or Alteration' (FAA form 7460-2) be submitted within 5 days after the construction reaches its greatest height. The Applicant will submit a 'Notice of Actual Construction or Alteration' (FAA form 7460-2) for all structures for which the FAA has required them in accordance with the required timeline, as necessary.

2.5.2.2 Threatened or Endangered Species

The Endangered Species Act of 1973 (16 USC 1531, et seq.) and implementing regulations designates and provides for protection of threatened and endangered plants and animals and their critical habitat. It requires a determination of whether a protected species is present in the area affected by a project. Section 7 of the ESA requires that Federal agencies consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) for their determination in authorizing a project that may affect listed species or designated critical habitats that may be found in the vicinity of a project. Prior to any consultation process with these agencies, the project proponent and Federal agency develop and submit a biological assessment (BA) for listed species (animals and plants) and critical habitat that may occur within the Project vicinity. The biological assessment is typically based on an analysis of project information (e.g. field studies/surveys) and pertinent natural resource information and provides an effects analysis for the Project on the listed species. The BA concludes with a determination of whether the Project will adversely affect each listed species or adversely modify critical habitat. Upon completion of the biological assessment, formal consultation between the action agency and the USFWS or NMFS is initiated, if necessary.

In cases where a project does not require the approval, funding or conduct of a federal agency, Section 10 of the ESA provides a parallel process whereby non-federal entities may consult with the USFWS or NMFS and acquire a take statement for incidental adverse effects or take of listed species by the Project. In the absence of a federal nexus, the Project proponent and permitting entities (state and county) are not required to obtain concurrence from the USFWS or NMFS when projects will have no effect or not likely adversely affect listed species. The threshold for implementing actions under Section 10 of the ESA is take of a listed species. If a project is likely to result in the take of a listed species, the project proponent should initiate acquisition of a Section 10 permit (USFWS 1996).

Statement of Compliance

The Applicant has carried out studies and field surveys conducted by Project consultants who have determined that no threatened and endangered plants and animals and their critical habitat will be affected by the Project. The Project will have no effect on federally threatened or endangered species.

2.5.3 Pertinent State Statutes, Regulations, Rules and Permits

2.5.3.1 Department of Natural Resources

Department of Natural Resources regulates surface mining pursuant to RCW 78.44. RCW 78.44.081 requires the issuance of a Reclamation Permit prior to engaging in surface mining. However RCW 78.44.031 (17)(d)(i) exempts surface mining primarily for on-site construction, on-site road maintenance, or on-site landfill construction.

Statement of Compliance
The onsite gravel pits will be exempt from Department of Natural Resources surface mining permit requirements. DNR has informed Applicant that the use of onsite gravel is allowed as a temporary construction use, provided that the pits are located on private land and do not sell material for unrelated offsite uses. All material recovered from the onsite pit will be used only for onsite construction purposes and will not be sold. A precedent for such use has additionally been established by the Stateline Wind Farm project near Walla Walla, which used exempt onsite gravel pits for the construction of that wind farm project.

It is anticipated that a reclamation plan will be submitted and approved by EFSEC prior to construction. Applicant will comply with the financial responsibility requirements by posting a financial instrument acceptable to EFSEC for the duration of the construction and reclamation period. These facilities would be subject to the requirements of a National Pollutant Discharge Elimination System (NPDES) storm water construction permit and other pertinent construction and Project operation permits.

2.5.3.2 Electrical Construction Permit

Washington Department of Labor and Industries which permits, inspects and enforces regulations regarding electrical installations pursuant to Chapter WAC 296-746A WAC Washington Department of Labor and Industries Safety Standards – Installing Electrical Wires and Equipment – Administration Rules.

Statement of Compliance
The Washington Department of Labor and Industries will administer and enforce all electrical permitting, inspecting, design and enforcement regulations regarding electrical installations either directly or pursuant to a contract with EFSEC. The Project will be designed and constructed in conformance with Chapter WAC 296-746A WAC.

2.5.3.3 Noise Control

The Washington Department of Ecology has the authority regarding noise standards and control pursuant to Chapter RCW 70.107 RCW Noise Control; Chapter WAC 173-58 WAC, Sound Level Measurement Procedures; and Chapter WAC 173-60 WAC, Maximum Environmental Noise Levels.

Statement of Compliance

The Project will be designed, constructed and operated to meet the Washington Department of Ecology's noise regulations and standards.

2.5.3.4 Water Quality Storm Water Discharge: Construction Activities and Operation

The Project will require a Stormwater General Permit for construction activities because construction of the facility will disturb more than five acres of land. EFSEC has jurisdiction regarding the National Pollution Discharge Elimination System (NPDES) Permit over the Project pursuant to Chapter WAC 463-38 WAC. The Washington Department of Ecology would have had jurisdiction in the absence of EFSEC. The applicable statutes and regulations are as follows: Chapter RCW 90.48 RCW Water Pollution Control Act; Chapter WAC 173-220 WAC Department Of Ecology National Pollutant Discharge Elimination System Permit Program (NPDES), which establishes a state permit program applicable to the discharge of pollutants and other wastes and materials to the surface waters of the state of Washington. WAC 173-226, 'Waste Water General Permit Program', 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: 42 USC 1251 Federal Clean Water Act; 15 CFR 923-930.

Statement of Compliance

The Applicant will obtain the necessary NPDES Permit(s) from EFSEC pursuant to Chapter WAC 463-39 that will conform to and be in compliance with all the requirements set forth above.

An NPDES Pemit will be required for construction activities and may be required for operation. The Applicant will apply for both a General Permit to Discharge Storm Water Associated With Construction and for Coverage Under Sand and Gravel Operations.

2.5.3.5 Department of Fish and Wildlife

The Washington Department of Fish and Wildlife, pursuant to Chapter 232-12 WAC, designates certain "Priority Habitats".

Statement of Compliance

The Applicant will comply with the substantive requirements of Washington Department of Fish and Wildlife regarding appropriate minimization and mitigation of impacts to "Priority Habitat" areas.

2.5.4 State Environmental Policy Act (SEPA)

A Development Permit would have been required from Kittitas County, which would have made it the lead agency for SEPA absent EFSEC jurisdiction. The applicable statutes, regulations and are as follows: Chapter RCW43.21C RCW Washington State Environmental Policy Act; Chapter WAC 197-11 WAC Washington Department of Ecology SEPA Rules, which establishes uniform requirements for compliance with SEPA and Kittitas County SEPA regulations set out in Kittitas County Code Title.

Statement of Compliance
A SEPA EIS will be issued by EFSEC that will comply with the statutes and regulations set out above. The substantive requirements set out in the Kittitas County Code Chapter 15.04 are the same and as such will be used by EFSEC in its SEPA process.

2.5.4.1 Archeological Sites

The Washington State Office of Archaeology and Historic Protection regulates and protects the cultural and historic resources on private and public lands in the State of Washington. The applicable statute is as follows: Archaeological Sites and Resources, Chapter 27.53 RCW.

Statement of Compliance
The Project will comply with Chapter 27.53 RCW. The Applicant has researched state and federal registries along with all archaeological and historical files and maps located at the Washington State Office of Archaeology and Historic Preservation (OAHP) in Olympia. The Applicant conducted a comprehensive pedestrian field survey of the Project area. This archaeological survey covered the entire areas within the Project where ground-altering activities are proposed. Eight archaeological or historical sites were identified and recorded with in the Project area. All sites will be avoided by a 100 foot buffer. A qualified archeologist will monitor all ground excavation activities during the construction process. The Yakama Nation, the Wanapum, and the Confederated Tribes of the Colville Reservation, have been consulted during the planning process, beginning in February of 2003. They will be notified prior to commencement of construction and will be invited to have representatives present during all groundbreaking activities.

2.5.5 Pertinent Local Ordinances and Permits

2.5.5.1 Zoning

The Kittitas County Zoning Regulations are found in Title 17 of the Kittitas County Code. Specifically, Kittitas County Zoning Code 17.61.020 (D) provides that "major alternative energy facilities" are allowable in Agriculture-20, Forest and Range, Commercial Agriculture and Commercial Forest zones pusuant to the provisions of Kittitas County Code 17.61A. The primary conditions are for the protecton of the health, welfare, safety, and quality of life of the gerneral public, and to ensure compatible land use in the vicinity.

<u>*Statement of Compliance*</u>
The Project site is in a zoning designation(s) for which the proposed use may be allowed pursuant to conditions that the protect the health, welfare, safety, and quality of life of the gerneral public, and ensure compatible land use in the vicinity. The requirements set out in the Kittitas County Code Chapter 17.61A for approval are substantially of the same nature as those used by EFSEC in its administrative and SEPA process.

2.5.5.2 Comprehensive Plan

The Kittitas County Comprehensive Plan is not directly applicable to the Project, in that the Plan is implemented through adopted development regulations. However, to the extent that the Plan contains goals and policies, which may be considered to be criteria applied in any development regulations or as substantive SEPA policies, the Applicant summarizes such goals and policies below.

Chapter 2, "Land Use," contains goals and policies encouraging land uses in agricultural and forestry zones which are compatible with, promote, conserve and protect agricultural and forestry uses, and discouraging land uses which are not compatible with these goals and objectives. (GPO 2.114B, 2.118, 2.130, 2.132, 2.133, 2.135, 2.139 and 2.140).

Chapter 5, "Capital Facilities Plan" contains goals and policies concerning Kittitas County's development of electric generation and transmission facilities both within urban areas and in rural areas. (GPO 5.110A and 5.110B).

Chapter 6, "Utilities" contains goals and policies relating to the development of utility facilities, including provisions for processing permits in a fair and timely manner, requiring the solicitation of community input prior to County approval of utility facilities, and requiring that decisions regarding utility facilities be made "in a manner consistent with and complementary to regional demands and resources." Chapter 6 also addresses policies guiding the routing of electric transmission and distribution facilities in rural areas. (GPO 6.7, 6.10, 6.18, 6.21, 6.31, and 6.32.)

Chapter 8, "Rural Lands," contains goals and policies guiding the development of rural areas of the county. These polices include the assurance that private land owners "should not be expected to provide public benefits without just compensation," and that "if the citizens desire open space, or habitat, or scenic vistas that would require a sacrifice by the land owner or homeowner, all citizens should be prepared to shoulder their share in the sacrifice." Chapter 8 encourages the development of "resource based industries and processing." (GPO 8.7, 8.24, 8.42, and 8.62).

<u>*Statement of Compliance*</u>
The Project will be compatible with the goals and policies of the Kittitas County Comprehensive Plan and will not conflict with surrounding land uses. It will comply

with all Kittitas County Comprehensive Plan standards as may be applicable and enforceable through relevant regulatory criteria.

2.5.5.3 Building Codes

A building permit will be required from Kittitas County pursuant to Kittitas County Code Title 14.04 for the construction of the permanent buildings. A permit is usually issued upon submittal of detailed plans.

Statement of Compliance
The Applicant will comply with the substantive requirements of the Kittitas County building codes.

2.5.5.4 Sewage Disposal Installation and Design Regulations

Kittitas County has jurisdiction over and regulates the design, installation and maintenance (including pumping) of on-site sewage disposal systems using septic tanks and subsurface disposal fields for systems with designed flows of less than 3,500 gallons/day pursuant to Kittitas County Code Title 13.04.

Statement of Compliance
The Project will require an on-site septic system with a design flow of less than 3,500 gallons/day. The Applicant will comply with the substantive Kittitas County septic tank and subsurface disposal field design, installation and maintenance requirements pursuant to Kittitas County Code Title 13.04.

2.5.5.5 Stormwater Management Plan

Kittitas County requires stormwater management plans for projects pursuant to Kittitas Count Code Title 12.70.

Statement of Compliance
It is uncertain whether a stormwater management plan would be required for this Project. The substantive requirements set out in the Kittitas County Code Chapter 12.70 are similar to the stormwater management requirements which will be imposed upon the Project by EFSEC.

2.5.5.6 Noxious Weeds

Kittitas County Noxious Weed Control Board regulates noxious weeds in Kittitas County pursuant to RCW 17.10.

Statement of Compliance
The Project will comply with the substantive requirements of Chapter 17.10 RCW as administered by the Kittitas County Noxious Weed Control Board.

2.5.5.7 Critical Areas Review/Determination

Kittitas County Code, Title 17A requires the submission of a critical areas checklist before commencement of all land use activities and a determination regarding critical areas and mitigation, if necessary.

Statement of Compliance
Critical areas mitigation requirements, if necessary, are site related, and will be implemented by EFSEC. EFSEC requirements related to critical areas would be similar to the substantive requirements resulting from the implementation of Kittitas County Code, Title 17A.

2.6 COORDINATION AND CONSULTATION WITH AGENCIES, INDIAN TRIBES, THE PUBLIC AND NON-GOVERNMENTAL ORGANIZATIONS

The Applicant has consulted extensively with local, state, and federal agencies and tribal representatives during the development of the proposed Project, as described below.

2.6.1 Local Agency Contacts

County Planning Staff
Representatives of the Applicant met with Clay White of the Kittitas County Community Development Services department (which encompasses both planning and building permit functions) on June 30, 2003 to discuss the proposed Project and site. County planning staff did not identify any anticipated problems with the proposal and encouraged the Applicant to submit a County development activities application as soon as possible to facilitate County review of the Project. There have been no written responses resulting from this consultation.

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.

2.6.2 State Agency Contacts

WDFW
The Applicant's wildlife and plant consultant, WEST, Inc. has contacted WDFW regarding the potential occurrence of state-listed threatened or endangered species within the Project area. This consultation is described in detail in Section 3.4 'Vegetation and Wetlands' and Section 3.6 '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 Edd Bracken) on several occasions to discuss the proposed Project beginning on May 29, 2003. Copies of the study protocols and draft findings have been provided to WDFW during the course of the development of the Project. Input from WDFW has shaped the studies and reports that have been developed for the Project. 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. A letter from Ted Clausing of the WDFW Yakima office regarding potential fisheries impacts of the Project and transmission feeder lines is attached as Exhibit 11.

WDNR
The Applicant has met with staff of the WDNR on several occasions 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 24th 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 land owners in Kittitas County to discuss potential Project effects on big game. The Applicant has also consulted via email 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 has 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.

2.6.3 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. The correspondence from BPA confirming the above is included as Exhibit 32.

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 3.6 'Wildlife'.

2.6.4 Tribal Contacts

Yakama Nation

Lithic Analysts, the Applicant's cultural resources consultant, sent a letter on March 5th, 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 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 as Exhibit 25. Lithic Analysts also contacted Mr. David Powell, Yakama Nation ceded lands archeologist 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, which he 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 5th, 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. Copies of this correspondence are included as Exhibit 25.

The February 19, 2004 meeting was attended by the Applicant, EFSEC, and CCT representatives. 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 5th, 2003, to Lenora Seelatsee, of the Wanapum Tribe, notifying the Wanapum 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. A copy of the cultural resources survey report will be forwarded to them.

2.7 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.

2.7.1 Repowering

The first generation of wind energy generating projects in the US and Europe that were installed in the 1980's have only recently begun to reach the end of their use life. The older technology used at these projects has generally proven to be more durable and longer lasting than was originally anticipated. However, at some older projects, repowering has occurred. Repowering refers to the refurbishing of older wind turbines or to the removal and replacement with newer more efficient turbines. Where older turbines have been removed and replaced with newer turbines, this has generally been accomplished by installing fewer, larger turbines. The net result has typically been to maintain the same or greater nameplate generating capacity. In most jurisdictions, repowering requires regulatory approval and review.

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, however, the decision as to whether or not to repower the Project would depend on factors such 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
- Regulatory Approval

2.7.2 Development on Adjacent Sites

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 which represent the best wind resource potential in the area.

Energy is the sole owner of Wind Ridge Power Partners, LLC. Zilkha Renewable Energy's address and telephone numbers are as follows:

Zilkha Renewable Energy
1001 McKinney Street
Suite 1740
Houston, TX 77002
Phone (713) 571-6640
Fax (713) 571-6659

3.1 EARTH

3.1.1 Existing Conditions

3.1.1.1. Regional Geography and Prominent Features

The proposed Wild Horse Wind Power Project (Project) is located in the northeast portion of Kittitas County in central Washington. Comprising a geographic area of 5,978 square kilometers (2,308 square miles), Kittitas County ranks eighth in size among Washington counties. The county is located east of the Cascade Range in the geographical center of the state and is bounded to the north by Chelan and Douglas Counties, to the south by Yakima County, and to the east by Grant County. The Pacific Crest Trail, high in the Cascade Range, forms its boundary to the west with King County. Prominent geographic features in Kittitas County include the Yakima River and Kittitas Valley to the southwest of the Project, the Wenatchee Mountains to the northwest, the Cascade Mountains to the far west, and the Columbia River to the east. The immediate Project area is dominated by northwest-southeast trending ridges that gently slope between elevations of 3,000 to 3,800 feet, and Whiskey Dick Mountain at approximately 3,873 feet. These ridges are generally dry and wind blown and support short shrub steppe vegetation.

The terrain in the county's northwest corner is in the southern extension of the Wenatchee National Forest and consists of rugged and heavily forested wilderness. At higher elevations, a series of major rivers carries precipitation and snow-melt out of the Cascades and into the Kittitas Valley. The Cooper and Waptus Rivers feed into the Cle Elum River while the North, West, and Middle Forks of the Teanaway River converge and become the main stem of the Teanaway River. Descending out of the mountains, the Cle Elum and Teanaway Rivers then feed into the Yakima River, which flows across the remaining expanse of Kittitas County (including Ellensburg) before winding south into Yakima County. The eastern portion of Kittitas County is bounded by the Columbia River. Near the eastern end of the Wenatchee Mountains, Naneum Ridge generally runs north-south through the Project area, and provides a drainage divide for numerous creeks and ephemeral springs flowing either west into the Yakima River, or east into the Columbia River.

The Wenatchee Mountains extend from the Cascade Range and include Naneum, Caribou, and Whiskey Jim Creeks, all of which eventually join the Yakima River south of Ellensburg. Skookumchuck and Whiskey Dick Creeks are included in surface waters that flow eastward into the Columbia River. To the south, the Saddle Mountains and the Manastash and Umtanum ridges are a physical barrier that runs east and west to form the county's southern border with Yakima County.

A brief description of surrounding land use and designations of the Project facility locations in applicable land use plans and zoning ordinances is located in Section 3.10.1, ‘Existing Conditions’. Section 3.2.1, ‘Existing Conditions’ describes climatological features at the Project site.

3.1.1.2. Geology

Regional Geology and Typical Geological Features

The Project area is located on the Columbia Plateau, which is located at the eastern base of the Cascade Range, and at the western edge of the Columbia Intermontane Physiographic Province (Freeman and others, 1945). This lowland province is surrounded on all sides by mountain ranges and highlands, and covers a vast area of eastern Washington and parts of northern Oregon. The province is characterized by moderate topography incised by a network of streams and rivers that drain towards the Columbia River.

The Columbia Plateau is underlain by a series of layered basalt flows extruded from vents (located mainly in southeastern Washington and northeastern Oregon) during the Miocene epoch (between 7 and 26 million years before present (B.P.). Collectively, these basalt flows are known as the Columbia River Basalt Group. Individual basalt flows range in thickness from a few millimeters to as much as 300 feet.

A variety of sedimentary units that range from Pliocene (2 to 7 million years B.P.) to Holocene (less than 10,000 years B.P. in age) are interbedded and overlie the Columbia River Basalt Group. Along the borders of the plateau, the basalts are underlain by Precambrian (more than 570 million years B.P.) to early Tertiary (65 million years B.P.) rock, which is mostly volcanic and metamorphic in origin. Sedimentary rocks are generally thought to underlie the basalts in the Project area (USGS, 2000).

The Columbia Plateau was divided into three informal physiographic subprovinces by Myers and Price (1979): the Yakima Fold Belt, Blue Mountains, and Palouse subdivisions.

Local Geology

The Project site is located in the Yakima Fold Belt subprovince; an area that includes most of the western half of the Columbia Plateau north of the Blue Mountains. Structurally, the Yakima Fold Belt subprovince is characterized by long, narrow anticlines with intervening narrow to broad synclines that trend in an easterly to southeasterly direction from the western margin of the plateau to its center. Most major faults are thrust or reverse faults that strike subparallel to the anticlinal fold axes. These faults are probably contemporaneous with the folding. Northwest- to north-trending shear zones, and minor folds commonly transect the major folds (USGS, 2000).

Exhibit 6-A and 6b contain maps which illustrate the major geologic units and features discussed in this section.

Structural Geology:

The structural geology of the site primarily includes folded and dipping basalt beds. The Whiskey Dick Anticline trends east-southeast through Whiskey Dick Mountain. The south-trending Naneum Ridge Anticline extends along the western edge of the Project site and intersects the Whiskey Dick Anticline atop Whiskey Dick Mountain. An east-dipping monocline is mapped just east of the Project area. The basalt beds in the eastern side of the Project site dip up to 6 degrees eastward, towards the Columbia River. See Exhibit 6-A, 'Geologic Units and Faults Map' and Exhibit 6-B, 'Geologic Structures and Faults Map (25 mile radius)'.

A landslide is mapped on the south side of Whiskey Dick Mountain. This slide was observed during the site visit. This landslide is estimated to be approximately 1/3 square mile in area and almost a mile long. The elevation ranges from approximately 3000 feet to 3700 feet over the length of the slide, with a corresponding average ground slope of approximately 2 horizontal to 1 vertical. The surface of this landslide is irregular and hummocky, and at the time of the site visit, springs appeared to be emanating from some portions of the slide. Native vegetation was observed at the surface throughout the slide area, suggesting that activity on the slide was either historical, or is of a rate slow enough to enable the establishment of native vegetation. This slide is mapped near C and D strings. (Tabor et. al, 1982). The location of this slide is indicated in the map provided in Exhibit 4, 'Geotechnical Data Report*'*. Further discussion pertaining to this feature is included in Section 3.1.2.4, 'Soils'.

As noted in Exhibit 6-B, two faults are mapped in the southeast area of the Project, that run approximately parallel to and on either side of the Whiskey Dick Anticline (which approximately follows the layout of the G string). Several other faults are noted approximately 5 miles west of the Project, which also trend northwest-southeast. These faults offset Miocene-age formations, and are mapped as being concealed beneath Quaternary formations (Tabor et al., 1982). This indicates the faults in the Project vicinity are older than Quaternary age, and likely formed in late Miocene age (between 6 and 18 million years ago). Many of these faults are inferred and shown as dotted lines buried by alluvial fan materials. It appears that these faults are inferred based on scattered outcrops of bedrock in the alluvial fans. If the faults had moved after the deposition of the alluvial fans, the alluvial fans would have been offset and that would have been an indication that these faults had been active in the late Quaternary.

Bedrock:
The bedrock underlying the Project site consists of Miocene-age basalt flows, and includes the upper Grande Ronde Basalt and the Frenchman Springs Member of the Wanapum Basalt, with interbedded Ellensburg Formation.

The upper Grande Ronde Basalt is described as fine- to medium-grained, nonporphyritic to very sparsely plagioclase porphyritic. Magnetic polarity is normal in the upper part of the Grande Ronde Basalt, but reversed in the lower part of the formation. Based on observations of outcrops and test pits during the site visit, the Grande Ronde Basalt appeared to be dark gray, fine-grained, and very hard but was fractured into angular to subrounded cobbles within a few feet of the ground surface. The fractured portion was infilled by silty and sandy matrix. In most of the test pits excavated in this basalt, the upper few feet were fractured and rippable, but fracture spacing and rock mass quality increased downward rapidly. Most test pits were terminated within 3 feet of the ground surface and were unable to be excavated further by the backhoe.

The Frenchman Springs Member is mapped in the Project area north of Whiskey Dick Mountain and overlies the Grande Ronde Basalt. This unit is described as fine- to medium-grained basalt with abundant to sparse plagioclase phenocrysts and glomerocrysts, commonly 1 to 2 cm across, irregularly distributed throughout the flow, and with normal magnetic polarity. Based on observations of outcrops and test pits excavated during the site visit, the Frenchman Springs member was similar in characteristics to the Grande Ronde Basalt, and is dark gray, fine-grained, and very hard but fractured. The fractured portion was infilled by silty and sandy matrix. In most of the test pits excavated in this basalt, the upper few feet were fractured and rippable, but fracture spacing and rock mass quality increased downward. Most test pits were terminated within 2 to 3 feet in depth and were unable to be excavated further by the backhoe.

A localized outcrop of the Vantage Member of the Ellensburg Formation is mapped in the southeast portion of the Project area. This unit consists of interbedded, weakly-cemented, volcaniclastic sandstone, siltstone, and minor dark mudstone. This member occurs between the Grande Ronde and Wanapum basalts, has an average thickness of 16 to 33 feet, and pinches out to the west towards the Naneum Ridge anticline. Based on observations and documentation of springs in the Project site, it appears that the springs are generally located along a relatively horizontal low-permeability zone that likely correlates with the Vantage Member.

Unconsolidated Deposits:
No unconsolidated deposits are mapped in the Project vicinity on the geologic map except for the landslide discussed above. Based on observations made during the site visit, the surficial materials consist primarily of a thin veneer of brown, silty clay topsoil that was likely wind-deposited. The thickness of this material varies across the site from a few inches to three feet, based on test pit observations. In several areas bedrock and talus were observed at the ground surface.

Mineral Resoureces:
Mineral resources in the immediate vicinity of the Project site include a small inactive borrow pit near the northwest corner of the site. Impacts to local geologic resources would be limited to rock excavated during wind turbine foundation construction activities and gravel quarrying for construction. Earth materials disturbed during excavation activities are not considered significant geologic resources, and therefore, impacts to local geologic resources would be negligible.

<u>*Historical Seismicity and Earthquake Risk & Probability*</u>
The seismic hazards in the region result from three seismic sources: interplate events, intraslab events, and crustal events. Each of these events have different causes, and,

therefore, produce earthquakes with different characteristics (that is, peak ground accelerations, response spectra, and duration of strong shaking).

Intraslab and Interplate Events:
Two of the potential seismic sources are related to the subduction of the Juan De Fuca plate beneath the North American plate. Interplate events occur as a result of movement at the interface of these two tectonic plates. Intraslab events originate in the subducting tectonic plate, away from its edges, when built-up stresses in the subducting plate are released. These source mechanisms are referred to as the Cascadia Subduction Zone (CSZ) source mechanism. The CSZ originates off the coast of Oregon and Washington, with subduction occurring beneath both states. The two source mechanisms associated with the CSZ currently are thought to be capable of producing moment magnitudes of approximately 9.0 and 7.5, respectively (Geomatrix, 1995).

Crustal Events:
Earthquakes caused by movements along crustal faults, generally in the upper 10 to 15 miles, result in the third source mechanism. In Washington, these movements occur in the crust of the North American tectonic plate when built-up stresses near the surface are released. According to the Washington Division of Geology and Earth Resources (WDGER), all earthquakes recorded in eastern Washington have been shallow, with most measured at depths less than 3.7 miles. The largest earthquake in eastern Washington in the last 50 years was a shallow, magnitude 4.4 event northwest of Othello on December 20, 1973 (WDGER, 2002).

Local Faults:
As noted in Exhibit 6-B, , two faults are mapped in the southeast area of the Project, that approximately run parallel to and on either side of the Whiskey Dick Anticline (which approximately follows the layout of the G string). Several other faults are noted approximately 5 miles west of the Project, which also trend northwest-southeast. These faults offset Miocene-age formations, and are mapped as being concealed beneath Quaternary formations (Tabor et al., 1982). This indicates the faults in the Project vicinity are older than Quaternary age, and likely formed in late Miocene age (between 6 and 18 million years ago). Based on the low level of historical seismicity and lack of late-Quaternary offsets of local deposits, the faults in the Project vicinity are likely inactive or else active but typically produce events with magnitude less than 3.0. Based on this information, local faults are not considered to pose a significant hazard to the proposed Project and further investigation or other mitigation measures are not warranted.

Historical Seismic Events in the Project Region:
Three earthquake databases managed by the U.S. Geological Survey list seismic events that have occurred within 60 miles of the Project site (USGS, 2001a). The databases searched were, "USGS/NEIC 1973-Present," "Significant U.S. Earthquakes (1568-1989)," and "Eastern, Central, and Mountain States of U.S., 1534-1986." These searches identified 73 seismic events of varying magnitudes and intensities that occurred between 1887 and 2000. Table 3.1.1-1 identifies only those seismic events that meet the following criteria:

- Magnitude and/or intensity data are available;
- The magnitude of the event is 3.0 or higher;
- The intensity using the Modified Mercalli (MM) Intensity Scale of the event is III or higher, or the event was actually "felt." For reference, an intensity of MM III is associated with shaking that is "felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake" (USGS, 2002). In comparison an event with an intensity of MM VII would produce the following effects: "Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars."(USGS, 2002);
- The seismic event was not an aftershock associated with a larger quake at the same location.

TABLE 3.1.1-1Historical Seismic Events That Have Occurred Within 60 Miles[1] of the Project Site[2]

Year	Month	Day	Latitude (° North)	Longitude (° West)	Magnitude[3]	Intensity[4]	Distance (miles)
1872	12	15	47.90	120.30	7.0	IXF	57
1959	8	6	47.82	120.00	4.4	VIF	52
1973	12	20	46.94	119.25	4.8	F	44
1974	7	14	47.60	120.70	3.3	IVF	43
1975	6	28	46.24	119.71	3.7	--	58
1977	7	13	47.06	120.96	3.6	VF	34
1978	6	27	46.86	120.96	3.7	IIF	36
1979	7	28	46.66	120.66	3.1	IVF	32
1979	12	10	46.70	120.60	3.2	VF	29
1981	2	2	46.28	120.88	4.0	--	59
1981	2	18	47.21	120.90	4.2	VIF	34
1983	11	14	46.66	120.57	3.1	IIIF	30
1983	12	5	46.93	120.70	3.3	VF	23
1984	4	11	47.54	120.16	3.6	--	34
1985	1	9	47.06	120.06	3.2	--	7
1985	6	17	47.06	120.05	3.3	--	7
1987	6	11	46.82	120.59	3.0	--	22
1987	12	2	46.67	120.68	4.1	VF	32
1987	12	2	46.68	120.67	4.3	IVF	32
1988	2	6	47.67	120.02	3.0	F	43
1988	5	5	47.65	120.32	3.3	IIIF	41
1988	5	28	46.81	119.43	3.5	--	38
1988	7	9	46.84	119.69	3.7	--	27
1988	7	14	46.89	119.41	3.3	--	37
1990	3	1	47.77	120.96	3.1	--	59

TABLE 3.1.1-1Historical Seismic Events That Have Occurred Within 60 Miles[1] of the Project Site[2]							
Year	**Month**	**Day**	**Latitude (° North)**	**Longitude (° West)**	**Magnitude[3]**	**Intensity[4]**	**Distance (miles)**
1990	4	22	46.54	119.73	3.3	--	40
1990	6	19	46.84	119.32	3.3	--	43
1990	12	15	46.80	119.99	3.1	--	19
1990	12	22	46.80	119.99	3.4	--	19
1991	2	1	46.81	120.56	3.4	--	22
1991	2	22	46.87	120.65	3.2	--	23
1991	2	26	46.72	119.88	3.0	--	26
1991	3	28	47.68	120.33	3.3	IVF	43
1991	7	6	46.94	120.34	3.4	--	9
1991	7	7	46.93	120.34	3.3	--	9
1991	11	24	47.60	120.24	3.2	--	37
1992	1	24	47.66	120.13	3.4	IIIF	41
1992	10	26	46.86	120.72	3.5	VF	26
1994	4	1	47.66	120.14	3.0	F	41
1994	6	25	46.87	119.31	3.0	--	43
1994	8	7	47.66	120.17	3.1	--	41
1994	11	13	46.59	119.59	3.3	--	41
1995	1	13	46.58	120.71	3.2	--	38
1995	3	9	47.19	120.95	3.0	--	35
1995	6	30	47.11	120.5	3.0	--	14
1995	8	29	46.21	119.91	3.1	--	57
1995	12	17	47.60	120.22	3.1	--	37
1996	6	25	47.20	119.51	3.0	--	33
1997	1	1	46.77	120.46	3.7	--	21
1997	5	27	46.83	119.36	3.3	--	41
1997	7	4	47.72	120.02	3.6	--	46
1997	9	3	47.69	120.27	3.3	--	43
1997	9	18	47.69	120.02	3.3	--	44
1997	11	6	46.53	119.71	3.3	--	40
1999	9	19	46.44	119.63	3.1	--	48
1999	9	19	46.39	120.11	3.2	--	43
1999	12	25	47.63	120.2	3.0	--	39
2000	3	16	47.61	119.32	3.2	F	55
2000	12	24	47.74	120.28	3.5	IVF	47
2001	2	28	47.75	120.03	3.2	IIIF	48
2001	5	11	47.23	119.35	3.3	--	41
2002	6	6	47.72	120.29	3.4	F	45
2003	1	15	46.62	120.52	3.2	F	31

TABLE 3.1.1-1Historical Seismic Events That Have Occurred Within 60 Miles[1] of the Project Site[2]

Year	Month	Day	Latitude (° North)	Longitude (° West)	Magnitude[3]	Intensity[4]	Distance (miles)

1The approximate center of the Project site is located at latitude 47° 02' 23" N, longitude 120° 12' 42" W.

2 Source: USGS Earthquake Hazards Program (see *http://neic.usgs.gov/neis/epic/epic_circ.html).*
The databases search includes Significant U.S. Earthquakes 1568 to 1989 and USGS/NEIC (PDE) 1973 - Present . The only earthquakes in the database prior to 1973 include events in 1872 and 1959.

3 Magnitude values are calculated by the USGS. Magnitude values are Local Magnitudes(ML) and Coda Duration Magnitude (MD). LM magnitude is generally referred to as the true "Richter magnitude". The values are computed for distances less than 600 km with depths less than 70 km. MD estimates are derived from the duration or coda length of earthquake vibrations. Duration or coda length magnitude scales are normally adjusted to agree with ML (see http://neic.usgs.gov/neis/epic/code_magnitude.html).

4 Modified Mercalli intensity scale. Dashed line equals no data for that event.

An earthquake magnitude of 5.5 to 6.0 was selected as being the dominating event at the Project site. The earthquake magnitude selected for the Project site was based on USGS deaggregation seismic hazard mapping for the Umatilla, Oregon, and Walla Walla, Washington, areas. These locations were selected as the closest locations with available data that are representative of the Ellensburg, Washington, area's seismology. The USGS seismic hazard maps present the average magnitude of all potential sources at a given location, and provide the percent contribution at discrete locations of the overall seismic hazard.

However, as shown in Table 3.1.1-1, seismograph records since 1959 indicate the Project area itself has been a-seismic in recent historical time. The closest recorded seismic event had an epicenter about 7 miles from the Project site and had a magnitude of 3.2, or MM intensity of III+. The largest recorded seismic event occurred 44 miles from the Project site and had a magnitude of 4.8. Seismic impact hazard is therefore deemed to be negligible

Low Project Site Seismic Hazard/Earthquake Risk:

The Project area is not considered susceptible to liquefaction or lateral spreading, because liquefaction and lateral spreading require loose, saturated soils. The Project site is underlain by bedrock well above the water table. In addition, the probability of a significant earthquake event occurring during the construction activities is extremely remote. Seismic impact hazard during construction is negligible. As noted above, the probability that the crustal faults in the region are active is relatively low, based on the low level of historical seismicity and lack of late-Quaternary offsets of local deposits, the faults in the Project vicinity are likely inactive or else active but typically produce events with magnitude less than 3.0. Therefore, the potential for fault offsets during a large earthquake also appears to be low. Based on this information, local faults are not considered to pose a significant hazard to the proposed Project and further investigation or other mitigation measures are not warranted.

Building Code Seismic Requirements and Considerations:
The Project shall be designed and constructed for seismic events in accordance with the engineering standards in effect at the time of construction, which will be either Uniform Building Code (UBC) or International Building Code (IBC) requirements. Under Uniform Building Code (UBC), construction projects are designed for a peak ground acceleration (PGA) corresponding to a level in excess of the 10 percent probable value in a 50 year period which corresponds to a likelihood of once in approximately every 500 years. Under IBC, the maximum considered earthquake (MCE) corresponds to an event having a 2 percent probability of exceedance in 50 years (or a 2500-year return period). The UBC and IBC standards require that under the design earthquake the factors of safety, or resistance factors, are used in the design to exceed certain values. This factor of safety is introduced to account for uncertainties in the design process and to ensure that performance is acceptable. Application of these codes in the Project design will provide adequate protection for the Project facilities and ensure protection measures for human safety, particularly given the relatively low level of earthquake risk for the site.

Volcanic Hazards
Within the State of Washington, the USGS recognizes five volcanoes as either active or potentially active: Mount Baker, Glacier Peak, Mount Rainier, Mount Adams, and Mount St. Helens. In the last 200 years, only Mount St. Helens, which is over 80 miles distant from the Project site, has erupted more than once (USGS, 2000a). Impacts to the Project from volcanic activity could be either direct or indirect.

Direct impacts could include the effects of lava flows, blast, ash fall, and avalanches of volcanic products (Waldron, 1989). Indirect effects could include mudflows, flooding, and sedimentation (Waldron, 1989). Data accumulated as a result of the 1980 Mount St. Helens eruption indicate that the most likely effect would be ash fallout in the geographic region surrounding the Project site if one of the five regional volcanoes were to erupt.

In the event that a volcanic eruption would damage or impact Project facilities, the Project facilities would be shut down until safe operating conditions return. Section 4.6.10, ‘Volcanic Eruption’, addresses emergency plans for the Project in the event of a significant volcanic eruption.

3.1.1.3. Soils

Soils in the Project area along the ridgetops, where most construction will occur, primarily consist of complexes of shallow soils that formed in residuum weathered from basalt and loess. Ridgetop soils in this portion of the Project area (which includes the wind turbine locations) include the following series (USDA, 2002a):

- Rock Creek Series: The Rock Creek series consists of shallow and very shallow soils formed in residuum from basalt. Rock Creek Soils are on ridgetops and plateaus. They are well drained with slow to medium runoff and moderately slow permeability. Slopes are 0 to 70 percent with a lithic (bedrock) contact at 14 inches.

- Argabak Series: The Argabak series consists of very shallow soils formed dominantly in loess and residuum weathered from basalt with some glaciated areas also having glacial till on ridgetops, hillslopes, and benches. Slopes are 0 to 65 percent and depth to a lithic contact ranges from 4 to 12 inches. They are well drained with slow to very rapid runoff and moderately slow permeability. Associated soils are Whiskey Dick soils found on hillslopes and ridgetops with a thickness of 20 to 40 inches to bedrock. Whiskey Dick soils are clayey-skeletal, well drained with slow to very rapid runoff, and slow permeability.

- Vantage Series: The Vantage series consists of shallow soils formed in residuum and colluvium from basalt with additions of loess. Vantage soils are well drained with slow to very rapid runoff and moderately slow permeability. They are on plateaus, ridgetops, benches and hillslopes. Slopes are 0 to 45 percent and depth to lithic contact ranges from 4 to 12 inches.

As noted above, soils in the area are dominated by three major soil series: the Rock Creek, Argabak and Vantage series. According to the Natural Resource Conservation Service (NRCS), the Rock Creek series is well drained with slow to medium runoff and moderately slow permeability, while the Argabak and Vantage are both classified as well-drained with slow to very rapid runoff and moderately slow permeability (USDA, 2002a). Even though soil permeabilities are classified as low and the runoff potential ranges from slow to very rapid, it is anticipated that the erosivity of area soils would be mitigated by factors such as grade (i.e., the majority of soils that would be disturbed in the Project area are generally located on grades of 20 percent or less) and the fact that area soils are well-drained. Therefore, it is estimated that the erosiveness of native soils immediately underlying the Project would be in the "medium" range. However, the erosivity index pertains to *in situ* (i.e., undisturbed) soils. As a result, the erosiveness index is not directly applicable to soils that would be disturbed by Project construction activities, but rather to soils adjacent to the disturbed areas. Please refer to Exhibit 5 for the Site Soils map.

For more information on erosion and erosion control measures, please see Section 3.1.2, 'Impacts of the Proposed Action' below and Section 3.3.2, 'Impacts of the Proposed Action'.

3.1.1.4. Local Geography and Topography

The Wild Horse Wind Power Project is located approximately 13 miles east of Ellensburg, WA. The Project is proposed on the ridges and plateau northeast of Whiskey

Dick Mountain. Whiskey Dick Mountain is the most prominent topographic feature in the Project site, and trends west-southeast, whereas the ridges in the northeast portion of the Project trend in various directions. The proposed strings of wind turbines trend generally in a northwest-southeast direction on these ridges. The Project site and adjacent lands range in elevation from approximately 2,000 to 3,870 feet above mean sea level with ridges ranging from 3,000 to 3,873 feet. Basalt rock is at or near the surface in most locations of the Project site, and mantled by a relatively thin cover of overburden clayey and sandy soil.

The Project area covers approximately 8,600 acres of land, although the actual permanent footprint of the area occupied by all of the Project facilities is only 165 acres. With the exception of Whiskey Dick Mountain, much of the site is a relatively flat plateau with steep-sided drainages eroded into it. Ephemeral and spring-fed creeks flow primarily eastward from the Project into the Columbia River. Exceptions are Dorse Spring and a spring in the south part of the Project area that flow south and west, draining into the Yakima River. Most of these drainages originate at springs that exist approximately between elevations 3,300 and 3,400 feet above mean sea level. Slopes within the Project area generally range from less than 5 degrees on the flat plateau area and ridge lines, up to 40 degrees on Whiskey Dick Mountain and in side drainages. Exhibit 1-B, 'Project Site Layout', presents a topographic map of the Project site.

<u>*Unique Physical Features*</u>

Lanslide:
In the south portion of the Project area, spanning Sections 32 and 33, a landslide is mapped. The direction of movement of this landslide is to the south, away from the Project site. A more complete description of this landslide is given above in Section 3.1.1.2, 'Geology'.

Benches:
Along sideslopes in the Project area, several areas of continuous, relatively horizontal benches were observed. These benches consist of an area approximately 20 to 40 feet wide where the ground surface was observed to be slightly flatter than the slope above and below the bench. There appear to be at least two different elevations at which these benches were observed. The uppermost bench was observed on the north and south sides of Whiskey Dick Mountain at an approximate elevation of 3,700 feet. Another set of these topographic benches were observed at various locations in the eastern area of the Project, at elevations between 3,300 and 3,400 feet. This second set of benches appears to coincide with the elevation of most of the known springs and seeps within the Project. These benches are believed to coincide with an interbed of subsurface material between basalt flows that has weathered and sloughed at the ground surface, and that cannot stand at as steep a slope as the basalt. The lower interbed is at a similar elevation as the Vantage Member of the Ellensburg formation, which is mapped only in the southeast area of the Project on the Wenatchee Geology Map (Tabor et al., 1982).

Other Features:

No petrified wood deposits similar to the gingko deposits located in the Gingko Petrified Forest (approximately 5 miles east of the Project site) have been discovered at the Project site and no petrified gingko was observed during the geotechnical reconnaissance work at the Project site.

No other unusual physical features were observed within or near the Project site. In the unlikely event that unique physical or geological features were discovered on-site during construction, construction personnel would stop work at that location and notify the project manager. The project manager would immediately contact appropriate officials at the state historic preservation office to determine an appropriate response.

3.1.2 Impacts of the Proposed Action

3.1.2.1 Erosion/Enlargement of the Land area

Possible impacts to the geologic formations during construction include altering the landscape with minor cuts-and-fills for roadways and leveling and excavation for turbine foundations. Section 2.2.3, 'Project Facilities' contains additional information on foundation construction and associated erosion control measures.

Because the construction of roads, wind turbine foundations, and other Project facilities will be engineered, these facilities will be subject to the requirements of a National Pollutant Discharge Elimination System (NPDES) storm water construction permit and other pertinent construction and operation permits and pollution control regulations as described in Section 4.6, NPDES, and Section 3.3.2.1, 'Surface Water Runoff/Absorption'. These sections provide a more detailed description of the materials, methods and approaches used as part of the BMPs for effective storm water pollution prevention and erosion control, as required by the regulations.

A detailed construction Storm Water Pollution Prevention Plan (SWPPP) will be developed for the Project to help minimize the potential for discharge of pollutants from the site during construction activities. The SWPPP will be designed to meet the requirements of the Washington State Department of Ecology General Permit to Discharge Storm water through its storm water pollution control program (Chapter 173-220 WAC) associated with construction activities and will be provided to EFSEC for review prior to construction.

The SWPPP will include both structural and non-structural best management practices (BMPs). Examples of structural BMPs could include the installation of silt curtains and/or other physical controls to divert flows from exposed soils, or otherwise limit runoff and pollutants from exposed areas of the site. Examples of non structural BMPs include management practices such implementation of materials handling, disposal requirements and spill prevention methods.

The SWPPP will be prepared, along with detailed Project grading plan design, by the Engineering, Procurement and Construction (EPC) Contractor when design-level topographic surveying and mapping is prepared for the Project site. Implementation of the construction BMPs will be carried out by the EPC Contractor, with supervision by the Project's resident Environmental Monitor who will be responsible for implementing the SWPPP.

Site-specific BMPs will be identified on the construction plans for the site slopes, construction activities, weather conditions, and vegetative buffers. The sequence and methods of construction activities will be controlled to limit erosion. Clearing, excavation, and grading will be limited to the minimum areas necessary for construction of the Project. Surface protection measures, such as erosion control blankets or straw matting, may also be required prior to final disturbance and restoration if the potential for erosion is high.

All construction practices will emphasize erosion control over sediment control through such activities as the following:

- Straw mulching and vegetating disturbed surfaces;
- Retaining original vegetation wherever possible;
- Directing surface runoff away from denuded areas;
- Keeping runoff velocities low through minimization of slope steepness and length; and
- Providing and maintaining stabilized construction entrances.

3.1.2.2 On-Site Rock Pit Geology

Three on-site rock pits have been identified for the Project and are described in Section 2.2.3.1 'Roads and Civil Construction Work' under the subheading 'On-Site Rock Quarries'.

Each rock quarry will have a disturbance footprint of approximately 5 acres and the depth will be approximately 10-20 feet depending on the type of rock encountered at each location. The quality of the (basalt) rock was observed to be relatively consistent at each of the locations, and the basalt hardness was field-estimated to be medium-strong to very-strong. Thickness of overburden was commonly less than 3 feet at the sites. While these sites are considered to have the potential for development, subsurface exploration will be conducted in order to identify the depth, breadth, and quality of the rock at each of the potential sites.

Due to the abundance of basaltic rock in the region, the relatively small size of the quarries (five acres) and shallow depth of the quarry sites (10 to 20 feet), it is unlikely that quarry operations will deplete or have an impact on the abundance and availability of basaltic quarry rock in the region.

Design specifications and further details for excavation, blasting and other activities associated with the removal and preparation of quarry materials for Project construction will be included in the Project's construction plans and specifications. This information will be provided to EFSEC for review and approval prior to the initiation of constuction activities.

A reclamation plan for the proposed rock quarries will be submitted to EFSEC for review and approval prior to construction.

As described in Section 2.6.2, 'WDNR', the Washington Department of Natural Resources has informed the Applicant that RCW 78.44.031 (17)(d)(i) exempts surface mining primarily for on-site construction, on-site road maintenance, or on-site landfill construction. The use of onsite gravel is allowed as a temporary construction use, provided that the pits are located on private land and do not sell material for unrelated offsite uses. Therefore, DNR surface mining permits SM8A and SM6 are not required for the Project gravel quarries.

3.1.2.3 Excavation and Fills

Based on preliminary calculations and depending on the type of turbine foundation design used, WTG excavations are anticipated to total approximately 186 cubic yards each, for a total of approximately 24,000 cubic yards. Approximately 50 % of excavated soils are anticipated to be re-used as backfill at foundations. The remaining 50% is expected to be too large for re-use. These larger cobbles will be crushed into smaller rock for use as backfill or road material. In the event that a net surplus of excavated material results from construction, those materials that cannot be used during construction would be utilized during reclamation activities at the rock quarry pits.

Estimated depths of cuts and fills for roads, trenches, and each substation(s);, are listed in Table 3.1.2-1 below. The estimations assume maximum volumes for the Project facilities and typical volumes for the type of wind turbines proposed for the Project:

Table 3.1.2-1: Estimated Depth of Cut and Fills

Feature	Estimated Depth of Cut and Fills
Roads	1 to 2 ft deep x 24 ft average width
Underground Trenches	3 to 4 ft deep x 6 ft average width
Substations	1 to 2 ft deep x 250 ft x 450 ft
Typical WTG Foundation	Excavation: 16 ft diameter x 25 ft deep = 186 cubic yards (backfilled)
Typical Turbine Crane Pad	1 to 2 ft deep x 30 ft x 100 ft

Specific criteria and methods for construction, locations and methods for handling any imported fill material have not been determined. Applicant will provide this information to EFSEC when available. Although no off-site disposal of any spoils is anticipated, the Applicant has permitted for soil import and export activity in the NPDES permit application (contained in Exhibit 8) in the unlikely event that any spoils can not be disposed of on-site.

Sand sources for the underground trench shading have not yet been identified but will most likely come from off-site. The quantities of sand and gravel required have been estimated and are quantified in Section 3.8, ‘Natural Resources’.

3.1.2.4 Soils

<u>*Landslide Potential & Avoidance*</u>

Mapped Landslide:
It appears that most Project facilities would not be located on unstable slopes or landslide-prone terrain. The turbines are located on top of ridges, on relatively flat areas, and not on slopes. Therefore, sliding of the soil materials is not expected. However, a landslide is mapped on the south side of Whiskey Dick Mountain, as indicated on the map provided in Exhibit 4, ‘Geotechnical Data Report’ (also see Section 3.1.1.2, ‘Geology’). The location of this slide and its mechanisms of behavior could affect final turbine locations in the vicinity of the C and D strings. Field observations in this area indicated hummocky, disturbed terrain and springs. At the present time, the distance separating wind turbines and their facilities (approximately 800 feet minimum) from the mapped landslide boundary appears to be adequate.

However, prior to construction of the Project, further detailed site investigations including ground penetrating radar (GPR) and geotechnical drilling shall be conducted as necessary to delineate the limits of the potential landslide area to ensure that the turbines are not placed in potentially unstable terrain and in order to provide final recommendations for minimum safe setback distances from slide areas.

General Landslide Risk:
In general, the Project is located in relatively low-gradient topography with a relatively thin veneer of soil that overlies basaltic bedrock. Therefore, risk of a landslide appears to be minimal overall, aside from the area of concern discussed in the above paragraph. Observations of the site conducted during the geotechnical investigation and geologic site reconnaissance indicate that potential landslide-prone terrain is not visually apparent on the Project site in the vicinity of the proposed wind turbines. If slope failure were to occur, the turbine strings are typically situated at a safe distance from steep slopes and the turbines and their associated foundation structures would not be affected.

In the event that roads are constructed below steep slopes (greater than 21 to 30 degrees), soil and rock from exposed overburden could fall on the road if the cut bank slope were to fail (i.e., during an earthquake or from seasonal freeze/thaw action and slope raveling). However, the proposed site layout does not include any roads below such steep slopes. The road that traverses the north side of Whiskey Dick Mountain was constructed with minor cuts and fills, but no areas of instability were observed during the site visit.

Furthermore, because Project access roads are used infrequently during operations, the risk associated with rock fall and/or slope movement to a vehicle and driver is low.

General Impacts to Soils
Impacts on Project area soils would be limited to areas disturbed by the construction activities. Impacts would consist of removal of topsoil and loss of soil permeability due to compaction within the footprint of the permanent facilities and in areas used for temporary construction activities (i.e., temporary staging areas and roads). Soils in disturbed areas would be susceptible to erosion from wind and storm water runoff. However, impacts to soils in disturbed areas are expected to be negligible because of the implementation of storm water pollution prevention Best Management Practices (BMPs) and mitigation measures implemented through site restoration activities.

Impacts to soils adjacent to disturbed areas are expected to be negligible because of the implementation of storm water pollution prevention Best Management Practices (BMPs) and site restoration activities.

Potential for Encountering Contaminated Soils
Applicant commissioned KTA of Seattle, WA to conduct a Phase I Environmental Site Assessment (ESA) of the property to be developed as part of the Wild Horse Wind Power Project. The objective of the ESA was to identify and characterize obvious or potential environmental concerns that may exist at the site. To accomplish this objective, a Phase I ESA was performed focusing on a review of environmental records, including information on the physical setting, historical use, and known environmental hazards near the Site. KTA performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E 1527. This assessment revealed no evidence of environmental impairment within the Project area. Based on these findings, it is not anticipated that any environmental contamination will be encountered during construction or operation of the Project. In the unlikely event that contaminated soils are encountered, Applicant will coordinate with appropriate personnel at Department of Ecology. Section 3.16.1.4, 'Miscellaneous', further describes procedures addressing the discovery of contaminated soils.

3.1.2.5 Topography

Impacts on topography in the area would be limited to the footprint of the Project facilities and roads. No Project-related impacts are expected to the topography of areas adjacent to the proposed facilities, since proposed facilities will be constructed at or near existing grade. The Project would alter the landscape with minor cuts-and-fills for roadways and leveling for wind turbine foundations. Table 3.1.2-1 describes the estimated depth of cut-and-fill activities. Each of the three proposed rock quarries will have a disturbance footprint of approximately 5 acres and the depth will be approximately 10-20 feet depending on the type of rock encountered at each location. The Applicant will implement Best Management Practices (BMPs) for erosion control and storm water pollution prevention during construction, and will implement BMPs during restoration activities at the rock quarries to minimize impacts on topography.

Specific details of topographic modifications will be provided to EFSEC when detailed engineering plans have been developed. Siting of the control measures will be determined by Project engineers after final design has been completed.

3.1.2.6 Comparison of Impacts of the Proposed Scenarios

All design scenarios will comply with relevant regulations and would require the development of an appropriate erosion control plan and implementation of erosion control best management practices (BMPs) during Project construction and operation.

All design scenarios under consideration address landslide potential and will implement appropriate avoidance setbacks from surfaces deemed unstable or unsafe upon further geotechnical investigation prior to construction.

Impacts on Project area soils for all scenarios would be limited to areas disturbed by the construction activities. All design scenarios will implement the use of storm water pollution prevention Best Management Practices (BMPs) and site reclamation activities.

There will be no significant change to topography resulting from any of the design scenarios under consideration.

Under the different design scenarios, there is no change to the length or width of Project components, including the roads, substations, O&M facilities, rock quarries, underground or overhead lines, permanent met towers, batch plant, or rock crusher. These components comprise the vast majority of acreage impacted by the Project, and because they remain unchanged under all scenarios, the total acreage and construction quantities are very similar under all scenarios. This is because the scenarios utilize a nearly identical layout, with greater or fewer WTGs along each string, but with the same beginning and end points for each string. The "permanently disturbed" acreage differs only by the different number of WTG foundations required, which is a very small percentage of the overall Project footprint acreage. The Large WTG Scenario utilizes larger foundations for a smaller number of WTGs while the Small WTG Scenario utilizes smaller foundations for a larger number of WTGs, yielding similar acreage requirements. The different acreages permanently disturbed under each scenario are detailed in Table 3.1.2-2 below. Project Site Layouts for the different scenarios are contained in Exhibit 1.

The construction impacts are also substantially similar under the different design scenarios. There is no significant change to peak and total earthmoving quantities, or to peak and total production volumes at the batch plant or rock crusher. This is because the Large WTG Scenario utilizes larger foundations for a smaller number of WTGs while the Small WTG Scenario utilizes smaller foundations for a larger number of WTGs. The overall excavation quantities for the Project for the different turbine scenarios vary by less than 10%. Gravel requirements vary by less than 1% under the different scenarios. The different natural resource requirements under each scenario are detailed in Table 3.8.2-1.

Table 3.1.2-2: Comparison of Area Impacts of the Proposed Scenarios			
	MOST LIKELY Scenario	**SMALL WTG Scenario**	**LARGE WTG Scenario**
	70.5 m Rotor	**60 m Rotor**	**90 m Rotor**
WTG Foundations - total acres	9.4	9.2	9.3
New Road acres	67	67	67
Major & Minor Improved Road acres	28	28	28
Road Turnaround acres	26	26	26
Substation acres	9	9	9
O&M building & parking acres	4	4	4
Rock quarry acres	15	15	15
Overhead collector line total acres	0.1	0.1	0.1
BPA & PSE Transmission feeder line total acres	0.3	0.3	0.3
Permanent Met Tower acres	0.3	0.3	0.3
Batch Plant acres	6	6	6
Total acres permanently disturbed	165	165	165

Notes

These estimates include reasonable contingency estimates

Truck turnarounds are estimated at 1 acre each

3 Substations estimated at 3 acres each

3 Quarries estimated at 5 acres each

Overhead collector line estimated at 250' spans and 10' x 10' pole disturbed areas

Transmission feeder lines estimated at 600' spans, two pole H frames, and 8' x 8' disturbed areas

Permanent Met towers estimated at 5 towers, 50' x 50' impacted area each

Underground collector trench considered a temporary disturbed area and not included here

3.1.3 Impacts of No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this ASC 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload demand would most 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 or "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.) See Section 2.3, 'Alternatives'.

3.1.4 Mitigation Measures

3.1.4.1 Mitigation for Seismic Hazards

The Project shall be designed and constructed for seismic events in accordance with the engineering standards in effect at the time of construction, which will be either Uniform Building Code (UBC) or International Building Code (IBC) requirements. The UBC and IBC standards require that under the design earthquake the factors of safety, or resistance factors, are used in the design to exceed certain values. Application of these codes in the Project design will provide adequate protection for the Project facilities and ensure protection measures for human safety, particularly given the relatively low level of earthquake risk for the site.

The wind turbines are also fitted with vibration sensors which will detect large scale seismic events and shut the turbine down immediately.

3.1.4.2 Mitigation for Volcanic Hazards

In the event that a volcanic eruption would damage or impact Project facilities, the Project facilities would be shut down until safe operating conditions return. If an eruption occurred during construction, a temporary shut-down would most likely be required to protect equipment and human health. See Section 3.8 for detailed Emergency Plans.

3.1.4.3 Mitigation for Erosion

Erosivity of area soils would be mitigated by factors such as grade (i.e., the majority of soils that would be disturbed by the Project are generally located on grades of 20 percent or less) and the fact that area soils are well-drained.

A detailed construction Storm Water Pollution Prevention Plan (SWPPP) will be developed for the Project to help minimize the potential for discharge of pollutants from the site during construction activities. The SWPPP will be designed to meet the requirements of the Washington State Department of Ecology General Permit to Discharge Storm water through its storm water pollution control program (Chapter 173-220 WAC) associated with construction activities and will be provided to EFSEC for review prior to construction.

All construction practices will emphasize erosion control over sediment control through such activities as the following (described in detail in Section 3.3.2, 'Impacts of the Proposed Action'):

- Straw mulching and vegetating disturbed surfaces;
- Retaining original vegetation wherever possible;
- Directing surface runoff away from denuded areas;
- Keeping runoff velocities low through minimization of slope steepness and length; and
- Providing and maintaining stabilized construction entrances.

3.1.4.4 Mitigation for Landslides

In general, the Project is located in relatively low-gradient topography with a relatively thin veneer of soil that overlies basaltic bedrock. Therefore, risk of a landslide appears to be minimal overall. If slope failure were to occur, the turbine strings are typically situated at a distance from steep slopes and the turbines and their associated foundation structures would not be affected.

3.1.4.5 Mitigation for Unique Features

In the unlikely event that unique physical or geological features were discovered on-site during construction, construction personnel would stop work at that location and notify the project manager. The project manager would immediately contact appropriate officials at the state historic preservation office to determine an appropriate response.

3.1.4.6 Mitigation for Contaminated Soils

Applicant commissioned KTA of Seattle, WA to conduct a Phase I Environmental Site Assessment (ESA) of property to be developed. This assessment revealed no evidence of environmental impairment within the Project area. Based on these findings, it is not anticipated that any environmental contamination will be encountered during construction or operation of the Project. In the unlikely event that contaminated soils are encountered, Applicant will coordinate with appropriate personnel at Department of Ecology.

3.1.5 Significant Unavoidable Adverse Impacts

There are no significant unavoidable adverse impacts related to geology, soils, erosion or topography.

3.2 AIR QUALITY

3.2.1 Existing Conditions

3.2.1.1 Climate

The Project site is located in a semi-arid region of south-central Washington, at the western edge of the Columbia Basin physiographic province, which includes the Kittitas Valley and the central plains area in the Columbia Basin south from the Waterville Plateau to the Oregon border, and east to near the Palouse River. The elevation increases from approximately 400 feet at the confluence of the Snake and Columbia Rivers to 1,300 feet near the Waterville Plateau and 1,800 feet along the eastern edge of the area. This large province occurs within the rain shadow of the Cascade mountain range, and is characterized by semi-arid conditions, as well as a large range of annual temperatures indicative of a continental climate. However, the relatively close proximity of the Pacific Ocean and the dominant westerly winds of the region combine to moderate the continental influence (Franklin and Dyrness 1988). Annual precipitation ranges from 7 inches in the drier localities along the southern slopes of the Saddle Mountains, Frenchman Hills and east of the Rattlesnake Mountains, to 15 inches in the vicinity of the Blue Mountains.

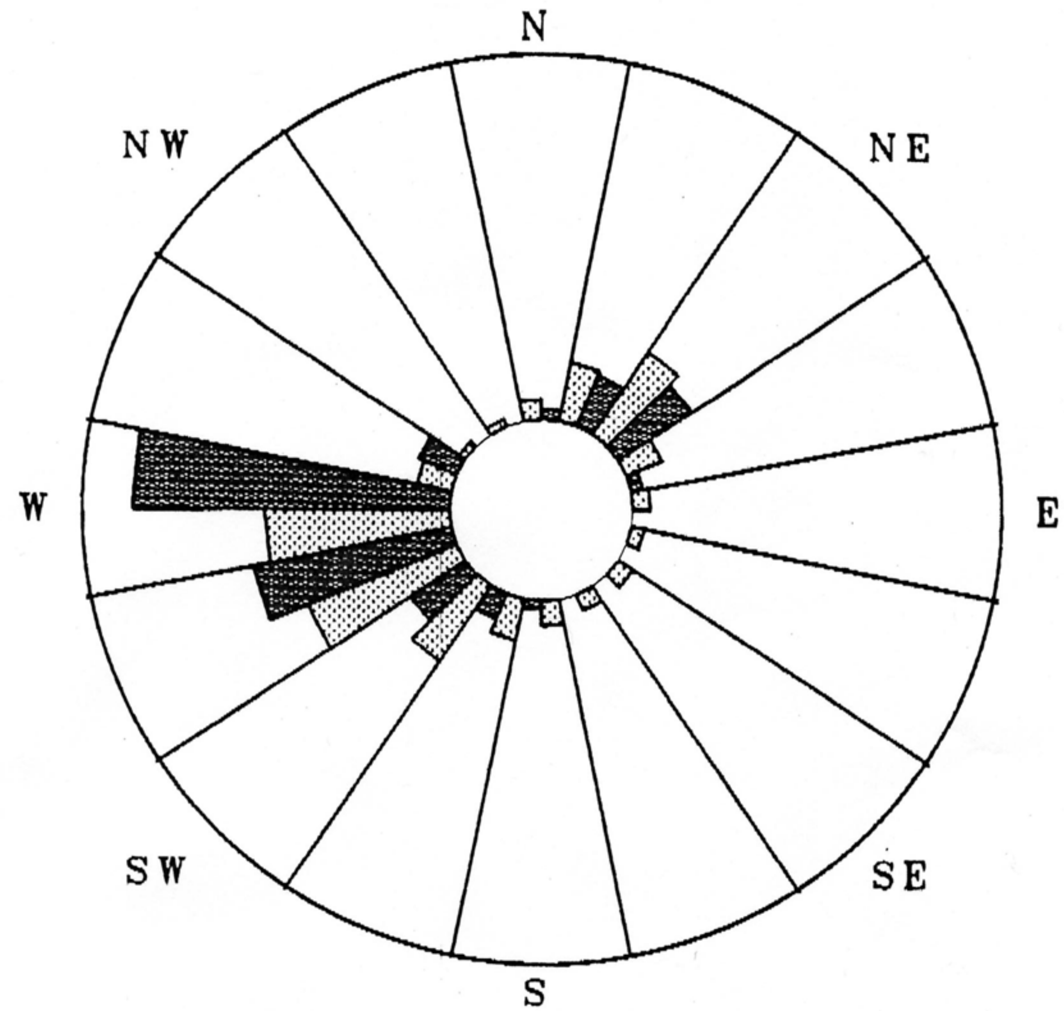
Summer precipitation is rare and usually associated with thunderstorms. During July and August, it is not unusual for four to six weeks to pass without measurable rainfall. The last freezing temperature in the spring occurs during the latter half of May in the colder localities of the Columbia Basin. The first freezing temperature in the fall is usually recorded between mid-September and mid-October. (Climate of Washington, Western Region Climate Center: [WRCC]).

Wind Mechanism

The Wild Horse Wind Power Project site is located on several well exposed ridgelines, the largest is known as Whiskey Dick Mountain at 3,873 feet elevation. The ridges range in elevation from 3,000 feet to 3,873 feet. The ridges are about 15 miles east of Ellensburg and 10 miles west of the Columbia River. They are downwind of Snoqualmie Pass, the lowest pass through the Washington Cascades. Strong westerly winds are channeled through Snoqualmie Pass and the winds accelerate down the backside (eastern slopes) of the Cascades. The acceleration of winds down the back side of mountain passes is a well known phenomenon associated with stable flows, and is referred to as downslope acceleration. The most persistent winds occur in the spring and summer months when there is a strong temperature gradient between the cool Puget Sound and the hot dry Columbia plateau region. However, strong winds also occur in other months, and are associated with the passage of numerous cold fronts moving through the region.

The wind rose in Figure 3.2.1-1 was developed from four years of historical data at the Project site and shows the percent of time and energy in 16 compass points and indicates that the prevailing winds blow from the west through west-southwesterly directions. The highest wind speeds are from westerly directions and generally occur in the spring through summer months. The black shading indicates the relative percent of turbine energy in each sector and the gray shading indicates the percent of time the winds blow from each direction.

Figure 3.2.1-1: Wind Energy Rose for Whiskey Dick Mountain



Ellensburg Temperature and Precipitation Statistics

The Ellensburg airport provides the longest term data set with information recordings from 1940 to present. The coldest average monthly temperatures at Ellensburg occur in January with a minimum of 15ºF, and a maximum of 32ºF. The warmest average monthly temperatures in Ellensburg occur in July, when the minimum is 54ºF and the maximum is 84ºF.

The average total annual precipitation at Ellensburg is 8.9 inches. Ellensburg's average annual snowfall is 35.2 inches. It should be noted that the highest point in the Project area (Whiskey Dick Mountain at 3,873 feet elevation) is over 2,100 higher in elevation than the reporting station in Ellensburg. Therefore the Project area will experience slightly cooler temperatures than reported for the Ellensburg station.

Based on 63 years of data collection at the Ellensburg Airport, average climate conditions are presented in Table 3.2.1-1 below.

Table 3.2.1-1 Average Climate Conditions at Ellensburg Airport, 1940-2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32	41	50	61	70	74	84	82	75	61	44	36	58.9
Average Min. Temperature (F)	15	22	27	34	43	49	54	53	45	36	27	22	35.6
Average Total Precipitation (in.)	1.3	0.8	0.7	0.5	0.6	0.7	0.2	0.3	0.5	0.7	1.3	1.2	8.91
Average Total SnowFall (in.)	13	6.2	2	0.1	0	0	0	0	0	0.1	5.5	8.2	35.2
Average Snow Depth (in.)	5	4	1	0	0	0	0	0	0	0	0	2	1

Period of Record: 5/4/1940 to 3/31/2003
Source: Western Regional Climate Center (http://www.wrcc.dri.edu) for Ellensburg Airport, Washington (452508).

<u>*Extreme Temperatures and Wind Gusts*</u>
Based on the same weather data set, the maximum recorded temperature was 103ºF and the minimum recorded temperature was -28ºF. Extreme gust wind speeds have been measured and calculated for Ellensburg in a report prepared by Wantz and Sinclair (1981) which indicates that the 100-year expected peak gust is 73 mph. The design case for all facility equipment, specifically the turbines and towers, are designed to withstand wind loads and temperatures far in excess of these extremes as described more fully in Section 2.2.3, 'Project Facilities'.

<u>*Air Stability and Humidity*</u>
A proxy for air stability at the site is represented by the sigma theta value, which is the standard deviation of wind direction. The sigma theta value for the Project site is 8.3 degrees. Site air stability is not relevant to air quality impacts because the Project will produce no air emissions during operations.

Mean annual humidity at the Ellensburg Airport in 2001 was 68%. It is assumed that this value is approximately the same for the Project site and indicative of site humidity levels, although on-site meteorological towers do not measure or record humidity. Humidity is generally not a design factor or performance consideration for wind power projects.

3.2.1.2 Air Quality Standards

Both the federal government (through EPA) and the state government (through the Washington Department of Ecology) regulate and permit sources of air emissions. In Kittitas County, the authority to regulate and permit sources of air emissions has been delegated to the Washington Department of Ecology's Central Regional Office. EPA has established National Ambient Air Quality Standards (NAAQS) for certain pollutants, which are air pollution concentration levels against which all areas of the country are evaluated. If an area meets the standards, it is an "Attainment Area" and if it does not, it is considered a "Nonattainment Area". The Project area (Kittitas County) air shed quality is classified as an Attainment area for particulate matter and as an Unclassified area for all other pollutants. Attainment means that the ambient air quality standards for particulate matter, as established by EPA, are met. Unclassified means that ambient air quality monitoring studies have not been completed. For air quality regulatory and permitting purposes, the "Unclassified" designation is the same as "attainment", so there are no special restrictions on permitting for the Wild Horse Project.

Applicable Air Quality Regulations

According to WAC 173-400-030 (37), "fugitive" air emissions are emissions that "do not and which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening." These emissions include fugitive dust from dirt or gravel roads, construction sites, and tilled land.

The air quality regulations applicable to fugitive dust emissions during construction and operation are as follows:

- WAC 173-400-040(1) Visible emissions, states that no person shall cause or permit the emission for more than three minutes, in any one hour, of an air contaminant from any emissions unit which at the emission point, or within a reasonable distance of the emission point, exceeds twenty percent opacity.

- WAC 173-400-040(2) Fallout, states that no person shall cause or permit the emission of particulate matter from any source to be deposited beyond the property under direct control of the owner or operator of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited.

- WAC 173-400-040(3a) Fugitive emissions, states that the owner or operator of any emissions unit engaging in materials handling, construction, demolition or any other operation which is a source of fugitive emissions shall take reasonable precautions to prevent the release of air contaminants from the operation.

- WAC 173-400-040(5) Emissions detrimental to persons or property, states that no person shall cause or permit the emission of any air contaminant from any source if it is detrimental to the health, safety or welfare of any person, or causes damage to property or business.

- WAC 173-400-040(8a) Fugitive dust sources, states that the owner or operator of a source of fugitive dust shall take reasonable precautions to prevent fugitive dust from becoming airborne and shall maintain and operate the source to minimize emissions.

- WAC 173-400-035 states that portable sources such as a rock crusher and batch plant, which locate temporarily at particular sites, states that the owner(s) or operator(s) shall be allowed to operate at the temporary location providing that the owner(s) or operator(s) notifies the Department of Ecology (Ecology) or the local air quality authority of intent to operate at the new location at least 30 days prior to starting the operation, and supplies sufficient information to enable Ecology or the local air quality authority to determine that the operation will comply with the emission standards for a new source, and will not cause a violation of applicable ambient air quality standards and, if in a nonattainment area, will not interfere with scheduled attainment of ambient standards. The permission to operate shall be for a limited period of time (one year or less) and Ecology or the local air quality authority may set specific conditions for operation during that period. A temporary source shall be required to comply with all applicable emission standards.

Related Air Quality Permits
Exhibit 7 contains a copy of the Department of Ecology Temporary Air Quality Permit Application for Rock Crushing on Site. Compliance with Department of Ecology air quality regulations and standards will be ensured by implementing effective control measures and by complying with permit guidelines and statutory requirements addressing fugitive dust emissions. No Best Available Control Technology (BACT) analysis for the Project has been requested or performed.

3.2.2 Impacts of the Proposed Action

3.2.2.1 Construction

Typical Meteorological Conditions: Dry-Season Construction
A typical construction day at the Project site during the dry season (July) would have average westerly winds at 10-20 miles per hour, no precipitation, and an average daytime temperature of 78 degrees Fahrenheit. The summer wind mechanism displays a predictable pattern where wind speeds increase during the afternoon hours and reach peak wind speeds at 8 p.m. each evening before receding. This pattern will reduce airborne emissions because construction activities will typically end before 8pm when wind speeds reach their daily peak. It is important to note that the Project boundaries are surrounded by unpopulated areas with no downwind residences for approximately ten miles.

Emissions – Mobile Sources

Mobile sources (such as construction equipment and vehicles) are regulated separately under the federal Clean Air Act through vehicle inspection and maintenance programs and are not included when determining if a source must go through air emissions permitting.

Construction emissions are not included in permitting of stationary sources. Only emissions from operations are considered in the new source permitting program. Construction of the Project will result in mobile air emissions from the following sources:

- Exhaust from the diesel construction equipment used for Project site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from diesel trucks used to deliver equipment, concrete, fuel, water and construction supplies to the construction site;
- Exhaust from vehicles used to transport workers and materials to and from and around the construction site;
- Exhaust from diesel-powered welding machines, electric generators, air compressors, etc.

These emissions will be similar in nature to those produced by any large construction project that involves heavy equipment and transportation of materials to a project site Table 3.2.2-1 contains a detailed list of equipment anticipated to be used during construction.

Table 3.2.2-1 Construction Vehicles On Site During Construction

Construction Phase	**Estimated Average # of Vehicles on Site**	**Duration (Approx. Months)**	**Approx. Hours/Day**
Site Prep & Road Const.			
Bulldozer	4	4	12
Dump truck	12	4	12
Excavator	4	4	12
Front end loader	4	4	12
Motor grader	4	4	12
Vibratory Roller	3	4	12
Water Truck	8	4	12
Fuel Truck	1	4	12
Foundations			
Backhoe	4	4	12
Crane & Boom Trucks	3	4	12
Concrete pump truck	2	4	12
Concrete truck	8	4	12

Drill Rigs	3	4	12
Dump truck	6	4	12
Track hoe Excavator	5	4	12
Front end loader	3	4	12
Small loaders	3	4	12
Transportation Trucks - materials	6	4	12
Water Truck	1	4	12
Fuel Truck	1	4	12
Electrical			
Cable Spool Trucks	5	5	12
Concrete Trucks	3	5	12
Boom Truck	3	5	12
Fork Truck to Offload Spools	2	5	12
Man lift bucket	2	5	12
Rock trencher	2	5	12
Transportation Trucks - materials	8	5	12
Winch truck	3	5	12
Substation & Interconnect			
Backhoe	3	4	12
Bulldozer	2	4	12
Concrete Trucks	4	4	12
Drill Rig	2	4	12
Dump truck	4	4	12
Man lift bucket truck	2	4	12
Trencher	2	4	12
Winch truck	1	4	12
Excavator	2	4	12
Wind Turbine Assembly & Erection			
Boom truck	4	5	12
Forklift	4	5	12
Rough terrain crane	5	5	12
Transportation Trucks - materials	20	5	12
Truck mounted crane	5	5	12

			12
Project Cleanup			
Dump truck	2	3	12
Front end loader	2	3	12
Motor grader	2	3	12
Transportation Trucks - materials/waste	3	3	12
Daily Construction Traffic			
Min. of 20 full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	35	4	12

Emissions – Temporary Equipment Sources

Temporary equipment that will be based on site include a portable concrete batch plant and a portable rock crusher, which will be in operation during road building and foundation construction phases, approximately 6-8 months in duration. Both the batch plant and rock crusher will utilize diesel-powered generators during operations. The batch plant and rock crusher daily operating hours will be determined by construction requirements. Applicant anticipates that normal construction schedules will require operation approximately 10-12 hours per day, 6-7 days per week. Operating hours and days could vary according to construction requirements, available daylight conditions, weather conditions, or other contingencies. Please refer to Section 2.2.3, 'Project Facilities' for more details.

Emissions - Fugitive Dust Sources

The construction activities that could produce fugitive dust are presented below. A detailed construction schedule is being developed - these estimates reflect reasonable assumptions based on the currently available data.

- Fugitive dust from construction-related traffic during the dry season. The ranges for approximate numbers of each major category of diesel-powered construction equipment are provided in Table 3.2.2-1 above.
- Fugitive dust as a result of ground disturbance during the dry season. The length, width, and type of construction for haul roads are described in Section 2.2.3, 'Project Facilities'. The peak-daily earthmoving volume for roads and foundations is anticipated to be approximately 7,800 cubic yards.
- Fugitive dust from on-site gravel quarries and WTG foundations resulting from blasting and excavation activities. Peak-daily production from on-site quarries is anticipated to be approximately 30,000 tons. Peak-daily excavation from WTG foundations is anticipated to be approximately 1,000 cubic yards of material.

- Fugitive dust from portable rock crusher and batch plant operations. Peak-daily production from the portable rock crusher and concrete batch plant is anticipated to be approximately 30,000 tons and 700 cubic yards, respectively.
- Fugitive dust from activities associated with gravel-pit reclamation.

Fugitive Dust Control – General

In accordance with the various provisions of WAC 173-400-040 above, the Project will employ reasonable precautions to prevent fugitive dust from being airborne and shall maintain and operate equipment in a manner that minimizes emissions. Such methods include good housekeeping procedures, such as dust suppression on roads and areas around the crusher and batch plant to prevent buildup of fine materials. The Applicant will implement an effective dust control program to minimize any potential disturbance from construction-related dust. Dust suppression will be accomplished through application of either water or a water-based, environmentally safe dust palliative such as lignin, in accordance with the Proposed Dust Abatement Policy developed by Kittitas County Public Works Department (this draft policy has not been formally adopted by the Board of County Commissioners). The use of a dust palliative such as lignin would result in the use of substantially less water for dust suppression and therefore less traffic from water trucks to the construction site. The final decision regarding dust suppression techniques will be made by the EPC contractor in consultation with EFSEC.

Fugitive Dust Control - Rock Crusher and Batch Plant:

In accordance with WAC 173-400-035 emissions controls for stationary processing equipment are anticipated to include cyclones, fabric filters and/or wet spray systems. Dust control systems shall be in place and maintained in good operating condition during all periods of crusher and batch plant operation. A water mist will be applied as needed near all emission points along the crushing circuit to control dust. The crusher and batch plant may be shut down when the wind is strong enough that best efforts to keep dust from leaving the pit area are not effective. Stockpiles shall be located to minimize exposure to wind. During cement transfer to the silo, silo exhaust shall be controlled by a properly designed and operated fabric filter device (baghouse). These measures are anticipated to eliminate the possibility of dust plumes within the Project area.

Maximum daily controlled PM10 emissions from stationary equipment are estimated to be approximately 200 lbs. Total Project PM10 emissions from stationary equipment during construction are estimated to be 2 tons. Estimated water quantities required for dust control have been included in total water requirements in Section 3.3, 'Water Resources'. These estimates reflect reasonable assumptions based on the currently available data.

Fugitive Dust Control - Reclamation Activities:

Dust suppression activities undertaken during construction will be resumed as appropriate during rehabilitation activities at gravel quarries, batch plant and rock crusher locations.

Odor
Odor emissions from the Project are limited to odors associated with exhaust from diesel equipment and vehicles. Given the strong prevailing west-northwesterly winds at the Project site and the fact that the nearest downwind houses or other sensitive receptors are located approximately ten miles from the Project site, no odor impacts are anticipated.

3.2.2.2 Operation

Emissions
Operation of the Project will produce no air emissions as no fuel is being burned to produce energy. Operation of the Project will therefore have no negative impact on air quality. To the extent that the Project displaces other, fossil-fuel fired power plants, it will have a positive effect on air quality.

Fugitive Dust Sources
Operation of the Project will result in minimal increases in fugitive dust levels. Project-related traffic increases on gravel access roads will generate small amounts of additional fugitive dust. This increased traffic is expected to consist largely of weekly or less frequent trips to turbines in service vehicles for maintenance and repair activities. Upgrading existing roads from dirt to gravel surfaces will result in some reduction in dust levels from current traffic on existing dirt roads.

Odor
Operation of the Project will create no odors as no combustion is involved and no odor-producing materials are used in Project operations.

3.2.3 Comparison of Impacts of Proposed Scenarios

Under the different design scenarios, there are no significant changes to air emissions volumes, fugitive dust levels, numbers of construction vehicles, or anticipated daily construction hours. This is because the road, underground trench, and overhead collector line lengths are unchanged under each scenario. It is also because the Large WTG Scenario requires excavation of larger foundations for a smaller number of WTGs while the Small WTG Scenario requires excavation of smaller foundations for a larger number of WTGs. Therefore, the requirements for blasting, rock crushing, earthmoving, and gravel are substantially similar under each scenario.

3.2.4 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this ASC 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.2.5 Mitigation Measures

The following mitigation measures for construction-related air emissions and dust are proposed:

- All vehicles used during construction will comply with applicable Federal and state air quality regulations;
- Operational measures such as limiting engine idling time and shutting down equipment when not in use will be implemented;
- Active dust suppression will be implemented on unpaved construction access roads, parking areas and staging areas, possibly using water-based dust suppression materials in compliance with state and local regulations;
- Dust suppression around batch plant and rock crushing facilities to prevent buildup of fine materials;
- Traffic speeds on unpaved access roads will be kept to 25 mph to minimize generation of dust;
- Carpooling among construction workers will be encouraged to minimize construction-related traffic and associated emissions;
- Disturbed areas will be replanted or graveled to reduce wind-blown dust;
- Erosion control measures will be implemented to limit deposition of silt to roadways.

No mitigation is proposed for Project operations as there will be no air or odor emissions.

3.2.6 Significant Unavoidable Adverse Impacts

There are no significant unavoidable adverse impacts with regard to air quality.

3.3 WATER RESOURCES

3.3.1 Existing Conditions

3.3.1.1 Surface Water

The Project will not generate process water and there will be no point source discharge to nearby surface waters. However, because the Project is located within one-half mile of nearby surface waters, brief descriptions of these creeks and springs are provided below. Most Project facilities will be located on exposed ridge tops away from surface waters and floodplains, as shown in Exhibit 1-B, 'Project Site Layout'. Several of the Project wind turbine strings are within approximately 1/4 mile horizontally of several small creeks and their tributaries, springs, stock watering ponds, and other unnamed ephemeral creeks. These include Whiskey Dick, Skookumchuck, and Whiskey Jim creeks; and Wild Horse, Skookumchuck Heights, Dorse, Reynolds, Thorn, Government, Pine, and Seabrock springs.

Creeks

Whiskey Dick, Skookumchuck, and Whiskey Jim creeks all originate within the proposed Project boundary, at an elevation of approximately 3,400 feet. Whiskey Dick and Skookumchuck Creeks flow east and southeast to an elevation of about 700 feet at their mouth at the Columbia River. Both creeks have a relatively steep gradient, with an average creekbed slope of 200 to 250 feet per mile over the 10 or 12 mile lengths of these creeks. Whiskey Jim Creek has an average gradient of 250 to 300 feet/mile until it joins Parke Creek at the eastern edge of the Kittitas Valley. Each of these creeks collects water from surface runoff, springs, and seeps that exist along each drainage. The creeks transition from intermittent flow in their upper elevations to perennial flow as they pick up flow from runoff, springs and seeps on the descent to lower elevations.

Springs

Wild Horse, Skookumchuck Heights, Dorse, Reynolds, Thorn, Government, Pine, and Seabrock springs are all mapped in the Project area. One additional spring exists just east of turbine C-5 in the south part of the Project and is mapped simply as "spring" on the USGS base mapping. Several of these springs have been developed by ranchers in the area, to the extent that a portion of their flow is collected and contained for the purpose of stock watering. The flow was approximated for several of these springs in May 2003. The observed flow rates were found to be in the range of 1 to 5 gallons per minute. The majority of these springs exist between elevations of 3,300 and 3,400 feet in the Project area. Because of the relatively short distance from the top of the ridges down to the location of the springs, the recharge area is relatively small and it is anticipated that spring flow will decrease later in the summer and fall.

The Project is located on ridge tops and away from nearby surface waters. Because Project facilities will be located significantly outside the floodplain of the Yakima and Columbia Rivers and other water bodies (the Project is located two to three thousand feet above the respective river elevations, see Exhibit 1-A 'Project Area Overview'), the risk of flood impacts is insignificant. Exhibit 10 contains a FEMA Flood Zone Overlay map indicating that the nearest 100-year flood zone occurs in Parke Creek below 2,000 feet in elevation, over two miles downgradient from the nearest Project feature which is the BPA transmission feeder line.

3.3.1.2 Ground Water

Ground Water Resources
In the State of Washington, groundwater quantity is protected by surface water and groundwater rights, and groundwater quality standards are defined in WAC 173-200.

Aquifer Description and Hydraulic Characteristics
As noted in the Section 3.1, 'Earth', the Project is located within the Yakima Fold Belt sub-province of the Columbia Plateau Physiographic Province. The variation in the geology of the overburden, multiple basalt flows, and interbedded sedimentary units provides complexity to the groundwater situation in the region. As a result, numerous hydrologic units exist within the complex geology of the Yakima Fold Belt and the greater Columbia Plateau aquifer system. However, to simplify the description of the area's hydrogeology, and to provide a description of the hydrogeologic conditions within and near the site, the aquifers in the vicinity of the Project have been grouped into two main hydrologic units: the overburden and the basalt aquifers.

Overburden Aquifer
The overburden in the structural basins of the Columbia Plateau Physiographic Province readily transmits water and comprises water table aquifers. These aquifers are generally coarse-grained and highly permeable in their upper sections and fine-grained and less permeable at depth. However, where the overburden is thick, such as in the structural basins in the Yakima Fold Belt, extensive coarse-grained layers exist deeper in the section and function as water-producing zones.

In the Yakima Fold Belt, groundwater movement in the overburden is downward from the anticlinal ridges toward the streams and rivers (i.e., Columbia and Yakima Rivers) in the intervening synclinal basins (USGS, 2000). The water-level contours for the overburden aquifer roughly parallel land surface (Whiteman, 1986; Lane and Whiteman, 1989; Hanson and others, 1994). Recharge is mainly from infiltration of applied irrigation water and from precipitation (USGS, 2000), with precipitation acting as the predominant source of recharge (Bauer and Vaccaro, 1990). Discharge is to rivers, lakes, drains, and waterways and to the underlying basalt unit. Downward movement of water to the underlying basalts is controlled by intervening fine-grained sedimentary layers and by head difference between the units (USGS, 2000).

Basalt Aquifers

Groundwater in the basalts occurs in joints, vesicles, fractures, and in inter-granulated pores of the intercalated sedimentary interbeds. The basalt forms an extremely complex heterogeneous aquifer system with interflow zones that potentially function as small semiconfined to confined aquifers. The basalt transmits water most readily through these interflow zones, which represent about 5 to 10 percent of the total thickness of a typical basalt flow (USGS, 1994). Deeper basalt units are generally confined. However, because the hydraulic connection between units is sufficient to allow continuous vertical movement of water between them, the confined units are referred to as being semiconfined (USGS, 2000).

Water-level data indicate that over most of the plateau, the vertical component of regional flow in basalts is downward except near discharge areas, located generally along streams and rivers (Lane and Whiteman, 1989). Localized anomalies to this pattern are caused primarily by geologic structures of both known and uncertain nature and secondarily by groundwater pumping and irrigation (USGS, 2000). Similar to the overburden aquifer, groundwater movement in the basalt aquifers of the Yakima Fold Belt is from the anticlinal ridges toward the streams and rivers (i.e., Yakima River) in the intervening synclinal basins (USGS, 2000).

Ground Water Quality and Beneficial Use

Groundwater has not yet been exploited for beneficial use via drilled wells within the Project area, according to a search of well logs for the Project area (Washington State Department of Ecology, 2003). The groundwater wells mapped in the area are at least 2 miles from the Project site boundary, and at least 1,000 feet lower in elevation. However, groundwater is vigorously used in the surrounding areas for domestic, irrigation, and other agricultural purposes, especially in the Kittitas Valley to the west. A review of nearby well descriptions in the surrounding vicinity indicates that the area's wells typically penetrate and draw water from the basalt aquifer, at depths of 100 to 500 feet. In the Project area, it is uncertain how deep a well would have to be to develop groundwater from the basalt aquifer of the area.

Groundwater in the basalt aquifer system is generally suitable for most uses. According to a report on the geochemistry of the Columbia Plateau aquifer system (USGS, 1994), the dominant water type is calcium magnesium bicarbonate, and sodium bicarbonate is the next most prevalent water type. However, sodium concentrations increase with residence time and the largest concentrations are found in samples from the deepest wells.

3.3.2 Impacts of the Proposed Action

3.3.2.1 Construction

Surface-water runoff/Absorption

Surface water runoff potential will be greatest during the construction of the Project, when large quantities of soil will be disturbed for construction of roads, tower foundations and other infrastructure.

Precipitation could result in surface runoff from Project facilities during Project construction and operation. However, the Project site grading plan and roadway design will incorporate measures in line with the Storm Water Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs) to ensure that most surface runoff will infiltrate directly into the surface soils surrounding Project facilities. Potential surface water impacts resulting from runoff related to construction and operations of the Project and measures to control such runoff are described below in 'Construction General Storm Water Pollution Prevention Measures'. The Project will implement a formal SWPPP and BMPs as are also described below in detail in, 'Construction General Storm Water Pollution Prevention Measures', to reduce and/or eliminate the discharge of suspended sediment and turbidity above the turbidity criteria stipulated in the Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A).

Water used for dust suppression would be directly applied using tanker trucks equipped with rear end sprinkler systems and absorbed on site or evaporated.

In general, surface soils on the Project site consist of silty sandy clay that has slow to moderate permeability. This material is dry to moist, and contains locally clayey zones that retain more moisture. These soils are typically present in the upper 12 inches, although areas were observed on the Project site where clay and fine-grained material was present in the upper 8.5 feet. At most locations on the Project, the thickness of soil overlying rock is minimal, and rock is either very near or outcropping at the surface. The presences of slow to moderate permeability soils at the site results in a moderate to relatively high runoff potential.

The erodibility (or erosiveness) of a particular soil is a function of slope and other physical characteristics such as depth of the soil, clay content, water holding capacity, vegetative cover, etc. The USDA Natural Resource Conservation Service compiles these characteristics into a classification scheme known as an "erosivity index." Generally, the erosivity index is available in NRCS Soil Conservation Surveys that are published for individual counties throughout the U.S. However, the only survey available for Kittitas County was published in 1945 and is currently outdated and out of print. In addition, the erosivity index was not provided in soil surveys that were published at the time that the Kittitas County soil survey was released. Moreover, it should be noted that the erosivity index pertains to in situ (i.e., undisturbed) soils, as opposed to soils disturbed by construction. However, there are other indicators that make it possible to draw conclusions regarding the erodibilty of soils in the Project area. These characteristics include geographic features such as slope and vegetative cover, as well as physical features of the soil, such as its drainage, runoff, and permeability index.

Soils in the area are dominated by three major soil series: the Rock Creek, Argabak and Vantage series. According to the Natural Resource Conservation Service (NRCS), the

Rock Creek series is well drained with slow to medium runoff and moderately slow permeability, while the Argabak and Vantage are both classified as well drained with slow to very rapid runoff and moderately slow permeability (USDA, 2002a).

Even though soil permeabilities are classified as low and the runoff potential ranges from slow to very rapid, it is anticipated that the erosivity of area soils would be mitigated by factors such as grade (i.e., the majority of soils that would be disturbed in the Project are generally located on grades of 20 percent or less) and the fact that area soils are well drained. Therefore, it is estimated that the erosiveness of native soils immediately underlying the Project would be in the "medium" range. However, as noted above, the erosivity index pertains to in situ (i.e., undisturbed) soils. As a result, the erosiveness index is not directly applicable to soils that would be disturbed by Project construction activities, but rather, to factors such as the effectiveness of Project Best Management Practices such as storm water control procedures.

Applicant has been unable to identify any existing information addressing existing sediment load conditions at the Project site and anticipates that sediment and erosion control practices will minimize or eliminate sediment discharge to drainages. The construction will occur considerable distances from all wetlands, springs, seeps and riparian areas as is further explained below.

Some soil compaction will occur in areas disturbed during temporary construction activities. Several methods of erosion control and storm water pollution prevention will be implemented during Project construction. The erosion control and storm water pollution prevention methods chosen for the site will be selected based on specific site conditions such as topography, surface soils, and vegetative cover. Typical structural controls that could be used include hay bales or silt-fence type materials, rock dams, and recessed grades as illustrated in Figure 3.3.2-1.

The Project consists of individual wind turbine generators (WTGs) having 16-foot foundation diameters that are surrounded by open, undisturbed areas and some gravel surfaces. The Project will therefore generate very little storm water run off. It is not anticipated that surface runoff control facilities beyond the control measures described in Construction Storm Water Pollution Control Measures will be required. There are no storm water conveyance and treatment facilities anticipated in or around the Project site. Specific siting of the control measures will be determined by Project engineers after final design has been completed.

There are no wetlands impacts associated with the Project. No Project facilities or transmission feeder line poles or trails will be built in or near any streambed, riparian corridor or wetlands. There is one stream, Parke Creek, that the BPA transmission feeder line crosses, but the transmission poles will be located at least 200 feet back from the stream bank on either side and there will be no heavy equipment used in the stream bed or riparian corridor for construction. WDFW has reviewed the proposed crossing site and construction techniques and have stated that no hydraulic permit is required. A copy of this letter is included as Exhibit 11.

There are wetlands in the form of seeps, ponds, and springs described above, within the Project area, however all Project facilities will be located a considerable distance from them. Project facilities will be located outside the designated buffers of any wetlands, as required by Section 17A.04.020 "Buffer width requirements" of the Kittitas County Code. The closest Project facility is a turbine access road with an underground collector cable, a low intensity use, which will be located approximately 200 feet away from a small, unnamed spring just east of turbine C-5. The maximum setback that would be required by Washington State Department of Ecology guidelines and EFSEC's proposed rules for Combustion Turbine Standards would be 50 feet. The construction methods and control measures discussed below in 'Construction General Storm Water Pollution Prevention Measures' will be adequate to protect all wetlands and riparian corridors. Please refer to Section 3.3.1, 'Existing Conditions' above for a description of creeks, springs and seeps in the Project area.

A formal Storm Water Pollution Prevention Plan (SWPPP) specifying the types of erosion control methods that will be used at the site will be designed and submitted to EFSEC for approval prior to construction. After construction is completed, temporarily disturbed areas will be returned as closely as possible to their original state. This excludes the access roads, crane pads, rock quarries, O&M facilities, and parking areas, which will remain in place for the life of the Project. On-site construction management will monitor the area for erosion and implement additional control measures if necessary.

Construction General Storm Water Pollution Prevention Measures

The Project wind turbines, site roads, underground cables, and other supporting infrastructure are located on high ridge tops with good wind exposure and not in wetlands or watercourses. The site construction plans will include detailed provisions and specifications to help minimize erosion and storm water pollution.

Storm Water Pollution Prevention Plan (SWPPP):

A detailed construction Storm Water Pollution Prevention Plan (SWPPP) will be developed for the Project to help minimize the potential for discharge of pollutants from the site during construction activities. The SWPPP will be designed to meet the requirements of the Washington State Department of Ecology General Permit to Discharge Storm Water through its storm water pollution control program (Chapter 173-220 WAC) associated with construction activities. A SWPPP meeting the conditions of the Storm Water General Permit for Construction Activities will be prepared and submitted to EFSEC along with a Notice of Intent (NOI) for construction activities prior to the start of Project construction. The Project NPDES permit application is included as Exhibit 8. The Project will meet the control requirements of the NPDES permit by complying with permit guidelines and statutory requirements.

Applicant will use the Washington Department of Ecology's Stormwater Management Manual for Western Washington. Mark Dirkx of the Department of Ecology indicated, and EFSEC agreed previously, that the Western Washington manual should be used, with some modifications applicable to Eastern Washington conditions, as the Department of

Ecology's Stormwater Management Manual for Eastern Washington (SWMM-EW) has not yet been finalized or adopted.

The SWPPP will include both structural and non-structural best management practices (BMPs). Examples of structural BMPs could include the installation of silt curtains and/or other physical controls to divert flows from exposed soils, or otherwise limit runoff and pollutants from exposed areas of the site. Examples of non-structural BMPs include management practices such as implementation of appropriate materials handling, disposal requirements and spill prevention methods.

Storm Water Pollution Prevention Plan Design:
The SWPPP will be prepared along with a detailed Project grading plan designed by the Engineering, Procurement and Construction ('EPC') Contractor when design-level topographic surveying and mapping are prepared for the Project site. The final configuration of proposed improvements will be overlaid onto the detailed topographic maps and the Project civil design engineer will establish the locations and types of construction BMPs to be required of the EPC Contractor. These details will be included on an overall map of the Project site and submitted to EFSEC prior to construction.

A narrative section of the SWPPP will describe the intended installation sequence and function of the selected BMPs, and present the sizing calculations. The plan will also identify the selected minimum standards to which each of the BMPs are to be constructed or installed. When prepared at this level of detail, the document will meet the requirements of the Storm Water Construction Activity NPDES permit system, and will accurately describe to the EPC Contractor, and the Project site construction management team, the improvements and actions required during construction. When complete and submitted to EFSEC, the SWPPP will then be included in the construction bid and contract documents. Implementation of the construction BMPs will be carried out by the EPC Contractor, with enforcement supervised by the Project's environmental monitor who will be responsible for implementing the SWPPP.

Construction Storm Water Pollution Control Measures
Site-specific BMPs will be identified on the construction plans for the site slopes, construction activities, weather conditions, and vegetative buffers. The sequence and methods of construction activities will be controlled to limit erosion. Clearing, excavation, and grading will be limited to the minimum areas necessary for construction of the Project. Surface protection measures, such as erosion control blankets or straw matting, also may be required prior to final disturbance and restoration if potential for erosion is high.

All construction practices will emphasize erosion control over sediment control through such non-quantitative activities as:

- Straw mulching and vegetating disturbed surfaces;
- Retaining original vegetation wherever possible;

- Directing surface runoff away from denuded areas;
- Keeping runoff velocities low through minimization of slope steepness and length; and
- Providing and maintaining stabilized construction entrances.

A more detailed description of the materials, methods and approaches used as part of the BMPs for effective storm water pollution prevention and erosion control are as follows:

Rain Level Monitoring:
The environmental monitor shall be responsible for checking and recording precipitation levels at the Project site using a rain gauge. This benchmark will be used to determine the performance of the SWPPP measures that have been implemented during construction. After construction, the O&M group will also continue to monitor rainfall amounts and monitor the in-place erosion control systems while re-seeded areas become more established. Modifications will be performed where needed by the O&M group after Project construction is completed.

Mulching:
Loose straw shall be spread and punched into the ground in all areas where vegetation has been cleared.

Temporary Straw Bale and Silt Fence Sediment Barriers:
Temporary straw bale barriers and sediment fences shall be inspected by the Contractor immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs, relocations, or additions shall be made promptly. No more than one foot of sediment shall be allowed to accumulate behind straw bales or silt fence sediment barriers. Sediment will be removed and re-graded into slopes. New lines of barriers installed uphill of sediment-laden barriers will be considered based on the rate at which the one foot of sediment accumulates.

Silt fences and straw bale sediment barriers will be maintained throughout the construction period, and beyond, until disturbed surfaces have been stabilized with vegetation. Silt fence construction specifications including fabric type, support spacing, and total length will be determined by actual construction conditions during final design of the facilities.

Check Structures And Sediment Traps:
Check structures, such as rock dams, hay bale check dams, dikes and swales will be used, where appropriate, to reduce runoff velocity as well as to direct surface runoff around and away from cut-and-fill slopes. Swales and dikes

Figure 3.3.2-1 Erosion Control Blankets and Silt Fencing used for Exposed Slope Stabilization as part of a SWPPP

may also be used to direct surface water toward sediment traps.

Matting And Erosion Control Blankets:
Depending upon weather conditions during the construction period, straw or jute matting or other suitable erosion control blankets will be used on the pad slopes and the drainage channel slopes if direct rainfall on the slopes will result in erosion prior to stabilization (see Figure 3.3.2-1).

Control of Excavation De-Watering:
While no de-watering is anticipated, excavation work requiring de-watering discharge will be directed to the surrounding upland areas, away from sensitive resources (e.g. wetlands, drainages, and seeps). De-watering water will be pumped through a hose which will be moved as the water is pumped out to distribute the ground water over a large surface area to allow it to evaporate and/ or infiltrate and avoid causing increased erosion or storm water pollution. There will be no direct discharge to surface waters or riparian areas from de-watering activities.

No Project facility will be located closer than approximately 200 feet from a riparian area, although the maximum setback that would be required by WDOE guidelines and EFSEC's proposed rules for Combustion Turbine Standards would be only 50 feet.

Storm Water Pollutants (Waste, Debris, Chemicals):
In addition to erosion and sedimentation control on the Project site, it also is important to reduce potential for chemical pollution of surface waters during construction. Source control is the most effective method of preventing chemical water pollution. All potential pollutants, including waste materials and demolition debris, that occur on-site during construction will be handled and disposed of in a manner that does not cause contamination of storm water.

The only potential water polutants that will be transported and used during construction in significant quantities are diesel fuels and gasoline, which will be transported and stored in accordance with state and federal regulations by appropriately licensed and trained petroleum transport professionals. Other potential water pollutants include lubricating and mineral oils, chemical cleaners, and herbicides in small quantites below state and federal regulatory thresholds. Handling of these materials will be conducted in a manner that is protective of the environment and in accordance with applicable federal and state requirements and with the Best Management Practices and the Spill Prevention, Containment and Control Plan described in Section 3.16.1.3, 'Health and Safety – Impacts of the Proposed Action - Spillage Prevention and Control'.

In the unlikely event of a fuel, oil, or chemical spill, Project personnel will activate the Spill Prevention, Containment and Control Plan described in Section 3.16.1.3, 'Health and Safety – Impacts of the Proposed Action - Spillage Prevention and Control'.

Environmental Monitor:
The proposed environmental monitor will be responsible for locating any necessary clean fill disposal sites for excess excavation spoils. To control the release of sediment from the disposal sites, silt fencing with a straw bale barrier shall be installed on the down slope side of all disposal areas if additional sediment or erosion control measures are determined to be necessary. The site environmental monitor will be responsible for planning, implementing, and maintaining Best Management Practices (BMPs) for:

- Neat and orderly storage of any construction chemicals and spent containers in lined, bermed areas;
- Materials handling and spill prevention procedures;
- Regular disposal of construction garbage and debris using on-site dumpsters.

Revegetation:
All areas that are impacted by the construction outside of the graveled areas and rock quarries will be seeded when there is adequate soil moisture. They will be re-seeded if healthy cover vegetations do not grow. The sediment fence and check dams will remain in place until the impacted areas are well vegetated and the risk of erosion has been eliminated. The Project operations group will remove the sediment fence at this time.

Sand and Gravel General Permit:
As noted in Section 2.2, 'Description of the Proposed Project', three on-site rock quarries are planned to provide road gravel for the Project and an on-site concrete batch plant would be located near the northwest end of the Project site. Exhibit 1-A, 'Project Site Layout' illustrates the location of the Project facilities. Applicant will apply for and obtain a Sand and Gravel General Permit from Washington Department of Ecology prior to construction for the temporary, portable on-site rock crusher and concrete batch plant. Exhibit 7 contains the completed permit application.

<u>*Specific Facility Control Measures*</u>

Foundation Construction Storm Water Pollution Control Measures:
Foundation construction will require significant excavation at each wind turbine location as described in Section 3.1.2.3, 'Earth – Impacts of the Proposed Action - Excavation and Fills'. Excavation materials will be stored adjacent to the foundation holes as the forms, rebar and bolts are assembled and as the concrete cures after it is cast in place. Sediment fences, hay bales or matting will be installed on steeper down slopes near the storage piles as necessary. Once the concrete cures, excavated materials will be used for back filling. In impacted areas adjacent to pads, mulch will be spread and the area will be re-seeded. Cobbles and rocks too large for backfilling will be crushed for gravel, used in rock check-dams or to support other on-site erosion control measures.

Access Roads Storm Water Pollution Control Measures:
Work on the access roads will include grading and re-graveling existing roads and construction of new roads. The site will have gravel roadways which will be generally a

low profile design allowing water to flow over them in most areas. Erosion control measures to be installed during the work on the access roads include:

- The maintenance of vegetative buffer strips between the impacted areas and any nearby waterways;
- Installation of sediment fence/straw bale barriers on disturbed slopes and other locations shown on the SWPPP;
- Straw mulching at locations adjacent to the road that have been impacted;
- Providing temporary sediment traps and sediment type mats downstream of seasonal stream crossings;
- Installation of silt fencing on steeper exposed slopes;
- Planting of designated seed mixes at impacted areas.

Turbines:
At each turbine location, a crane pad area of approximately 4,000 square feet will be graded in place and covered with road rock. During construction, silt fences, hay bales, or matting will be placed on the down slope side of the crane pad areas. Wind turbine equipment such as the blades, tower sections and nacelles will be transported and off-loaded at each turbine location near the foundation and crane pad. After construction, disturbed areas around all crane pad staging areas will be re-seeded with an appropriate seed mix.

Underground Cable Trenching Storm Water Pollution Control Measures:
Underground electrical and communications cables will be placed in 3- to 5-foot-wide trenches along the length of each wind turbine string corridor. In some cases, trenches will run from the end of one turbine string to the end of an adjacent turbine string to link turbines via the underground network. Trenches will be excavated from 1.5 to 4 feet deep depending on the underlying soil/rock conditions. Excavated materials will be piled alongside the cable trenches for back filling after cable installation. The excavated materials will typically remain in an exposed state for approximately two weeks. Sediment fences, hay bales or matting will be installed on steeper down slopes near the storage piles. After backfilling, excess excavated soils will be spread around the surrounding area and contoured to the natural grade. Cobbles and rocks too large for backfilling will be crushed for gravel, used in rock check-dams or to support other on-site erosion control measures. Finally, the area will be re-seeded with an appropriate seed mix.

Overhead Collector Line Construction Storm Water Pollution Control Measures:
Construction of the overhead pole lines will require excavation for setting of the poles. Excavated materials will be piled alongside the excavations for back filling after pole installation. Pole excavations are typically in an exposed state for approximately one week. Sediment fences, hay bales or matting will be installed on any steep down slopes near the storage piles. After backfilling, excess excavated soils will be spread around the surrounding area and contoured to the natural grade. Cobbles and rocks too large for backfilling will be crushed for gravel, used in rock check-dams or to support other on-site

erosion control measures. Finally, the area will be re-seeded with an appropriate seed mix.

Substation Construction Storm Water Pollution Control Measures:
The substation is generally flat and the base area will be graded and covered with a sub-base rock and a graveled surface on top. Foundation and underground trenching excavation spoils will be handled in the same manner as described in the above sections regarding foundations and underground cable trenches. Disturbed areas surrounding the substation perimeter will be contoured to the natural grade, covered in straw mulch, protected for erosion control and re-seeded as appropriate to the adjacent slopes. The main substation transformers, which are filled with mineral oil, are equipped with an oil level meter and float switch. The transformers will be surrounded by oil containment catch trenches around the outer perimeter of their foundations as described in more detail in Section 2.2.3 ' Project Facilities'.

Final Road Grading & Site Clean Up Storm Water Pollution Control Measures:
The Project will use dumpsters or drop boxes from a local waste management company to collect recyclable materials and dispose of waste materials that can not be reused. A final site cleanup will be made before turning the Project over to the O&M group. In accordance with the Erosion & Sediment Control Plan for access road improvement and construction, county roads will be restored to at least their pre-Project condition and to the satisfaction of the Kittitas County Public Works Department.

Cement Batch Plant Storm Water Pollution Control Measures:
The cement batch plant will be located on-site at a central location within a flat area approximately 500' by 500' in size, surrounded by a 1' high earth berm to contain spilled water runoff (see Project Site Layout in Exhibit 1-B).

The batch plant will utilize outdoor stockpiles of sand and aggregate. These stockpiles will be located to minimize exposure to wind. Sediment fences, hay bales or matting will be installed near the storage areas as necessary. Cement will be discharged via screw conveyor directly into an elevated storage silo without outdoor storage. Construction managers will exercise good housekeeping practices and conduct regular cleanings of the plant, storage and stockpile areas to minimize buildup of fine materials.

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

Rock Quarry Storm Water Pollution Control Measures:
A total of three temporary on-site rock quarries are planned for the Project (see Project Site Layout in Exhibit 1-B). Each rock quarry will have a disturbance footprint of approximately 5 acres and the depth will be approximately 10-20 feet depending on the type of rock encountered at each location. Sediment fences, hay bales or matting will be installed near the quarries to control storm water run on and runoff, as necessary.

A rock crusher will be located at one of the three on-site quarry pits for the duration of the construction period. The crusher will be located in an area approximately 500’ by 500’ in size, surrounded by a 1’ high earth berm to contain spill water runoff. This area will be sprayed by a water truck several times each day for dust suppression. The crusher contains several dust-suppression features including screens and water-spray. Effective dust-control measures will be operating at all emission points during operation, including start-up and shut-down periods. During periods of sustained high winds contractors will shut down operation of the rock crusher if reduced visibility poses a safety hazard.

It is not anticipated that surface runoff control facilities beyond the control measures described in ‘Construction Storm Water Pollution Control Measures’ will be required. Specific siting of the control measures will be determined by Project engineers after final design has been completed. Applicant will provide design assumptions including storm events and plans when they have been completed.

Groundwater:
A review of available literature indicates that groundwater in the Project area is generally available in large quantities. However, water for Project construction activities will not be obtained from groundwater resources directly below the Project site. Instead, water for Project construction will be trucked in by the construction contractor from local providers.

Excavation, drilling, and blasting to construct foundations for the wind turbine generators (WTGs) could penetrate to depths of 35 feet into the overburden and basalt units below the Project site. In the event of a significant rainfall, the foundation excavations could provide a temporary conduit for surface seepage, thus resulting in accelerated recharge to the overburden and basalt aquifers in the immediate vicinity of the foundation site. This in turn could cause a temporary rise in turbidity in groundwater near the foundation excavations. However, the contribution to the groundwater regime from the turbine foundation excavations will be small and potential negative impacts to groundwater are not expected.

In addition, the total annual precipitation in the area is approximately 9 inches. Construction of the WTG foundations is expected to begin during the dry season (August) and continue through mid-January. Therefore, potential impacts to groundwater are are not anticipated because of the low precipitation and low water table typical in the region during this period.

Wind turbines will be constructed on ridges located well above the anticipated local water table. In the unlikely event that groundwater (perched or otherwise) is encountered during excavation and construction activities, and dewatering is required, the water generated during dewatering activities will be discharged to the surrounding upland areas through a hose which will be moved as the water is pumped out to distribute the ground water over a large surface area to allow it to evaporate and/or infiltrate. Groundwater was not observed in test pits excavated to depths ranging from less than 1 to 9 feet at the site during a geotechnical investigation at the Project site (see Exhibit 4, ‘Project Site

Geotechnical Data Report'), but in any case, there will be no direct discharge to surface waters or riparian areas from de-watering activities. Because no de-watering activity is anticipated, no de-watering water has been included in calculations for water consumption or vehicle trips.

Industrial Storm Water Pollution Prevention Measures

Industrial SWPP:
Similar to the Constuction SWPPP, the Applicant will prepare and define an Industrial SWPPP as part of the final design. A SWPPP meeting the conditions of the Storm Water General Permit for Industrial Activities will be prepared along with a Notice of Intent (NOI) for industrial activities prior to the start of Project operation. The Project will meet the control requirements of the NPDES permit by complying with permit guidelines and statutory requirements.

A Project operations group will be responsible for monitoring the SWPPP measures during the operational period to ensure they continue to function properly. Final designs for the permanent BMPs will be incorporated into the final construction plans and specifications prepared by the civil design engineer. An operations manual for the permanent BMPs will be prepared by the EPC Contractor civil design engineer and the Project's Enginering Team.

The permanent storm water BMPs will include permanent erosion and sedimentation control through site landscaping, grass, and other vegetative cover. The final designs for these permanent BMPs will conform to the Washington Department of Ecology Stormwater Management Manual. It is not anticipated that surface runoff control facilities will be required due to the low volume of rainfall (9 inches per year) at the Project site and the small amount of impervious surfaces spread over a very large area. The O&M facility will occupy a foundation approximately 50 feet by 100 feet. This 5,000 square-foot area will utilize downspouts to shed rainwater from building surfaces. Additional control measures such as French drains will be implemented if necessary. Design plans are not available at this time for the O&M and substation facilities. Applicant will provide design plans including storm event assumptions when they have been completed.

3.3.2.2 Operation

Surface Water
Operation of the Project will not require the use of any water for cooling or any other use aside from the limited needs of the Operations and Maintenance facility described below in Section 3.3.2.4, 'Water Use During Operations' below. There will be no industrial wastewater stream from the facility (only domestic type wastewater from the O&M building which will discharge to an on-site septic system) and thus no wastewater will be used, discharged or recycled for plant operations. Therefore, operation of the Project will not result in any discharges to surface water.

As described above, the Applicant will prepare and define a SWPPP as part of the final design. The Project operations group will be responsible for monitoring the SWPPP measures that were implemnted during construction to ensure they continue to function properly. Final designs for the permanent BMPs will be incorporated into the final construction plans and specifications prepared by the civil design engineer. An operations manual for the permanent BMPs will be prepared by the EPC Contractor civil design engineer and the Project's Enginering Team.

The permanent storm water BMPs will include permanent erosion and sedimentation control through site landscaping, grass, and other vegetative cover. The final designs for these permanent BMPs will conform to the Washington Department of Ecology Stormwater Management Manual. It is not anticipated that surface runoff control facilities will be required due to the low volume of rainfall (9 inches per year) at the Project site and the small amount of impervious surfaces spread over a very large area. The O&M facility will occupy a foundation approximately 50 feet by 100 feet. This 5,000 square-foot area will utilize downspouts to shed rainwater from building surfaces. Additional control measures such as French drains will be implemented if necessary. Design plans are not available at this time for the O&M and substation facilities. Applicant will provide design plans including storm event assumptions when they have been completed.

Operational BMPs will be adopted, as part of the SWPPP, to implement good housekeeping, preventive and corrective maintenance procedures, steps for spill prevention and emergency cleanup, employee training programs, and inspection and record keeping practices, as necessary, to prevent storm water pollution.

Examples of good operational housekeeping practices, which will be employed by the Project, include the following:

- Prompt cleanup and removal of spillage;
- Regular pickup and disposal of garbage;
- Regular sweeping of floors;
- HAZMAT data sheet cataloguing and recording; and
- Proper storage of containers.

The oil containment system for the substations will consist of a perimeter containment system, large enough to contain the full volume of transformer mineral oil with a margin of safety, surrounding the main substation transformers. The trough will be poured as part of the transformer concrete foundation or will consist of a heavy oil-resistant membrane that is buried around the perimeter of the transformer foundation.

The trough and/or membrane will drain into a common collection sump area that will be equipped with a sump pump designed to pump rainwater out of the trough to the surrounding area away from nearby surface waters or sensitive areas (e.g. wetlands, springs, seeps). In order to prevent the sump from pumping oil out to the surrounding area, it will be fitted with an oil detection shut-off sensor that will shut off the sump if oil is detected. A fail-safe system with redundancy is built-in to the sump controls since the transformers are also equipped with oil level sensors. If the oil level inside a transformer drops due to a leak in the transformer tank, it will also shut off the sump pump system to prevent it from pumping oil and an alarm will be activated at the substation and into the main project control (SCADA) system. The trough will be large enough to contain the full volume of oil plus 10% reserve volume.

Discharges from the containment system will be directed to upland areas and away from nearby surface waters or sensitive areas (e.g. wetlands, springs, seeps). Discharge from the containment system will be in compliance with laws governing the discharge of oil as specified in the Code of Federal Regulations (CFR) under 40 CFR Part 110.3:

> § 110.3 Discharge of oil in such quantities as "may be harmful" pursuant to section 311(b)(4) of the Act. [see below Note]
>
> For purposes of section 311(b)(4) of the Act, discharges of oil in such quantities that the Administrator has determined may be harmful to the public health or welfare or the environment of the United States include discharges of oil that:
>
> (a) Violate applicable water quality standards; or
>
> (b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines. [61 FR 7421, Feb. 28, 1996]
>
> Note: *Act* means the Federal Water Pollution Control Act, as amended 33 U.S.C. 1251 et seq., also known as the Clean Water Act.

Water in the containment system that shows obvious indicators of potentially violating appreciable water quality standards, i.e., the water exhibits an oily sheen as specified under 40 CFR Part 110(b), will be removed from the containment system and disposed of in accordance with applicable federal, state and local laws.

No Project facility will be located closer than approximately 200 feet from a riparian area, although the maximum setback that would be required by WDOE guidelines and EFSEC's proposed rules for Combustion Turbine Standards would be only 50 feet. There would be no setback required by Kittitas County.

The Project operations group will periodically review the SWPPP against actual practice. The plant operators will ascertain that the controls identified in the plan are adequate, and that employees are following them.

Groundwater

The facilities are located ¼ to ½ mile away from local streams and drainages. All excavation and facilities shall be relatively shallow and will not exceed a maximum of 35 feet in depth for the turbine foundations. Although the soils in the area are part of the overburden aquifer, the soils covering the Project area are typically shallow and it is unlikely that groundwater would be encountered in the overburden. It is anticipated that the tower foundations will penetrate through the shallow soils covering the area and will be firmly established in the basalt that underlies the entire Project area. However, the roads, tower foundations and other facilities are sufficiently above the water table to avoid any significant impacts to subsurface hydrology and will have no direct effect on groundwater quantity, quality, and flow direction in the immediate area below the proposed facilities. There will be no well installed to service the operation and maintenance facility. Project roads will be designed and surfaced to eliminate impacts to groundwater. Therefore no impacts to the groundwater are expected from the operation of the facility.

There will be no discharges to groundwater from Project operations. Wastewater from the O&M facility will be discharged to a domestic septic tank installed pursuant to the requirements of Kittitas County Environmental Health Department. The septic system will be located just below surface level, and will be a closed system. The septic system design specifications will be developed and submitted to EFSEC for approval prior to construction. Water needs will be limited to bathroom and kitchen use, and general maintenance purposes and is expected to consume less than 1,000 gallons per day. The source of this water is described below in Section 3.3.2.4, 'Water Use During Operations' below.

3.3.2.3 Water Use During Construction

Construction of the Project will require water use for road construction, wetting of concrete, dust control, and other activities. Water consumed during construction activities will be purchased by the EPC Contractor from an off-site vendor with a valid water right and transported to the site in water-tanker trucks. Water supplied will likely be of potable quality and likely chlorinated. No water will be used from the site. Estimated water use for all construction-related needs, including dust control, is approximately 11 million gallons. There will be no water treatment requirements or methods on-site. Environmentally benign dust palliatives such as lignin may be added to water used for dust suppression to improve efficacy and reduce water use. The City of Kittitas has expressed interest in selling water for construction of the Project (included as Exhibit 13), and has confirmed that supplying all of the Project's water requirements would not cause any significant impact on the City's public water supply, even if the period of highest water use occurred during the summer months. The City operates a backup well that could be used to supply Project water requirements, in addition to water supplied from the City of Kittitas water tower. Traffic impacts resulting from water deliveries are addressed in Section 3.15, 'Traffic and Transportation'. Because de-watering at WTG foundations is not anticipated, de-watering trucks have not been included in estimates for truck trips.

The amount of water required for dust control is highly dependent on whether a dust palliative such as lignin is used as well as timing and weather. If lignin or another environmentally safe, non-toxic dust palliative is used, the amount of water used for dust control is reduced by an estimated 50%.

Table 3.3.2-1: Average & Peak Construction Water Consumption		
	Average (gal/min)	Peak (gal/min)
Rock Crusher	83	125
Batch Plant	50	60
Dust control trucks (1,000 gal)	167	667
New road construction	73	293
Total	373	1,144

Estimated water consumption rates are presented above in Table 3.3.2-1. Daily water requirement estimates use an average number that will fluctuate greatly throughout different phases of Project construction. Daily water requirements based on total Project water estimates yield an average requirement of approximately 20,000 gallons per day. However, during periods of intensive water usage for road construction the daily consumption is expected to increase to 220,000 gallons per day.

3.3.2.4 Water Use During Operation

Water necessary for operation of the Project will be purchased from an off-site source, trucked to the site and stored at the operation and maintenance facility. The source of this water has not been determined but many vendors, including the City of Kittitas, exist in the area. Operation of the Project will not result in significant additional demands on public water supplies, as estimated daily water use is substantially less than 1,000 gallons per day during operations. This will not result in a significant long-term increase over current demand.

3.3.3 Comparison of Impacts of the Proposed Scenarios

Construction

There is no significant difference in materials consumed during construction under different Project scenarios. This is because the road, underground trench, and overhead collector line lengths are unchanged under each scenario. It is also because the Large WTG Scenario requires excavation of larger foundations for a smaller number of WTGs while the Small WTG Scenario requires excavation of smaller foundations for a larger number of WTGs. Therefore, the estimated requirements for water during construction are within 5% variance of the estimated 4.2 million gallons under the Large WTG and Small WTG Scenarios.

Operation

The consumption of water during operations will be the same for any of the proposed scenarios.

3.3.4 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.3.5 Mitigation Measures

Mitigation measures have been incorporated into the proposed Project design as described throughout the preceding sections. Mitigation measures include avoiding stream crossings to the maximum extent feasible; complying with federal, state, and local ordinances; and implementing a formal SWPPP and best management practices during construction.

3.3.6 Significant Unavoidable Adverse Impacts

There will be no significant unavoidable adverse impacts with regard to water resources.

3.4 VEGETATION AND WETLANDS

3.4.1 Existing Vegetation Conditions

This section describes the vegetation resources, including rare plants and wetlands, of the Project area, assesses the potential impacts of the proposed Wild Horse Wind Power Project on these resources, and describes the mitigation planned for the Project. A complete report of the habitat characterization and rare plant investigation is provided as Exhibit 12, 'Habitat Characterization and Rare Plant Resources Report'. The information presented below was gathered from published literature, resource management agencies, local biologists, and on-the-ground surveys.

3.4.1.1 Habitat Characterization

Habitat Characterization Methodology

Vegetation in the 8,600 acre Project area was mapped according to "habitat types," which are considered to be the generally recognizable assemblages of plant species that occur in a pattern across the landscape. Habitat types were determined based on visual assessment of dominant plant species. Commercially available black and white digital aerial photography dated 2000 with a pixel size of 1 meter was used for the habitat mapping. The habitat types were mapped during late April – early May 2003, with follow-up visits in July, September, and October 2003. Initially, the roads in and around the Project site were driven in order to correlate habitat types with the signature (color, shading, texture) on the aerial photos. Each habitat type was then mapped based on either visual observation of the habitat from a road or high point, or by walking the boundaries of the habitat. Due to the scale of the aerial photos used, fine-scale intermingling in transition areas and small inclusions of one habitat type within another are not shown. The mapped boundaries of each habitat type were digitized using ArcView™. The habitat map is provided as part of Exhibit 12.

In addition to the habitat map that was developed for the Project area, a literature review was conducted to gain an understanding of previous work in similar habitats. Daubenmire (1970), in particular, is noteworthy for characterization of the vegetative communities of eastern Washington.

In accordance with guidelines developed by WDFW (August 2003) for baseline and monitoring studies for wind projects, an assessment of habitat quality was conducted. The guidelines state that "where a wind project will affect [shrub-steppe] habitat in "excellent" condition (based on federal methodologies for assessing range land), wind project developers will engage in additional consultation with WDFW regarding suitable mitigation requirements for such habitat". The Applicant contacted a federal Bureau of Land Management (BLM) botanist specializing in shrub-steppe habitat to determine the federal methodology for classifying habitat (R. Rosentreter, BLM, pers. comm.). The BLM suggested using Natural Resource Conservation Service (NRCS) "Range Condition Classes", which classify range condition as "excellent", "good", "fair", or "poor", based on a comparison of the existing community composition to the climax community composition.

The Releve method (Braun-Blanquet 1932) was used to document the existing community composition. Sample points were taken at each turbine string. A data sheet was filled out at a sample location judged to be most representative of the habitat for each turbine string. Existing plant species were listed at each sample location. Climax community composition data was obtained from the NRCS. Although the Soil Survey for Kittitas County is currently out-of-print, the soil map and characteristic climax plant community data were available from the local NRCS office. The climax community composition data is provided by soil type. Comparison of the existing community composition to the climax community composition allows an assessment of habitat quality. Based on NRCS guidelines (USDA SCS 1973), rangeland with 75 to 100 percent of its climax vegetation is in "excellent" condition. Rangeland with 50 to 75 percent of its climax vegetation is in "good" condition. Rangeland with 25 to 50 percent of its climax vegetation is in "fair" condition, and less than 25 percent is in "poor" condition.

The steppe vegetation of eastern Washington has been characterized by Daubenmire (1970). Daubenmire's classification includes nine vegetation zones; each zone is based on climate, vegetation structure, and floristics. The Project area is within the *Artemisia tridentata – Agropyron* zone. In an undisturbed condition, this zone is distinguished by big sagebrush (*Artemisia tridentata*) as the principal shrub and bluebunch wheatgrass (*Agropyron [Pseudoroegeneria] spicata*) as the principal grass. The soils in this zone are mostly loams or stony loams. Grazing by domestic livestock in this zone tends to result in a decline in large perennial grasses and an increase in annual cheatgrass. Big sagebrush cover can vary from 5 to 26 percent, and does not seem to be correlated to grazing (Daubenmire 1970).

In addition to big sagebrush, a number of other shrub species may be present in the *Artemisia tridentata – Agropyron* zone in small numbers; these include rabbitbrushes (*Chrysothamnus* spp. and *Ericameria* spp.), threetip sagebrush (*Artemisia tripartita*), and spiny hopsage (*Grayia spinosa*). The bluebunch wheatgrass is supplemented by variable amounts of needle-and-thread grass (*Hesperostipa comata*), Thurber's needlegrass (*Achnatherum thurberianum*), Cusick's bluegrass (*Poa cusickii*), and bottlebrush (*Elymus elymoides*). A low layer of plants consisting of Sandberg's bluegrass, cheatgrass, and flatspine stickseed (*Lappula occidentalis*) may also be present (Daubenmire 1970).

Within the steppe region, a variety of habitats occur that have soils sufficiently unusual in physical or chemical properties to develop unique climax communities that are not necessarily associated with a particular vegetation zone. Lithosol (shallow soils) habitats are one such habitat that commonly occurs on the ridgetops within the Project area. Daubenmire (1970) recognizes a variety of lithosolic plant associations. All are typically composed of a uniform layer of Sandberg's bluegrass, over a crust of mosses and lichens, with a low shrub layer above. The primary difference in these communities is in the composition of the shrub layer. Within the Project area, the shrub layer on these lithosols is principally composed of stiff sagebrush (*Artemisia rigida*) and/or several different buckwheat species (*Erigeron spp.*).

The above descriptions of generalized vegetation zones and associations are based on climax communities, which typically develop over time in the absence of anthropogenic disturbance. Within most of the shrub-steppe region, including the Project area, many of the plant communities have been modified due to numerous disturbance factors. Livestock grazing, introduction of exotic plant species, and ground disturbance from recreational activities have resulted in a shift in plant community composition in the Project area from the climax communities described above. Notable in the Project area is a lower percentage of native grass species and grass cover in general as compared to climax communities, attributable to livestock grazing (L. Stream, WDFW, pers. comm.). Additionally, the Project area does contain some non-native species and weedy species; however, native species overwhelmingly dominate the Project area.

<u>*Habitat Characterization Results*</u>
The following habitat types were mapped in the Project area and are described below:

- *Shrub-steppe* – 7,992 acres in the Project area (92 percent)
- *Herbaceous* – 469 acres in the Project area (5 percent)
- *Herbaceous/Rock outcrop* – 97 acres in the Project area (1.1 percent)
- *Pine Forest* - 31 acres in the Project area (0.4 percent)
- *Woody Riparian* – 54 acres in the Project area (0.6 percent)
- *Rock outcrop* – 5.6 acres in the Project area (0.1 percent)
- *Seasonal Water Body* – 1.7 acres in the Project area (0.02 percent)

The following habitat types occur along the BPA and PSE transmission feeder line routes within the 328-foot buffer that was surveyed for rare plants:

- *Shrub-steppe* – 438 acres (91 percent of the survey area)
- *Herbaceous* – 37.4 acres (7.5 percent of the survey area)
- *Pasture* – 3.6 acres (0.7 percent of the survey area)
- *Talus* – 2.4 acres (0.5 percent of the survey area)
- *Woody Riparian* – 1.3 acres (0.3 percent of the survey area)

Within the Project area, the primary habitat type is shrub-steppe. These upland sites are dominated by shrubs, primarily big sagebrush and stiff sagebrush. Threetip sagebrush (*Artemisia tripartita*), antelope bitterbrush (*Purshia tridentata*), and squaw current (*Ribes cereum*) occasionally dominate. A mix of grasses and forbs make up the understory. Big sagebrush is typically dominant in areas with deeper soils, while stiff sagebrush is dominant on exposed sites with shallow soils, including lithosols. The shrub-steppe habitat type can be further broken down into three categories based on relative spatial density of the shrub layer – dense (greater than 60 percent shrub cover), moderate (30 to 60 percent shrub cover), and sparse (less than 30 percent shrub cover). These categories are subjective and based on a qualitative assessment. In general, areas with a dense shrub layer are found on deep-soiled sites on slopes and dominated by big sagebrush, antelope bitterbrush, or squaw current. Areas with a moderate shrub layer are flat to gently sloping, and typically dominated by big sagebrush or stiff sagebrush. Areas with sparse shrub cover are found on exposed ridgetops and knolls and dominated by low-growing stiff sagebrush, or in some areas, various buckwheats.

In the Project area, herbaceous habitats comprise 5 percent of the Project area and are generally limited to very steep slopes and exposed ridges that do not support shrubs, or only scattered individual shrubs (usually stiff sagebrush or buckwheats). The herbaceous habitat type includes a variety of plant associations dominated by grass species, particularly Sandberg's bluegrass (*Poa secunda*), bluebunch wheatgrass, Hood's phlox (*Phlox hoodii*), Hooker's balsamroot (*Balsamorhiza hookeri*), and narrowleaf goldenweed (*Haplopappus stenophllus*). Lithosols are common in this habitat type, especially on exposed ridgetops; Sandberg's bluegrass is the dominant grass on lithosols. On some steep slopes, fingers of exposed cobbles and rock are intermingled among the herbaceous habitat. This herbaceous/rock outcrop type makes up an additional 1.1 percent of the Project area. One 5.6 acre site at the top of Whiskey Dick Mountain is classified as simply rock outcrop.

While the shrub-steppe habitat type dominates the landscape in and around the Project area, a small amount of Ponderosa pine (*Pinus ponderosa*) forest occurs in a narrow strip along one of the main Project area drainages (31 acres or 0.4 percent of the Project area). This narrow strip of forest contains mature Ponderosa pine in the overstory, with a mix of grasses and forbs in the understory.

Riparian areas associated with creeks and springs are limited, but present in the Project area. All Project facilities will be located outside the designated buffers of any wetlands, as required by Section 17A.04.020 "Buffer width requirements" of the Kittitas County Code. A narrow woody riparian strip along Whiskey Dick Creek comprises approximately 0.6 percent of the Project area (54 acres). Small to medium sized trees dominate the overstory, including black hawthorn (*Crataegus douglasii*) and alder (*Alnus sp.*). Scattered shrubs occur in the understory (e.g., squaw current and big sagebrush), along with grasses and forbs such as bulbous bluegrass (*Poa bulbosa*) and fern-leaved lomatium (*Lomatium dissectum*). The riparian habitats associated with springs are degraded from livestock use, and much of the riparian vegetation has been removed. The weedy species, bur buttercup (*Ranunculus testiculatus*) was common around springs.

One seasonal water body occurs near 'String K' that is mapped as approximately 1.6 acres in size. Water was present during the April - May survey period, however this site was dry during visits to the site later in the year. Other on-site investigators report that this water body is generally dry by late May. This water body is located almost 250 feet outside the 100-foot buffer for 'String K'. The area appears to be heavily used by livestock and wildlife for water and the shore was mostly rocky with very little or no riparian vegetation.

A map showing the distribution of the habitat types in the Project area is included as part of Exhibit 12, 'Habitat Characterization and Rare Plant Resources Report'.

Both the BPA and PSE transmission feeder lines are routed along exposed ridge tops, where possible. The BPA transmission feeder line heads west out of the Project area for approximately 2.5 miles along a ridge with sparse to moderate sagebrush cover; lithosol is intermixed in the shrub-steppe habitat. The line is then routed down a narrow drainage and across Parke Creek and a dirt road. Woody riparian habitat occurs along Parke Creek at the proposed transmission line crossing location. The overstory consists of tree species including black hawthorn and aspen (*Populus tremuloides*). The shrub layer includes snowberry (*Symphoriocarpos* sp.), Wood's rose (*Rosa woodsii*), golden current (*Ribes aureum*), and willow (*Salix* sp.). The understory consists of a variety of grasses and forbs. The riparian area is within a cattle pasture and the understory is heavily grazed by cattle. West of the Parke Creek and road crossings, the line once again enters shrub-steppe habitat for the remaining approximately 1.5 miles to the intersection with the existing BPA transmission line corridor.

The PSE transmission feeder line heads south out of the Project area along ridge tops dominated by sparse to moderate shrub-steppe habitat for approximately 2 miles where it then crosses the Vantage Highway. South of the Vantage Highway, the transmission line continues along ridge tops primarily in shrub-steppe habitat, although it passes through a few small areas of herbaceous habitat on some exposed knolls. The western-most half-mile of the PSE feeder line crosses a pasture, a small creek, a local road, and the Highline Canal and then interconnects with an existing PSE transmission line.

Results of the habitat quality assessment conducted at each turbine string show that habitat quality ranges from "fair" to "good" (see Exhibit 12, 'Habitat Characterization and Rare Plant Resources Report'). Although the sample locations were at the turbine strings, the "fair" to "good" rating can be applied across the Project area based on general observations. No sample locations fell into the "excellent" category, due to the history of grazing at the site. Evidence of grazing was observed throughout the Project area. Grazing has resulted in fewer grasses and less grass cover than would be expected in the climax communities. Daubenmire (1970) also observed a decline in large perennial grasses due to grazing, although he could find no correlation among big sagebrush cover and grazing. Similarly, no sample locations fell into the "poor" category. Although the Project area appears to have experienced a minor shift in species composition with less grass cover than would be expected, native species dominate and no significant weedy invasions (e.g. cheatgrass) were observed that could alter species composition to such as degree as to result in a "poor" rating.

Thirteen of the eighteen sample locations were rated as "good", and five were rated as "fair". The percentages that observed vegetation differed from climax vegetation ranged from 36 percent to 60 percent. A "fair" is defined as rangeland with 25 to 50 percent of its climax vegetation, and a "good" rangeland has 50 to 75 percent of its climax vegetation. Five sample locations were at 50 percent, and were "rounded up" to the "good" category. No spatial pattern was found for the sample locations rated as "good" verses "fair", although the "good" locations are generally more isolated, away from the main roads (except String E), and the "fair" locations are closer to main roads (except String M). The "fair" to "good" ratings are indicative of past land uses and the relatively isolated setting. Although the area has been grazed, no significant shifts in species composition were observed, such as conversion of native vegetation to cropland. It is assumed that the relatively isolated setting has minimized the introduction and spread of noxious and/or invasive species that occurred throughout much of the rangeland in the western US.

Noxious Weeds
The Kittitas County Noxious Weed Control Board publishes a list of noxious weeds presently known to exist within the boundaries of Kittitas County (http://www.co.kittitas.wa.us /noxiousweeds/list.asp). During surveys for rare plants, a list was made of all vascular plants encountered in the areas where project facilities will be located and a 164 foot (50 meter) buffer. Several species considered to be "weedy" (i.e., undesirable or non-native) were encountered including:

- Knapweed (*Centaurea sp*)
- Thistle (*Cirsium sp*)
- Yellow salsify (*Tragopogon dubius*)
- Blue mustard (*Chorispora tenalla*)
- Cheat grass (*Bromus tectorum*)
- Bulous bluegrass (*Poa bulbosa*)
- Hornseed buttercup (*Ranunculus testiculatus*)
- Russian thistle (*Salsola kali*)
- Common dandelion (*Taraxacum officinale*)
- Fiddleneck (*Amsinkia sp*)
- Bur chervil (*Anthriscus caulus*)
- Tumble mustard (*Sisymbrium altissimum*)
- Teasel (*Dipsacus sylvestris*)

Of these weedy species found at the Project area (including the main Project area and the proposed feeder line routes), knapweed and thistle are on the County noxious weed list (Class B weeds). These species were not common and were associated with areas of previous disturbance, such as the rocky area on top of Whiskey Dick peak previously explored for oil and gas, and areas along roads and livestock watering areas. None of the weedy species observed in the Project area were common; the Project area is dominated by native species.

3.4.1.2 Unique Species/Rare Plants

Rare Plant Investigation Methodology

Study Area:
For the purposes of the rare plant investigation, the survey area included all lands that would be occupied by proposed facilities and a 164-foot (50 meter) buffer. This included proposed turbine strings, underground and overhead electrical lines, access roads, staging areas, substation sites, potential quarry sites, and the two proposed transmission feeder line routes (BPA and PSE). In most cases, the resultant survey corridors were 328 feet

wide, although in some areas, several Project facilities are proposed to be located along side each other, resulting in a wider survey corridor.

Target Species:
For the rare plant investigation, the target species included all plant taxa listed as 'Endangered', or 'Threatened' by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act that potentially occur in the Project area. In addition, taxa that have been formally proposed, or are candidates for such federal listing, or taxa listed as "species of concern" that potentially occur in the Project area were also considered target species. The "species of concern" status is an unofficial status for species that appear to be in jeopardy, but for which information is insufficient to support listing. Target species also included all plant taxa defined as 'Endangered', 'Threatened', 'Sensitive', 'Review', or 'Extirpated' by the Washington Natural Heritage Program (WNHP) that potentially occur in the Project area. The WNHP, part of the WDNR, maintains the most complete database available for state-listed speices. Taxa meeting the above criteria were targeted by the investigation to determine their presence or absence within the study area. Determinations of status for rare plant species were based on information provided by the USFWS and the WNHP's list of tracked plant species (WNHP 2003a).

As per Section 7(c)(1) of the US Endangered Species Act of 1973 (16 USC 1531, *et seq.*, as amended), a letter was sent to the USFWS requesting a list of federally Threatened, Endangered, or Proposed taxa which have potential to occur within the Project area. The USFWS Section 7 response letter listed one federally threatened plant species and one candidate plant species with potential for occurrence in the Project area. The threatened species is Ute ladies'-tresses (*Spiranthes diluvialis*) and the candidate species is basalt daisy (*Erigeron basalticus)*. No other plant species of concern to the USFWS were listed in the letter.

In addition, the WNHP was contacted to obtain element occurrence records for any known rare plant populations (federal and/or state listed) in the vicinity. The WNHP reported one element occurrence record for a tracked plant species in the area crossed by the proposed PSE transmission feeder line route (WNHP, 2003). This species occurrence, Hoover's tauschia, was reported from portions of Sections 4 & 9, Township 17N, Range 21E. Additional element occurrences were reported by WNHP within a three-mile radius of the Project area and include 11 occurrences of Pauper milk-vetch, 12 occurrences of Hoover's tauschia (including the one crossed by the PSE feeder line), six occurrences of hedgehog cactus, and one occurrence of a Wyoming big sagebrush/bluebunch wheatgrass community. The locational information for these populations is not precise and generally covers portions of several sections.

To supplement the information provided by the above agencies, a number of other resources were consulted. These sources provided additional information on the potential rare plant species for the Project, including critical information such as habitat preferences, morphological characteristics, phenologic development timelines, and species ranges. Sources included: taxonomic keys and species guides (WNHP, 1999; USFWS, 2001; Cronquist et al. 1977; Hitchcock and Cronquist, 1973); online databases of common and rare plant species (Ilanga Inc. 2003; USDA, 2002); and Natural Resources Conservation Service (NRCS) soils data (USDA, 2002*a*).

<u>*Rare Plant Resource Investigation Results*</u>

Field Investigation:
All fieldwork was performed by trained botanists with experience performing rare plant surveys in the region. Exhibit 12, 'Habitat Characterization and Rare Plant Resources Report', contains a summary of each investigator's education and experience.

A pedestrian field survey was performed from April 21 – 27 and May 5 – 9, 2003 to locate rare plant species within the study area (defined above). Additional pedestrian field surveys were performed on July 25, September 24, and October 31, 2003 to search areas that were added or modified from the original Project layout. The survey was timed to locate as many target species as possible, particularly those most likely to occur in the affected habitats (sagebrush-steppe). The survey was accomplished by performing meander pedestrian transects, zigzagging back and forth across the survey corridor. The intensity of the pattern, and the speed at which the surveyor walked, was variable, and depended on the structural complexity of the habitat, the visibility of the target species, and the probability of species occurrence in a given area. In some high probability, low visibility habitats, a tight grid pattern was walked. Care was taken to thoroughly search all unique features and any high probability habitats encountered. A GPS unit showing the survey boundaries was used for navigation, supplemented by 7.5' U.S. topographic maps.

During all surveys a list of all vascular plants encountered was made (a complete species list is included in Exhibit 12, 'Habitat Characterization and Rare Plant Resources Report'). Informal collections of unknown species were taken for later identification. *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1973) was the primary authority used for vascular plant species identification. Updated taxonomy referenced in the NRCS PLANTS database or Washington Flora Project database is noted where applicable (USDA, 2003; Ilanga Inc. 2003). Notes were also taken regarding general plant associations, land use patterns, unusual habitats, etc. Photographs of the habitat types and representative individual plants were taken using a digital camera.

The field surveys did not locate any USFWS Endangered, Threatened, Proposed, or Candidate plant species. No habitat for Ute ladies'-tresses occurs in the study area. Limited potential habitat was also found for the federal candidate species, basalt daisy. Although basalt daisy is typically restricted to the extensive cliffs along the Yakima River and Selah Creek, all rock outcrops within the project area were searched intensively for the presence of the species with negative results.

Potential habitat was also found within the study area for a number of federal 'Species of Concern'. These include Columbia milkvetch, Hoover's desert-parsley, least phacelia, Seely's silene, and Hoover's tauschia. In all cases, where potential habitat was found for these species, the area was searched carefully, with negative results.

Likewise, the field surveys did not locate any plants listed as Endangered, Threatened, or Sensitive by the State of Washington. Potential habitat, however, was found for a number of these species throughout the Project area. These habitats were searched thoroughly for the presence of the target species, but none was found.

One plant species on the Washington State 'Review' list, hedgehog cactus, was found within the study area. Much of the suitable habitat present in the Project area (lithosol including sparse shrub-steppe and herbaceous habitats) was found to contain scattered individuals. Most of the plants were in flower at the time of the survey. Since the populations were extensive and extended well beyond the edge of the study corridors, mapping of the entire extent was not undertaken.

Hedgehog cactus is currently a Washington State 'Review 1' species, indicating that, within the state, the species is a, "[p]lant taxon of potential concern, [but is] in need of additional field work before a status can be assigned" (WNHP 2002*c*). The Review designation carries no legal requirement for protection; however, WNHP personnel are interested in tracking occurrences of Review species to aid in the assignment of status. Hedgehog cactus is not currently regarded as Endangered, Threatened, or 'Species of Concern' by the USFWS.

The hedgehog cactus populations found within the Project area are all located in lithosolic habitats. These habitats are well represented within the Project area, intermingled among sagebrush steppe and herbaceous habitats. Much of the suitable habitat searched was found to contain the species. In addition, a large amount of suitable habitat exists nearby, adjacent to the survey corridors. Although areas outside of the corridors were typically not surveyed, it is reasonable to assume that much of this suitable habitat also contains hedgehog cactus.

Hedgehog cactus

Target Plant Species Within the Project Areas:
The final list of rare plant species thought to have potential for occurrence within the Wild Horse Wind Power Project area is presented in Table 3.4.1-1. It includes all of the species discussed above, as well as a number of others which were included based on references consulted during the prefield review. Although rare plant species other than those listed in Table 3.4.1-1 were not thought to have potential for occurrence within the project area, all rare plant species known or suspected to occur in Washington were considered during the field survey. The species listed in Table 3.4.1-1, however, received the most focus during the investigation. Habitat preferences and identification periods

were derived from the literature for each potential species. Using this information, along with topographic maps of the Project area, a field survey plan was developed to guide the timing and intensity of the field surveys.

Table 3.4.1-1: Rare Plant Species with Potential for Occurrence in the Wild Horse Wind Power Project Area				
Common Name ***Scientific Name***	**Federal Status**	**State Status**	**Typical Habitat**	**ID Period**
Tall agoseris *Agoseris elata*		S	Meadows, open woods, and exposed rocky ridgetops	June-August
Pasque flower *Anemone nuttalliana*		S	Prairies to mountain slopes, mostly on well-drained soil	May-August
Palouse milk-vetch *Astragalus arrectus*		S	Grassy hillsides, sagebrush flats, river bluffs, and openings in open ponderosa pine and Douglas fir forests	April-July
Columbia milk-vetch *Astragalus columbianus*	SOC	LT	Sagebrush-steppe	March-June
Pauper milk-vetch *Astragalus misellus* var. *pauper*		S	Open ridgetops and slopes	April-mid June
Dwarf evening-primrose *Camissonia pygmaea*		T	Unstable soil or gravel in steep talus, dry washes, banks and roadcuts	June-August
Naked-stemmed evening primrose *Camissonia scapoidea*		S	Sagebrush desert, mostly in sandy, gravelly areas	May-July
Bristle-flowered collomia *Collomia macrocalyx*		S	Dry, open habitats	late May-early June
Golden corydalis *Corydalis aurea*		R1	Varied habitats, moist to dry and well drained soil	May-July
Beaked cryptantha *Cryptantha rostellata*		S	Very dry microsites within sagebrush steppe	late April – mid June
Shining flatsedge *Cyperus bipartitus*		S	Streambanks and other wet, low places in valleys and lowlands	August-September
Wenatchee larkspur *Delphinium viridescens*	SOC	T	Moist meadows, moist microsites in open coniferous forest, springs, seeps, and riparian areas	July

Table 3.4.1-1: Rare Plant Species with Potential for Occurrence in the Wild Horse Wind Power Project Area				
White eatonella *Eatonella nivea*		T	Dry, sandy, or volcanic areas within sagebrush-steppe	May
Basalt daisy *Erigeron basalticus*	C	T	Crevices in basalt cliffs on canyon walls	May-June
Piper's daisy *Erigeron piperianus*		S	Dry, open places, often with sagebrush	May-June
Sagebrush stickseed *Hackelia hispida* var. *disjuncta*		S	Rocky talus	May-June
Longsepal globemallow *Iliamna longisepala*		S	Sagebrush-steppe and open ponderosa pine and Douglas fir forest	June-August
Hoover's desert-parsley *Lomatium tuberosum*	SOC	T	Loose talus and drainage channels of open ridgetops within sagebrush-steppe	March-early April
Suksdorf's monkey-flower *Mimulus suksdorfii*		S	Open, moist to rather dry places within sagebrush-steppe	mid April-July
Coyote tobacco *Nicotiana attenuata*		S	Dry, sandy bottom lands, dry rocky washes, and other dry open places	June-September
Cespitose evening-primrose *Oenothera cespitosa* ssp.*cespitosa*		S	Open sites on talus or other rocky slopes, roadcuts, and the Columbia River terrace	Late April - mid June
Hedgehog cactus *Pediocactus simpsonii* var. *robustior*		R1	Desert valleys and low mountains	May-July
Brewer's cliff-brake Pellaea breweri		S	Rock crevices, ledges, talus slopes, and open rocky soil	April-August
Fuzzytongue penstemon *Penstemon eriantherus* var.*whitedii*		R1	Dry open places	May-July
Least phacelia *Phacelia minutissima*	SOC	S	Moist to fairly dry open places	July

Table 3.4.1-1: Rare Plant Species with Potential for Occurrence in the Wild Horse Wind Power Project Area				
Sticky goldenweed *Pyrrocoma hirta* var. *sonchifolia*		R1	Meadows and open or sparsely wooded slopes	July-August
Seely's silene *Silene seelyi*	SOC	T	Shaded crevices in ultramafic to basaltic cliffs and rock outcrops, and among boulders in talus	May-August
Ute ladies'-tresses diluvialis	LT	E	Broad low-elevation intermontane valley plains, with deltaic meandered wetland complexes; restricted to calcareous, temporarily inundated wet meadow zones and segments of channels and swales where there is stable subsurface moisture and relatively low vegetation cover.	Mid July - August
Hoover's tauschia Tauschia hooveri	SOC	T	Basalt lithosols within sagebrush-steppe	March-mid April

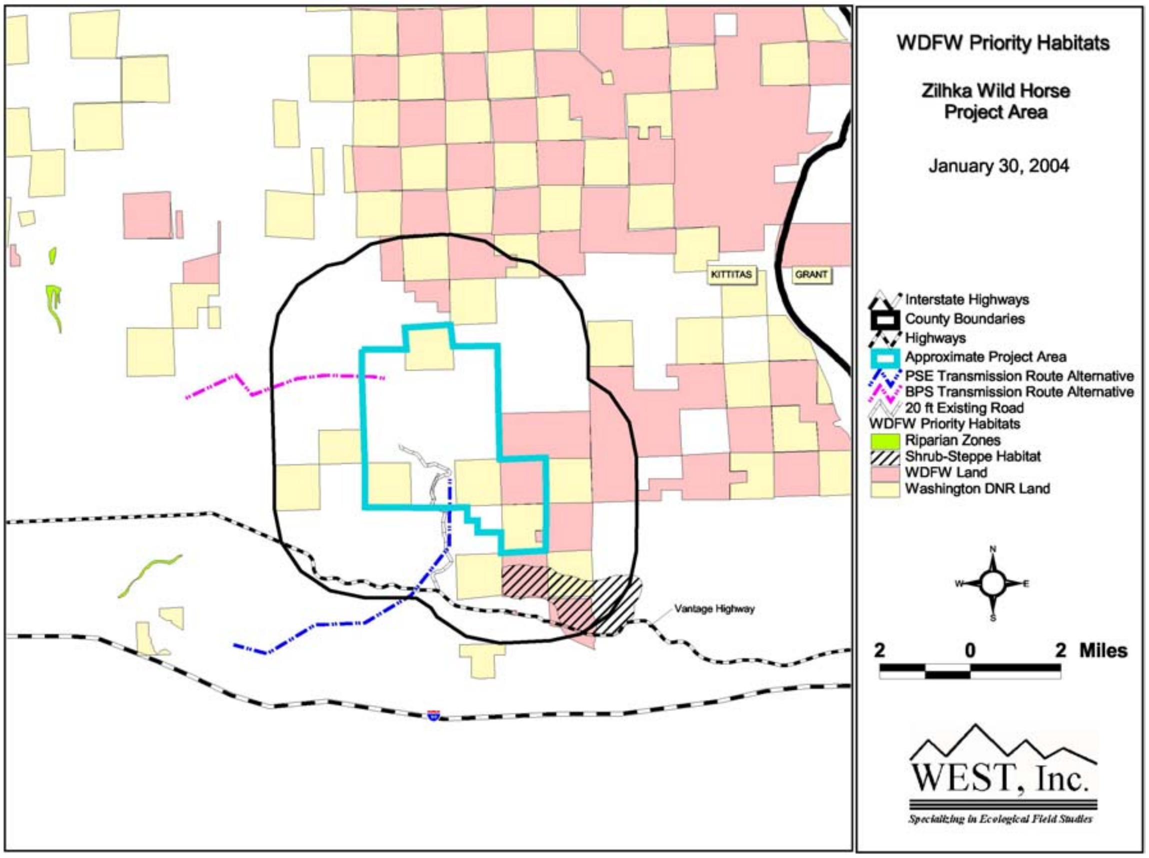
Federal Status:
LT = Listed Threatened. Likely to become endangered
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
SOC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

State Status:
E = Endangered. In danger of becoming extinct or extirpated from Washington.
T = Threatened. Likely to become Endangered in Washington.
S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.
R1=State Review Group 1. Taxa for which there is insufficient data to support listing in Washington as Threatened, Endangered, or Sensitive

3.4.1.3 Priority Habitats and Critical Areas

WDFW defines "priority habitats" as "those habitat types or elements with unique or significant value to a diverse assemblage of species." WDFW has designated 18 priority habitats types, including shrub steppe and riparian areas. Not all shrub steppe or riparian habitat has been mapped as "priority habitat" by WDFW, and not all shrub steppe or riparian habitat would necessary qualify; for example, habitats in severely degraded condition may not be considered priority by WDFW (Clausing, WDFW, pers. comm.). Identifying and mapping priority habitat is an on-going process for WDFW. Currently, no priority habitat is mapped in the Project area itself, however an area of shrub-steppe habitat south of the Project area is mapped as priority shrub steppe habitat (Figure 3.4.1.3-1). Although not mapped as priority habitat, the WFDW would likely consider the shrub steppe habitat rated as "good" condition in the Project area as priority habitat.

Figure 3.4.1.3-1



The Kittitas County Code Title 17A defines "critical areas" as the following:

(1) wetlands;
(2) areas with a critical recharging effect on aquifers used for potable water;
(3) fish and wildlife habitat conservation areas;
(4) frequently flooded areas; and
(5) geologically hazardous areas.

No wetlands occur in any areas where Project facilities will be located, including a 100-foot buffer around each facility. The BPA transmission feeder line route includes a crossing of Parke Creek; however, there are no wetlands associated with the proposed crossing area and no construction will take place within 200 feet of the stream bank. No areas with a critical recharging effect on aquifers used for potable water occur in the Project area. No frequently flooded areas occur in or near any areas where project facilities will be located (see Section 3.3, 'Water'). Geologic issues are addressed in Section 3.1, 'Earth'.

In the Kittitas County Code, the definition for "fish and wildlife habitat conservation areas" includes "riparian habitat". The only riparian habitat potentially affected by the project is associated with, Parke Creek, which the BPA transmission feeder line crosses. This riparian habitat may be considered a critical area by Kittitas County, but the transmission poles will be located at least 200 feet back from the stream bank on either side and there will be no heavy equipment used in the stream bed or riparian corridor for construction. WDFW has reviewed the proposed crossing site and construction techniques and have stated that no hydraulic permit is required. A copy of this letter is included as Exhibit 11.

3.4.2 Project Impacts

Both temporary and permanent impacts of the Project to vegetation will occur during construction. During operations, permanent impacts will remain for the life of the Project while temporary impacts will be restored over time as native vegetation recovers. Therefore the discussion of impacts is not divided into construction and operations for this section.

3.4.2.1 Project Impacts by Habitat Type

Tables 3.4.2-1 and 3.4.2-2 summarize the amount of permanent and temporary impacts expected to habitat types in the Project area. Six of the eight habitat types mapped in the main Project area would be affected; affected habitat types include herbaceous, herbaceous/rock outcrop, shrub-steppe dense, shrub-steppe medium, shrub-steppe sparse, and rock outcrop. Pine forest and woody riparian habitats would not be impacted by project facilities, either temporarily or permanently. Habitats along the BPA and PSE transmission lines that would be affected include herbaceous, pasture, shrub-steppe dense, shrub-steppe medium, shrub-steppe sparse, and rock outcrop. A total of approximately 165 acres would be permanently impacted, with the majority (approximately 139 acres or 84 percent) in shrub-steppe habitats. An additional approximately 356 acres would be temporarily disturbed; approximately 323 acres (91 percent) in shrub-steppe habitats. A breakdown of permanent and temporary impacts by habitat type is shown in Table 3.4.2-2.

Permanent impacts to vegetation would consist of replacement of existing vegetative cover with Project facilities such as wind turbines and access roads. Indirect permanent impacts could also occur such as a change in species composition (e.g., if shrub-steppe habitats are converted to cheatgrass), change in fire frequency of the area, and soil erosion.

Temporary impacts to vegetation include temporary removal of vegetation, crushing or breakage of vegetation, and possible disturbance to habitat (e.g. soil erosion). These impacts are expected to be short-term in nature (e.g., less than five years), depending on the success of revegetation efforts.

The primary habitat type affected is shrub-steppe and most of the shrub-steppe habitat in the Project area is considered good quality. This rating could be lowered to fair or poor if significant change in species composition (e.g., conversion to cheatgrass) results from the proposed Project. This is not expected to occur as the Applicant has proposed mitigation measures, described below, to prevent such invasion of noxious weeds. Lithosolic soils occur only in the "shrub-steppe, sparse" and "herbaceous" habitat categories. Total permanent impacts to lithosols are estimated at approximately 61 acres, based on Table 3.4.2-2 below.

Very few trees occur in the Project area, and none are expected to be removed from the Project area. The BPA transmission feeder line crosses Parke Creek where deciduous trees are present, but the Applicant has indicated that a permanent maintenance trail will not be necessary in the Parke Creek riparian zone and it is expected that no trees will need to be removed.

Table 3.4.2-1: Summary of Impacts to Habitat Types by Project Facility

		Area Impacted (acres)	
Project Facility	**Habitat Type**	**Permanent**	**Temporary**
Wind Turbines	Herbaceous	0.8	25.3
	Herbaceous/Rock Outcrop		0.6
	Shrub-steppe Dense	0.1	7.7
	Shrub-steppe Medium	4.5	133.5
	Shrub-steppe Sparse	4.0	111.6
Permanent Meteorological Towers	Herbaceous	0.1	
	Shrub-steppe Medium	0.1	
	Shrub-steppe Sparse	0.1	
Substations	Shrub-steppe Medium	9.0	
Operations and Maintenance Facility	Shrub-steppe Medium	3.6	
	Herbaceous	0.4	
Quarry & Batch Plant	Herbaceous	6.9	
	Shrub-steppe Medium	10.1	
	Herbaceous/Rock outcrop	4.9	
Temporary Laydown Areas	Shrub-steppe Medium		6.0
	Shrub-steppe Sparse		4.0
Overhead Collection Lines (pole structures)	Herbaceous	0.0	
	Shrub-steppe Dense	0.0	
	Shrub-steppe Medium	0.0	
	Shrub-steppe Sparse	0.0	

Major Improvement Roads	Herbaceous	2.3	
	Shrub-steppe Dense	0.4	
	Shrub-steppe Medium	17.0	
	Shrub-steppe Sparse	11.5	
New Roads	Herbaceous	7.7	
	Shrub-steppe Dense	1.5	
	Shrub-steppe Medium	46.8	
	Shrub-steppe Sparse	26.8	
	Rock Outcrop	0.4	
Minor Improvement Road	Herbaceous	2.3	
	Shrub-steppe Medium	2.8	
Underground Trench	Herbaceous		1.6
	Shrub-steppe Dense		0.5
	Shrub-steppe Medium		10.1
	Shrub-steppe Sparse		5.7
Construction Trail - overhead feeder line	Herbaceous		2.0
	Pasture		0.1
	Shrub-steppe Dense		1.6
	Shrub-steppe Medium		11.6
	Shrub-steppe Sparse		5.0
	Rock Outcrop		0.1
Feeder line (pole structures & Pole Assembly)	Herbaceous	0.0	3.1
	Pasture	0.0	0.2
	Shrub-steppe Dense	0.0	2.5
	Shrub-steppe Medium	0.2	15.2
	Shrub-steppe Sparse	0.1	7.9
	Rock Outcrop	0.0	0.1
TOTAL		165	356

Table 3.4.2-2. Summary of Impacts by Habitat Type		
	Impacted Area (acres)	
Habitat Type	**Permanent**	**Temporary**
Herbaceous	20.6	32.0
Herbaceous/Rock Outcrop	4.9	0.6
Pasture	0.0	0.3
Shrub-steppe Dense	2.1	12.3
Shrub-steppe Medium	94.2	176.4
Shrub-steppe Sparse	42.5	134.2
Rock Outcrop	0.4	0.2
Total	165	356

**Quantities listed are approximate.*

3.4.2.2 Sensitive Plant Species

Due to the absence of known populations within the Project area, no Project-related impacts are anticipated to any federally Endangered, Threatened, Proposed, or Candidate plant species. Since no impacts are anticipated, the appropriate determination of effect for the Project for federally-listed plant species is “no effect”. Preparation of a Biological Assessment is therefore not necessary. Likewise, no Project-related impacts are predicted for any Washington State Endangered, Threatened, or Sensitive plant species.

Limited impacts are anticipated, however, to one species on the Washington State Review list, hedgehog cactus. Ground disturbance related to construction and operation of the proposed Project could cause direct adverse impacts to individuals if they are located within the impact footprint. However, due to the large number of individuals observed, their frequency in preferred habitats, and the high likelihood that many more individuals occur in the area adjacent to the survey corridors, the Project is not expected to significantly impact the species’ viability in the Project area. An estimated 10 percent of the individuals in the Project area could be directly impacted by the Project. This level of direct impact is not anticipated to jeopardize the continued existence of the local population, or lead to the need for state or federal listing.

In addition to direct impacts from ground disturbing activities, the Project also has the potential to impact hedgehog cactus indirectly if the Project leads to the degradation of habitat in the area through the introduction and spread of noxious weeds or the increase of human presence in the area. Although little is known about how hedgehog cactus responds to competition from non-native species, it is safe to assume that significant increases in noxious weeds in the area could adversely impact the species. At the present time, the lithosolic habitat where hedgehog cactus is found is relatively intact. If the Project led to the degradation of these habitats by increasing noxious weed densities, it is likely that some level of adverse impact to hedgehog cactus populations would occur.

This is not expected to occur as the Applicant has proposed mitigation measures to prevent and minimize the spread of noxious weeds. Furthermore, uncontrolled access to the Project area could increase the possibility of cactus collectors on-site. Collection of hedgehog cactus for gardens has been cited as a reason for decline of the species (Taylor 1992). Access to the Project area will be controlled during construction and operations and will likely result in a lower level of human activity within the Project area than is currently occurring.

3.4.2.3 Priority Habitats and Critical Areas

No mapped WDFW priority habitats occur in the Project area, therefore no project-related impacts will occur to mapped priority habitats.

Since none of the following Kittitas County "critical areas" are found in or near any areas where Project facilities will be located, no impacts are anticipated to: wetlands, areas with a critical recharging effect on aquifers used for potable water, or to frequently flooded areas.

Other Kittitas County critical areas are addressed elsewhere in the application, including fish and wildlife habitat conservation areas (Section 3.6, 'Wildlife') and geologically hazardous areas (Section 3.1, ' Earth').

3.4.2.4 Noxious Weeds

Most noxious and invasive species are aggressive pioneer species that have a competitive advantage over other species on disturbed sites. Therefore, all areas disturbed by the Project are potential habitat for noxious and invasive species, particularly for those species previously observed or known to occur in the Project area. The introduction of new noxious species from other areas can occur from construction equipment and other vehicles transporting seeds onto the Project site. Once established in an area, negative impacts can include one or more of the following, depending on the species, degree of invasion, and control measures:

- loss of wildlife habitat;
- alteration of wetland and riparian functions;
- reduction in livestock forage;
- displacement of native plant species;
- reduction in plant diversity;
- changes in plant community functions;
- changes in fire frequency
- increased soil erosion and sedimentation;
- reduced recreational value and use;
- increased control and eradication costs to local communities; and/or
- reduction in land value

3.4.2.5 Wetlands

No wetlands occur in or near areas designated for Project facilities or construction impacts; therefore, no construction or operation impacts to wetlands are expected.

3.4.2.6 Comparison of Impacts of Proposed Scenarios

Under the different design scenarios, there is no significant change to the potential impacts of the Project. This is because under each scenario, there is no change to the length or width of Project components, including roads, substations, O&M facilities, rock quarries, underground or overhead lines, permanent met towers, batch plant, or rock crusher. These components comprise the vast majority of acreage impacted by the Project, and because they remain unchanged under all scenarios, the total acreage and construction quantities are very similar under all scenarios.

The total acreage and construction quantities are very similar under all scenarios because the scenarios utilize a similar layout, with greater or fewer WTGs along each string, but with the same beginning and end points for each string. The "permanently disturbed" acreage differs only by the different number of WTG foundations required, which is a very small percentage of the overall Project acreage. The Large WTG Scenario utilizes larger foundations for a smaller number of WTGs while the Small WTG Scenario utilizes smaller foundations for a larger number of WTGs, yielding similar acreage requirements. The different acreages permanently disturbed under each scenario are therefore the same as presented in Table 3.4.2-2. The acreages of temporary disturbance under the different scenarios are presented below, and increase by 13% or decrease by 18% depending on the number of laydown areas required for each scenario. Because the Small WTG scenario would install more WTGs, it would require a larger temporary impact area for WTG laydown and assembly than the other scenarios.

Table 3.4.2-3: Summary of Temporary Disturbance by Habitat Type

	Temporarily Impacted Area (acres)		
Habitat Type	**Large WTG Scenario**	**Most Likely Scenario**	**Small WTG Scenario**
Herbaceous	26	32	36
Herbaceous/Rock Outcrop	0.5	0.6	0.7
Pasture	0.2	0.3	0.3
Shrub-steppe Dense	10.0	12.3	13.9
Shrub-steppe Medium	143.2	176.4	198.7
Shrub-steppe Sparse	108.9	134.2	151.2
Rock Outcrop	0.2	0.2	0.2
Total	289	356	401

Note: Estimates are extrapolated from Table 3.4.2-2 data.

3.4.3 Impacts of No Action Alternative

Under the No Action Alternative, the project would not be constructed or operated, and the environmental impacts described in this ASC 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.4.4 Wetlands

Wetlands are of concern at the federal, state, and county levels. At the federal level, filling of wetlands is regulated under Section 404 of the Clean Water Act. The Army Corps of Engineers is responsible for the regulation of wetlands and the Corps has prepared a manual for the delineation of wetlands (Environmental Laboratory, 1987). At the state level, the Washington Department of Ecology regulates wetlands within the state. The Department of Ecology provides guidelines on the delineation of wetlands, wetland characterization and function assessments, and mitigation. At the county level, wetlands are designated as "critical areas".

All areas where proposed Project facilities will be located were searched for the presence of wetlands by a qualified wetland delineator. The wetland searches included a 164 foot (50 meter) buffer around each proposed Project facility. No wetlands occur in areas designated for Project facilities or construction impacts, nor do wetlands occur within the buffer zone. Several springs are scattered throughout the Project area, but none are in close proximity to any Project facility. Whiskey Dick Creek, an intermittent stream, flows through the Project area, but again, not in close proximity to any Project facility. The proposed BPA feeder line crosses Parke Creek, an intermittent stream, east of the main Project area. The crossing location was investigated and no wetlands are associated with Parke Creek at this location. The area supports a woody riparian zone with trees such as alder (*Alnus incana*) and aspen (*Populus tremuloides*) in the overstory and mixed shrubs (e.g., snowberry [*Symphoricarpos sp*], golden current [*Ribes aureum*], willow [*Salix sp.*]) and forbs in the understory. The vegetation did not meet the criteria for a wetland and no hydrology indicators were observed. Parke Creek is somewhat channelized at this location and there was no evidence of periodic flooding or a high water table. The location is within a pasture and the area is heavily grazed by livestock.

Due to the nature of wind power projects, most facilities are located in upland habitats. During the design of the Project, all Project facilities, including access roads, electric lines, and turbine strings, were intentionally laid-out to avoid the limited water features in the Project area (particularly springs).

3.4.5 Mitigation Measures

3.4.5.1 Mitigation for Impacts to Project Area Habitats

The Applicant has proposed to mitigate for all permanent and temporary impacts to habitat caused by the Project in accordance with the ratios outlined in the WDFW Wind Power Guidelines (WDFW, August 2003). A mitigation parcel has been identified within the 8,600-acre Project area. The mitigation parcel is T18N, R21E, Section 27, except for the portion of this section that will be developed as part of the Project. String ‘L’ follows a ridgeline that dissects Section 27 from north to south. The area set aside for Project mitigation is estimated at approximately 600 acres. This is more than the required replacement habitat under the WDFW Wind Power Guidelines. The Applicant has agreed to fence this parcel to eliminate livestock grazing if the grazing practices of adjacent properties at the time the Project goes into operation will require fencing to ensure that cattle are excluded from this parcel. In addition to Section 27, the Applicant is proposing to fence several springs within the Project area to eliminate livestock degradation. Fencing used for the mitigation parcel and the springs will be designed to keep livestock out but allow game species to cross. The Applicant intends to coordinate with Washington Department of Fish and Wildlife (WDFW) regarding fence specifications.

As noted above, WDFW has prepared a set of guidelines for wind power projects east of the Cascades to provide guidance for siting and mitigation. These guidelines were followed during selection of Section 27 as a mitigation site for the Project. Section 27 provides opportunity for “like-kind” replacement habitat of equal or higher habitat value than the impacted area and it occurs in the same geographical region as the impacted habitat. Furthermore, since the Applicant has an option to purchase the property if the Project goes forward, the Applicant can provide legal protection and protection from degradation for the life of the Project. Consistent with WDFW’s guidelines, permanent impacts to habitat would be replaced at a ratio equal to or greater than 1:1 for grassland and 2:1 for shrub-steppe.

Additional benefits of Section 27 as a mitigation parcel for the Project include:

- Protection of a segment of Whiskey Dick Creek
- Continuity of habitat with adjacent state lands
- Preservation of a diversity of habitats

Use of Section 27 as a mitigation parcel would result in protection of an approximately 1-mile segment of Whiskey Dick Creek near its headwaters. Protection of waterways and their adjacent riparian habitat provide significant benefits above and beyond replacement of "like-kind" habitat at agreed upon ratios. Protection of this segment of Whiskey Dick Creek provides benefits for water quality, wildlife, and species diversity. In addition, Section 27 is adjacent to state-owned lands. WDNR administers Section 34 to the south and WDFW administers Section 26 to the east. Use of Section 27 for mitigation will provide continuity of habitat with these adjacent state-owned sections. Finally, a variety of habitat types that occur in the general Project area are found in Section 27, so a diversity of habitat types would be preserved. These include shrub-steppe (moderate and dense), herbaceous, herbaceous/rock outcrop, and woody riparian.

3.4.5.2 Mitigation for Impacts to Unique Species/Rare Plants

The only unique species or rare plant that may be impacted by the project is hedgehog cactus, a Washington State Review list species. Access to the site will be controlled during both construction and operations, which should provide greater protection than is currently afforded to this species. As collection of this species for gardens has been cited as a reason for its decline, if such collection becomes a problem at the Project site despite the controlled access, the Applicant will additionally post signage indicating that collection of any plants in the Project area is prohibited.

3.4.5.3 Mitigation for Impacts to Critical Areas/Priority Habitats

Since no Kittitas County critical areas will be impacted by the Project, no mitigation is proposed.

Shrub steppe is considered a priority habitat by WDFW. The Applicant has selected a mitigation site that meets or exceeds the WDFW's guidelines for mitigation of shrub steppe for wind power projects east of the Cascades. This mitigation site is described above in Section 3.4.5.1.

3.4.5.4 Wetlands

Since no impacts to wetlands are expected, no mitigation is proposed.

3.4.5.5 Noxious Weeds

To avoid, minimize, or reduce the impacts of noxious weeds, the following mitigation measures will be implemented:

- The contractor will clean construction vehicles prior to bringing them in to the project area from outside areas.
- Disturbed areas will be reseeded as quickly as possible with native species.
- Seed mixes will be selected in consultation with WDFW and Kittitas County Weed Control Board.
- If hay is used for sediment control or other purposes, hay bales will be certified weed free.
- Access to the site will be controlled which may result in a lower level of disturbance and fewer opportunities for noxious weeds to be introduced and/or spread.
- Noxious weeds that may establish themselves as a result of the Project will be actively controlled in consultation with the Kittitas County Weed Control Board.

3.4.6 Significant Unavoidable Adverse Impacts

With mitigation, no significant unavoidable adverse impacts are anticipated to vegetation resources in the Project.

3.5 AGRICULTURAL CROPS AND LIVESTOCK

3.5.1 Existing Conditions

As described in Section 3.1, 'Earth' and in Section 3.10, ‘Land Use’, land uses in the Project area are predominantly open space and livestock (cows, horses and sheep) grazing. There is currently no agricultural activity taking place on any of the parcels where Project facilities are proposed, other than grazing. None of the land is irrigated and no crops are grown on these parcels, which are designated as open range by Kittitas County. Due to low precipitation, this area is not highly productive rangeland, and most grazing use is seasonal (spring) in nature. The vegetation in the Project area, as described and assessed in detail in Section 3.4, 'Vegetation and Wetlands', is dominated by native shrub steppe species, but invasive species are present in some areas, particularly those areas near existing roads and around springs.

The Project site and lands designated for the BPA feeder line are owned by Washington DNR, Washington DFW, and one private landowner. The parcels along the PSE transmission feeder line are owned by six landowners. To the west of the Project area and BPA transmission lines in areas served by the Highline canal, irrigated agriculture predominates.

3.5.2 Impacts of the Proposed Action

3.5.2.1 Construction

During construction of the Project, it will be necessary to remove livestock from those areas where blasting or heavy equipment operations are taking place. The Applicant will make arrangements with the property owner and livestock owner(s) to keep livestock out of these areas during those periods. The entire construction period is expected to last less than one year, so the impact on grazing operations will be limited to one grazing season. The area that will be temporarily disturbed during construction is approximately 360 acres. This temporarily disturbed area will be replanted after construction with an appropriate native seed mix and is expected to recover over time, particularly given that disturbance corridors are largely linear in nature. As described in Section 3.4, 'Vegetation and Wetlands', an active noxious weed control program will be implemented, in consultation with the Kittitas County Noxious Weed Control Board during both construction and operations to effectively prevent and minimize the introduction and/or spread of invasive species.

3.5.2.2 Operation

Once the Project is completed, grazing activities can resume as before. The operation of wind turbines is highly compatible with grazing activities. Cattle, horses, sheep, and other domestic animals routinely graze underneath operating wind turbines at projects across the U.S. and around the world. Most of the Project facilities will be located within a roughly 25,000 acre privately-owned ranch. The entire Project area encompasses approximately 8,600 acres. The total footprint area that will be permanently occupied by the Project facilities is approximately 165 acres. The access trails serving the transmission feeder line(s) will remain accessible for grazing.

It is not known at the present time whether or not grazing will continue within the Project area. For the parcels owned by WDNR, that decision will rest with WDNR. The parcel owned by WDFW is not currently leased for grazing. Following an exercise of the Applicant's purchase option, the Applicant would control the affected land, and has not determined whether grazing leases will be renewed. Continuation of grazing leases on the Applicant's property would not constitute granting public access to the Project area as only the lessee's agents would be permitted to enter the property.

Figure 3.5.2-1 Elk Herd Migrating near Blue Canyon Wind Farm, Oklahoma 2004

The Applicant has determined that grazing activities will be discontinued in an area that will be used for habitat mitigation. Section 27 (T 18 N, R 21 E) has been proposed for use as mitigation acreage and would be excluded from grazing, in accordance with the WDFW's guidelines for wind power development.

Assuming cattle grazing continues on adjacent parcels, the Applicant would install approximately 9,800 feet of new fencing along portions of the northern, western and southern boundaries of Section 27 during the construction timeframe. To the extent practical, existing fencing along the northern and eastern boundaries of Section 27 would remain in place. When completed, the fence will exclude livestock from the section in order to enhance its value as wildlife habitat. The specific height and material used for new fencing will be determined in consultation with WDFW to allow wildlife to cross over into this area.

In the event that cattle grazing is discontinued entirely on the private lands within the Project boundary, approximately 5,300 acres of grazing land would be removed from production for the life of the Project (at least 20 years). The removal of approximately 5,300 acres of land from the approximately 445,000 acres of pasture or unimproved grazing land in Kittitas County (Kittitas County Comprehensive Plan, 2003) would represent a reduction of approximately 1.2%. This Section 'Agricultural Crops and Livestock' contains additional details addressing grazing, and Section 3.10, 'Land Use' addresses zoning details.

The current holder of the grazing lease for the privately owned land within the Project area resides in Grant County and transports livestock a considerable distance to graze the area. It is not known what the lessee's plans would be if livestock are displaced from the Project area, however, any livestock grazing that are displaced from the Project area may be shifted to graze on the remaining 20,000 acres of the privately owned ranch that surrounds the Project area or to other privately-owned or WDNR-owned land in the area that is available for grazing.

The possibility for operation of the Project to displace wintering elk is discussed in Section 3.6, 'Wildlife'. It is not known for certain if the human disturbance associated with Project operations will displace significant numbers of elk, however, it appears unlikely given that the site is presently used regularly by hunters and other recreational users. Currently at the Blue Canyon Wind Farm, a similar wind power project operating in Oklahoma and shown in Figure 3.5.2-1, preliminary study appears to indicate that there is very little impact on the migrating elk herds which habitually graze across the project area. The Applicant has agreed to allow controlled hunting within the Project area in order to allow management of the elk and deer populations and to prevent creation of a sanctuary effect that could lead to greater agricultural damage claims from farmers and ranchers in the area.

3.5.2.3 Comparison of Impacts of Proposed Scenarios

The difference in temporarily and permanently disturbed acreages is presented in Table 3.5.2-1 below. The primary difference between the proposed scenarios, as applicable to this section, is the difference in temporarily disturbed area which will be re-seeded.

Table 3.5.2.1 Difference in Project Disturbance Areas Under Different Scenarios

	Large WTG Scenario	Most Likely Scenario	Small WTG Scenario
Project Temporary Disturbance Area	289 acres	356 acres	401 acres
Project Permanent Disturbance Area	164.7 acres	164.7 acres	164.6 acres

3.5.3 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.5.4 Mitigation Measures

As described in the preceding sections, the Applicant proposes to implement an active noxious weed control program to prevent and minimize the spread or introduction of noxious weeds in the Project area and to allow controlled hunting to avoid creating a sanctuary for elk and deer that may cause an increase in agricultural damage to neighboring landowners.

3.5.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to agricultural crops and livestock are expected as a result of the proposed Project.

3.6 WILDLIFE

This section summarizes results of the extensive wildlife studies that have been done to characterize the existing wildlife present at the Project site and estimate potential impacts to wildlife from construction and operation of the Project. The complete results of the wildlife studies and all accompanying maps and figures are presented in Exhibit 14, 'Wildlife Baseline Study'.

The Applicant has contracted with Western Ecosystems Technology, Inc. (WEST) to develop and implement a survey protocol for a baseline study of wildlife and habitat in the Project area. The protocol for the ecological baseline study is similar to protocols used at the Kittitas Valley, Desert Claim, Vansycle, Klondike, Stateline, Maiden, Condon and Nine Canyon wind projects in Washington and Oregon, the Buffalo Ridge wind project in Minnesota, and the Foote Creek Rim wind project in Wyoming.

This section summarizes the results of a full year of ecological baseline studies conducted from May 10, 2002 through May 22, 2003. The wildlife portion of the ecological baseline study consisted of 1) point count and in-transit surveys for wildlife species, 2) an aerial survey within approximately two miles of the project boundary for visible raptor nests and wintering big game in the spring of 2003 and 3) aerial and ground surveys during the breeding season for sage grouse in the Project vicinity. Rare plant surveys and habitat mapping were also conducted and those results have been summarized in a separate report (Lack et al. 2003). The recent synthesis of baseline and operational monitoring studies at wind developments by Erickson et al. (2002), as well as other relevant information has been reviewed and has been utilized for predicting impacts from the Project. Agency personnel were contacted for information regarding their concerns and data available on wildlife of the general Project area.

Consultation with local, regional and central office personnel of WDFW was initiated in early 2003 for the proposed Project. Project consultants and WDFW met in March 2003 to discuss protocol components for the spring 2003 studies. Representatives of the Applicant, project consultants, and WDFW met in Ellensburg on May 25, 2003 to discuss the Project, including preliminary results of the studies and mitigation strategies. Information on sensitive plant and wildlife species within the vicinity of the Project was requested and received from the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and the Washington Natural Heritage Program (WNHP). Personnel from WDFW, WEST and the Applicant made a field visit to the site on September 25, 2003.

3.6.1 Existing Wildlife Conditions

The ecological and current habitat conditions of the Project area are described in detail in Section 3.4, 'Vegetation and Wetlands' and thus are not repeated here.

3.6.1.1 Baseline Study Methodology

Avian Use Surveys

The goal of the avian use surveys was to estimate the temporal and spatial use of the study area by birds. The avian use surveys combined observations collected at seven fixed-point circular plots in the study area with in-transit observations of birds made while driving to and from the study areas (Figure 3.6.1-1). All wildlife species of concern and uncommon species observed were recorded while the observers were in the study area traveling between observation points and while conducting other field activities. An experienced wildlife and avian biologist, Jay Jeffrey of WEST Inc., conducted the avian surveys. A total of 179 30-minute point count surveys were conducted in the Project area between May 10, 2002 and May 22, 2003. The avian use surveys meet the specifications contained in the WDFW Wind Power Guidelines for the conduct of general avian use surveys for the project.

Fixed-point Surveys:

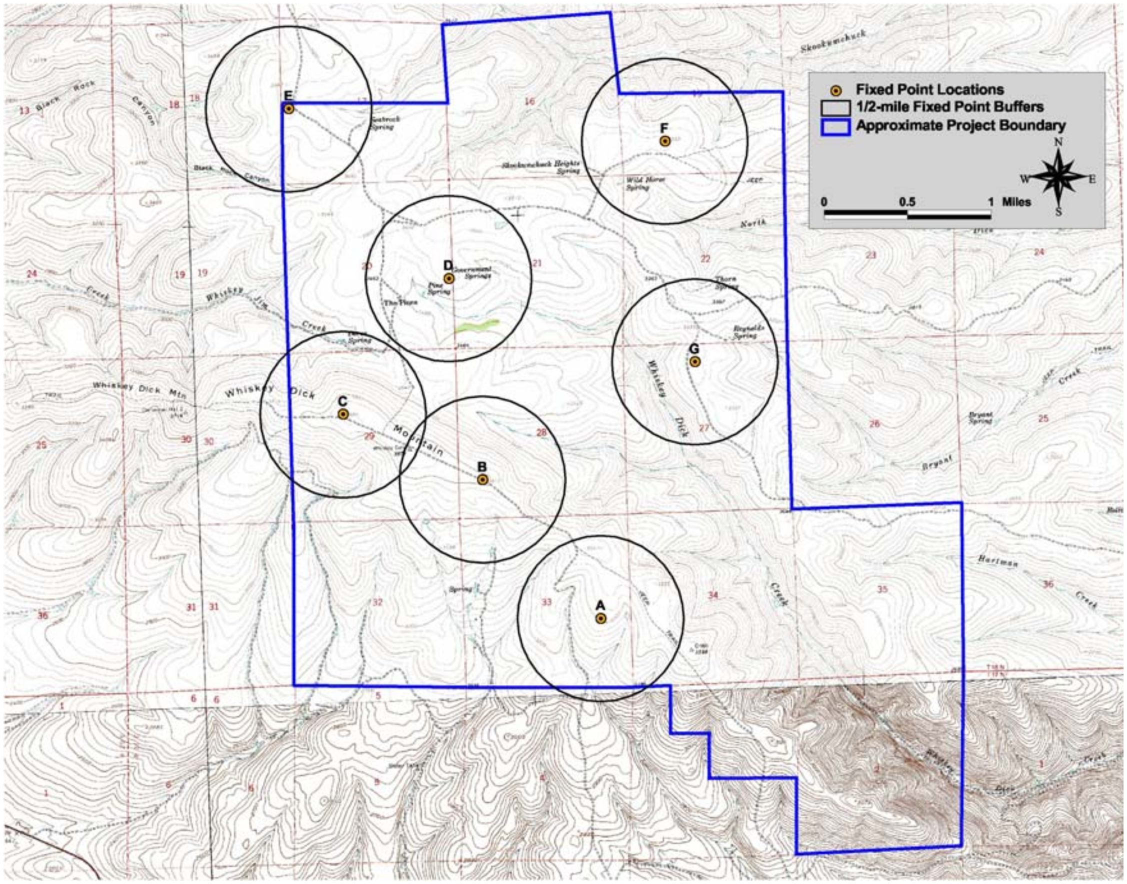
Each plot consists of an 800-m radius circle centered on an observation point location (Figure 3.6.1-1). Landmarks were located to aid in identifying the 800 meter boundary of each observation point. Observations of birds beyond the 800 meter radius were recorded, but these observations were not included in standardized use estimates.

All detections of birds, mammals, reptiles, and amphibians in and near plots during the 30-minute plot surveys were recorded. Visual and binocular scanning of the entire plot viewshed and beyond were continuously performed throughout the survey period. A unique observation number was assigned to each sighting. The following data were recorded for each plot survey: date, start and end time of observation period, plot ID, species or best possible identification, number of individuals, sex and age class when known, distance from plot center when first observed, closest distance, altitude above ground (first, low and high), flight direction, behavior(s), habitat(s), whether observed during one or more of the three instantaneous counts, and in which of the three ten minute periods it was observed. Flight paths were mapped for raptors and species of concern and given corresponding observation numbers. The map indicates whether the bird was within or outside the survey radius based on reference points at known distances from the plot center. Flight paths were digitized using ARCVIEW 3.2. Climate information, such as temperature, wind speed, wind direction, precipitation and cloud cover were also recorded for each point count survey.

Incidental/In-transit Observations:

All wildlife species of concern and uncommon species observed while field observers were traveling between plots were recorded on incidental/in-transit data sheets. Other incidental observations made during other surveys or visits to the sites were also recorded. These observations were recorded in a similar fashion to those recorded during the plot studies. The observation number, date, time, species, number, sex/age class, height above ground, and habitat were recorded.

Figure 3.6.1-1. Location of avian observation stations



Observation Schedule:

Surveys were conducted typically on weekly intervals during the spring, early summer and fall, and occasionally during the winter months, due to restricted site access. During a set of surveys, each selected plot was visited once. A pre-established schedule was developed prior to field work to ensure that each station was surveyed about the same number of times each period of the day, during each season, and to most efficiently utilize personnel time. The schedule was altered in response to adverse weather conditions, which required delays and/or rescheduling of observations.

Statistical Analysis:

Avian Use:

Species lists were generated by season including all observations of birds detected regardless of their distance from the observer. The number of birds seen during each point count survey was standardized to a unit area and unit time surveyed. The standardized unit time was 30 minutes and the standardized unit area was 0.78 square miles (2.01 square kilometers) with a 2,625 foot (800 meter) radius viewshed for each station. For example, if four raptors were seen during the 30 minutes at a point with a viewing area of 0.78 mi^2 (2.01 km^2), these data may be standardized to 4/0.78 = 5.13 raptors/mi^2 (1.98 raptors/km^2) in a 30-minute survey. For the standardized avian use estimates, only observations of birds detected within 2,625 ft (800m) of the observer were used. Estimates of avian use (expressed in terms of number of birds/plot/30-minute survey) were used to compare differences in avian use between 1) avian groups and 2) seasons.

Avian Diversity and Richness:
The total number of unique species was calculated by season. The mean number of species observed per survey (i.e., per station per 30-minute survey) was tabulated to illustrate and compare differences in mean number of species per survey between seasons.

Avian Flight Height/Behavior:
The first flight height recorded was used to estimate percentages of birds flying below, within and above the rotor swept area (RSA). The zone of collision risk we used was 82-328 ft (25-100 m) above ground level (AGL).

Avian Exposure Index:
A relative index to collision exposure (R) was calculated for bird species observed during the fixed-point surveys using the following formula:

$$R = A*Pf*Pt$$

Where A = mean relative use for species i (observations within 2,625 ft (800 m) of observer) averaged across all surveys, Pf = proportion of all observations of species i where activity was recorded as flying (an index to the approximate percentage of time species i spends flying during the daylight period), and Pt = proportion of all flight height observations of species i within the rotor-swept area (RSA). This index does not account for differences in behavior other than flight characteristics (i.e., flight heights and percent of birds observed flying).

Data Compilation and Storage:
A Microsoft® ACCESS database was developed to store, organize and retrieve field observation data. Data from field forms were keyed into electronic data files using a pre-defined format to facilitate subsequent QA/QC and data analysis. All field data forms, field notebooks, and electronic data files were retained for reference.

Quality Assurance/Quality Control (QA/QC):
QA/QC measures were implemented at all stages of the study, field surveys, data entry, and during data analysis and report writing. At the end of each survey day, each observer was responsible for inspecting his or her data forms for completeness, accuracy, and legibility. Periodically data forms were reviewed to ensure completeness and legibility; any problems detected were corrected. Any changes made to the data forms were initialed and dated by the individual making the change.
A sample of records from the electronic files was compared to the raw data forms and any errors found were corrected. Any irregular codes detected, or any data suspected as

questionable, was discussed with the observer and study team leader. All changes made to the raw data were documented for future reference. Any errors or suspect data identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps made.

Raptor Nest Survey

Searches were conducted for raptor, raven and American crow nests within the Project area and a two-mile buffer, an area totaling approximately 49 mi^2 ($127km^2$) (Exhibit 14, Figure 6). Surveys were conducted from a helicopter with one observer on April 14, 2003. Search paths were recorded with a handheld Global Positioning System (GPS) at five second intervals. In addition to raptor nests, researchers also recorded observations of big game and searched for sage grouse (leks and flushed birds). The raptor nest survey protocol exceeds the minimum recommended protocol in the WDFW Wind Power Guidelines.[1] Flight paths totaled 290 miles (467km) in length, of which 95 miles (153km) were conducted during sage grouse lek surveys (Exhibit 14, Figure 6). The helicopter was kept at an elevation of approximately 250 ft (76m) above the ground during sage grouse lek surveys.

Raptor nest surveys were scheduled after most species of raptor finished courtship and were incubating eggs or brooding young. Surveys were also scheduled just prior to the onset of leaf out to increase the visibility of raptor nests within deciduous habitats. Nest searches were conducted by searching habitat suitable for most above ground nesting species, such as cottonwood, ponderosa pine, tall shrubs, and cliffs or rocky outcrops. The helicopter was flown at an altitude of tree top level to approximately 250’ (76m) above the ground during surveys. If a nest was observed the helicopter was moved to a position where nest status and species present could be determined. Efforts were made to minimize disturbance to breeding raptors, including keeping the helicopter a maximum distance from the nest at which the species could be identified. Those distances varied depending upon nest location and wind conditions. Data recorded for each nest location included species occupying the nest, nest status (inactive, bird incubating, young present, eggs present, adult present, unknown or other), nest substrate (pine, oak, cottonwood, juniper, shrub, rocky outcrop, cliff or power line), number of young present, time and date of observation and the nest location (recorded with a handheld GPS). Mule deer and elk locations were also recorded while conducting sage grouse lek and raptor nest surveys.

Sage Grouse Survey

The objective of the sage grouse surveys was to investigate the likelihood of presence of breeding sage grouse within the Project vicinity. This survey of a state sensitive species (“Threatened”) is consistent with recommendations for pre-project surveys of

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[1] WDFW Guidelines, August 2003 “At a minimum, one raptor nest survey during breeding season within 1-mile of the project site should be conducted to determine the location and species of active nests potentially disturbed by construction activities, and to identify active and potentially active nest sites with the highest likelihood of impacts from the operation of the wind plant. A larger survey area (e.g., a 2-mile buffer) is recommended if there is some likelihood of the occurrence of nesting state and/or federally threatened and endangered raptor species (e.g., ferruginous hawk, bald eagle, golden eagle)...”

Threatened, Endangered and Sensitive Status Wildlife in the WDFW Guidelines[2]. Surveys for breeding season sage grouse presence, including leks, included two helicopter surveys (March 20 and April 14, 2003) and 3 ground surveys (March 13, March 22, April 2, 2003). Surveys for sage grouse leks focused on relatively flat areas of sagebrush and steep canyons were avoided. Sage grouse surveys were conducted from 0600 – 0830 hours. Approximately 95 linear miles (153km) were flown for each aerial sage grouse survey. The helicopter was kept at an elevation of approximately 250' (76m) above the ground. Ground surveys focused on areas of historic observations and other relatively flat areas.

Big Game Survey
Big game surveys were done in conjunction with the avian use and raptor nest surveys. Standardized observations of big game were recorded during the fixed point surveys. Observations of big game were recorded and mapped during the raptor nest survey on April 14, 2003.

3.6.1.2 Wildlife Study Results

Field work (all survey types) was conducted on the Project site between May 10, 2002 through May 22, 2003. A total of 53 species were identified during the avian point count surveys, sage grouse surveys, in-transit travel, and incidentally while conducting other field tasks at the Project (Table 3.6.1-1).

Avian Use and Frequency
A total of 50 species were observed during the fixed-point surveys at the Project site. The mean number of species observed per survey (30-minute point count) was 2.43. The mean number of species was highest in the spring/summer and lowest during the fall and winter. The passerine diversity was relatively low for the Project, likely due to the low diversity of habitats associated with the point counts (Table 3.6.1-2).

A total of 1,332 individual bird detections within 512 separate groups were recorded during the fixed-point surveys. Cumulatively, three passerines and a corvid, (horned larks, snow bunting, European starling and common raven) comprised approximately 53% of the observations. All other species comprised less than 5% of the observations individually.

Passerines:
Passerines were the most abundant avian group observed during all seasons. Passerines showed higher abundance in spring/summer (7.244) compared to fall and winter (4.796 and 4.449, respectively, Figure 3.6.1-2). The moderate winter use was primarily due to several large flocks of snow buntings (140 individuals). Passerines made up approximately 74% or more of the avian use in all seasons. Passerines were observed

[2] WDFW Guidelines, August 2003: "If existing information suggests the probable occurrence of state and/or federal threatened or endangered or sensitive-status species on the project site at a level of concern, focused surveys are recommended during the appropriate season to determine the presence or likelihood of presence of the species."

during 90.11% of the surveys in the spring/summer, 58.16% in the fall and 33.16% in the winter.

Raptors:
Raptor use was second highest to passerines in the spring/summer (0.679) and third to passerines and corvids, in the fall (0.456) and winter (0.204). Raptor use decreased from spring/summer to fall and more from fall and winter with American kestrels, red-tailed hawks and golden eagles the most abundant species (Figure 3.6.1-2). In all seasons, raptors made up less than eight percent of the avian use, and were observed in 43.77% of the spring/summer surveys, 31.29% in the fall and 16.33% of the winter surveys.

Corvids:
Corvid use was similar in all seasons, and consisted of several groups of common ravens.

Waterfowl:
The only waterfowl use occurred in the spring/summer, and consisted of one group of Canada geese. Low use is anticipated at this project site due to the lack of foraging and roosting habitat.

Flight Height Characteristics
At least 10 groups of flying birds were observed for seven species during the fixed-point surveys. Of these species, golden eagle (53.8%), common raven (50.0%) and red-tailed hawk (42.9%) were most often observed within the RSA. Common passerines including horned lark (12.8%) and mountain bluebird (9.8%) were not often observed within the RSA.

Overall, 36.0% of the birds observed were recorded within the defined RSA, 63.3% were below the RSA, and 0.7% were flying above the RSA. As a group, raptors had the third highest percentage of observations within the RSA (36.5%) behind waterbirds and corvids. Raptor subgroups observed above this mean percent within the RSA included eagles (57.1%; mostly golden eagles), buteos (44.4%) and large falcons (40.0%). The majority of all groups were observed below the RSA except waterbirds, which were most often observed within the RSA (88.9%; all ring-billed gulls).

Table 3.6.1-1: List of avian species observed during fixed-point, in-transit and sage grouse surveys on the Wild Horse Project site.

Species/Group	Scientific Name	Species/Group	Scientific Name
Canada goose	*Branta canadensis*	northern shrike	*Lanius excubitor*
ring-billed gull	*Larus delawarensis*	rock wren	*Salpinctes obsoletus*
killdeer	*Charadrius vociferus*	ruby-crowned kinglet	*Regulus calendula*
American kestrel	*Falco sparverius*	sage sparrow	*Amphispiza belli*
Bald eagle	*Haliaeetus leucocephalus*	sage thrasher	*Oreoscoptes montanus*
Cooper's hawk	*Accipiter cooperii*	Say's phoebe	*Sayornis saya*
golden eagle	*Aquila chrysaetos*	snow bunting	*Plectrophenax nivalis*
gyrfalcon	*Falco rusticolus*	spotted towhee	*Pipilo maculatus*

Table 3.6.1-1: List of avian species observed during fixed-point, in-transit and sage grouse surveys on the Wild Horse Project site.

Species/Group	Scientific Name	Species/Group	Scientific Name
merlin	*Falco columbarius*	Swainson's thrush	*Catharus ustulatus*
northern goshawk	*Accipiter gentilis*	Townsend's warbler	*Dendroica townsendi*
northern harrier	*Circus cyaneus*	vesper sparrow	*Pooecetes gramineus*
prairie falcon	*Falco mexicanus*	violet-green swallow	*Tachycineta thalassina*
red-tailed hawk	*Buteo jamaicensis*	western bluebird	*Sialia mexicana*
rough-legged hawk	*Buteo lagopus*	western kingbird	*Tyrannus verticalis*
sharp-shinned hawk	*Accipter striatus*	western meadowlark	*Sturnella neglecta*
turkey vulture	*Cathartes aura*	white-crowned sparrow	*Zonotrichia leucophrys*
black-billed magpie	*Pica pica*	yellow-rumped warbler	*Dendroica coronata*
common raven	*Corvus corax*	California quail	*Callipepla californica*
American pipit	*Anthus rubescens*	chukar	*Alectoris chukar*
American robin	*Turdus migratorius*	gray partridge	*Perdix perdix*
Brewer's blackbird	*Euphagus cyanocephalus*	sage grouse[a]	*Centrocercus urophasianus*
Brewer's sparrow	*Spizella breweri*	mourning dove	*Zenaida macroura*
Bullock's oriole	*Icterus bullockii*	common nighthawk	*Chordeiles minor*
Dark-eyed junco	*Junco hyemalis*	northern flicker	*Colaptes auratus*
European starling	*Sturnus vulgaris*	unidentified gull	
gray-crowned rosy finch	*Leucosticte arctoa*	unidentified buteo	
horned lark	*Eremophila alpestris*	unidentified falcon	
loggerhead shrike	*Lanius ludovicianus*	unidentified empidonax	
mountain bluebird	*Sialia currucoides*	unidentified hummingbird	

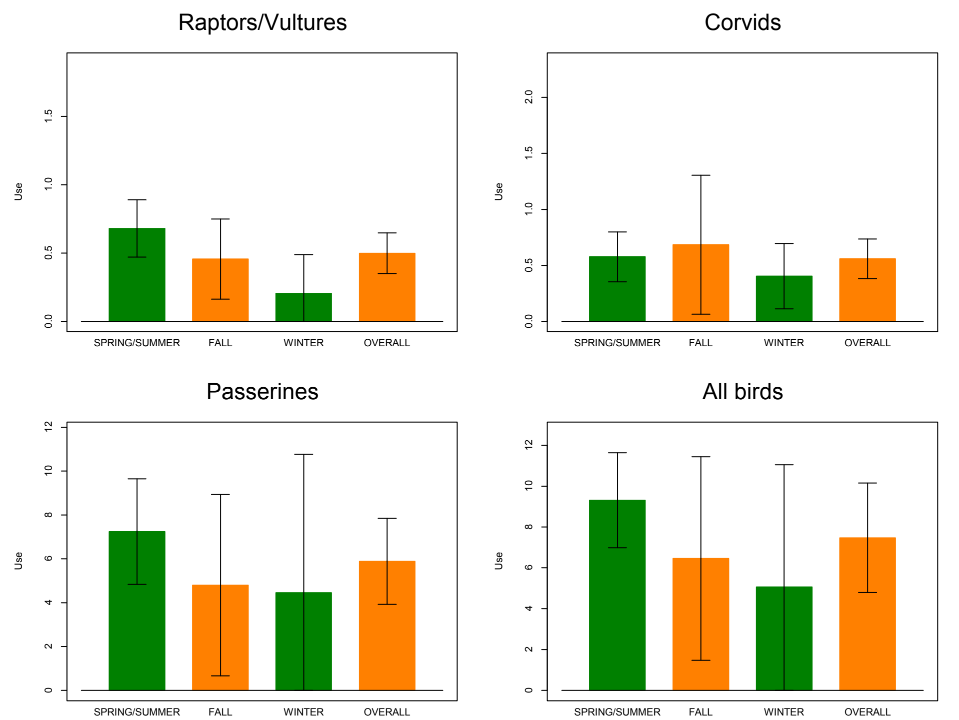
[a] *pellets only*

Table 3.6.1-2: Avian species observed while conducting fixed-point surveys (May 10, 2002 – May 22, 2003) on the Project Site.								
	Spring/ Summer		**Fall**		**Winter**		**Grand Total**	
Species/Group	#obs.	#groups	#obs.	#groups	#obs.	#groups	# obs.	#groups
Waterfowl								
Canada goose	32	1	0	0	0	0	32	1
Waterbird								
ring-billed gull	8	1	0	0	0	0	8	1
unidentified gull	0	0	1	1	0	0	1	1
Subtotal	8	1	1	1	0	0	9	2
Shorebirds								
killdeer	13	9	0	0	0	0	13	9
Raptors								
Accipiters								
northern goshawk	0	0	0	0	2	2	2	2
sharp-shinned hawk	0	0	2	2	0	0	2	2
Subtotal	0	0	2	2	2	2	4	4
Buteos								
red-tailed hawk	12	12	4	4	0	0	16	16
rough-legged hawk	1	1	1	1	2	2	4	4
unidentified buteo	0	0	1	1	0	0	1	1
Subtotal	13	13	6	6	2	2	21	21
Eagles								
bald eagle	0	0	0	0	1	1	1	1
golden eagle	3	3	7	7	5	5	15	15
Subtotal	3	3	7	7	6	6	16	16
Falcons								
American kestrel	34	31	1	1	0	0	35	32
merlin	1	1	1	1	0	0	2	2
prairie falcon	4	4	1	1	0	0	5	5
unidentified falcon	1	1	0	0	0	0	1	1
Subtotal	40	37	3	3	0	0	43	40
northern harrier	4	4	5	5	2	2	11	11
Raptor Subtotal	60	57	23	23	12	12	95	92
Corvids								
black-billed magpie	18	9	0	0	2	2	20	11
common raven	32	26	33	19	22	15	87	60
Subtotal	50	35	33	19	24	17	107	71
Passerines								
American pipit	0	0	7	1	0	0	7	1

Table 3.6.1-2: Avian species observed while conducting fixed-point surveys (May 10, 2002 – May 22, 2003) on the Project Site.								
	Spring/ Summer		**Fall**		**Winter**		**Grand Total**	
Species/Group	#obs.	#groups	#obs.	#groups	#obs.	#groups	# obs.	#groups
American robin	21	11	38	3	0	0	59	14
Brewer's blackbird	6	1	0	0	0	0	6	1
Brewer's sparrow	35	22	0	0	0	0	35	22
Bullock's oriole	1	1	0	0	0	0	1	1
dark-eyed junco	0	0	6	1	0	0	6	1
European starling	99	5	0	0	0	0	99	5
gray-crowned rosy finch	0	0	29	2	15	2	44	4
horned lark	271	94	73	14	31	6	375	114
loggerhead shrike	4	3	0	0	0	0	4	3
mountain bluebird	16	8	44	9	0	0	60	17
northern shrike	0	0	1	1	5	4	6	5
rock wren	0	0	1	1	0	0	1	1
ruby-crowned kinglet	1	1	0	0	0	0	1	1
sage sparrow	12	8	0	0	0	0	12	8
sage thrasher	42	41	1	1	0	0	43	42
Say's phoebe	0	0	1	1	0	0	1	1
snow bunting	0	0	1	1	140	4	141	5
spotted towhee	2	2	0	0	0	0	2	2
Townsend's warbler	1	1	0	0	0	0	1	1
unidentified empidonax	0	0	1	1	0	0	1	1
vesper sparrow	56	33	1	1	0	0	57	34
violet-green swallow	2	2	0	0	0	0	2	2
western bluebird	0	0	6	1	0	0	6	1
western kingbird	1	1	0	0	0	0	1	1
western meadowlark	48	27	7	2	0	0	55	29
yellow-rumped warbler	3	1	4	1	0	0	7	2
Subtotal	622	263	221	41	191	16	1034	320
Upland Gamebirds								
California quail	1	1	0	0	0	0	1	1
chukar	2	1	0	0	0	0	2	1
gray partridge	0	0	21	1	0	0	21	1
Subtotal	3	2	21	1	0	0	24	3
Doves								
mourning dove	1	1	0	0	0	0	1	1
Other Birds								
common nighthawk	2	2	0	0	0	0	2	2
northern flicker	13	9	1	1	0	0	14	10
unidentified hummingbird	1	1	0	0	0	0	1	1

Table 3.6.1-2: Avian species observed while conducting fixed-point surveys (May 10, 2002 – May 22, 2003) on the Project Site.								
	Spring/ Summer		**Fall**		**Winter**		**Grand Total**	
Species/Group	#obs.	#groups	#obs.	#groups	#obs.	#groups	# obs.	#groups
Subtotal	16	12	1	1	0	0	17	13
Grand Total	805	381	300	86	227	45	1332	512

Figure 3.6.1-1 Avian use by major bird group



Relative Exposure Index

Relative exposure indices (use multiplied by proportion of observations where bird flew within the rotor swept area) were calculated by species (Table 3.6.1-3). This index is only based on flight height observations and relative abundance and does not account for other possible factors such as foraging behavior. Small bird species with the highest exposure indexes were snow bunting, European starling and gray-crowned rosy finch. Due to high use estimates, horned lark had the highest exposure index at the Stateline, Nine Canyon and Foote Creek Rim wind plants, and has been the most commonly observed fatality at those operating projects. The large bird species with the highest exposure index was common raven, followed by American kestrel, and ring-billed gull. Mortality studies at other wind projects have indicated that although ravens are often observed at wind projects within the zone of risk, they appear to be less susceptible to collision with wind turbines than other similar size birds (e.g., raptors, waterfowl).

Spatial Use of the Project Area

No large differences for use are apparent other than the higher use at station D from the large flocks of snow buntings, European starlings and Canadian geese observed (Exhibit 14, Figure 9). Passerine use by station shows the same pattern as all birds (Exhibit 14, Figure 10). Raptor use by station ranged from 0.1 to 0.8, indicating relatively similar spatial use of the Project area (Exhibit 14, Figure 11). Station F had the lowest raptor use. Station E, located to the northeast of the Project area, had moderate raptor use compared to the other stations.

Table 3.6.1-3: Mean exposure indices calculated by species observed during fixed-point surveys at the Project site.

Species/Group	Overall Mean Use	% Flying	% Flying within RSA	Exposure Index
snow bunting	0.873	100.00	60.99	0.532
European starling	0.541	100.00	72.73	0.394
common raven	0.448	80.46	50.00	0.180
gray-crowned rosy finch	0.245	100.00	68.18	0.167
horned lark	2.119	58.13	12.84	0.158
American kestrel	0.193	88.57	32.26	0.055
American pipit	0.043	100.00	100.00	0.043
ring-billed gull	0.042	100.00	100.00	0.042
golden eagle	0.075	86.67	53.85	0.035
red-tailed hawk	0.085	87.50	42.86	0.032
mountain bluebird	0.318	68.33	9.76	0.021
common nighthawk	0.012	100.00	100.00	0.012
western meadowlark	0.310	12.73	28.57	0.011
prairie falcon	0.027	100.00	40.00	0.011
rough-legged hawk	0.021	100.00	50.00	0.011
northern harrier	0.055	100.00	18.18	0.010
killdeer	0.071	69.23	11.11	0.005
northern goshawk	0.011	100.00	50.00	0.005
bald eagle	0.005	100.00	100.00	0.005
vesper sparrow	0.325	5.26	0.00	0.000
American robin	0.325	81.36	0.00	0.000
sage thrasher	0.249	2.33	0.00	0.000
Brewer's sparrow	0.200	0.00	N/A	N/A
Canada goose	0.169	0.00	N/A	N/A
gray partridge	0.130	0.00	N/A	N/A
black-billed magpie	0.111	90.00	0.00	0.000
northern flicker	0.075	42.86	0.00	0.000
sage sparrow	0.073	8.33	0.00	0.000
Brewer's blackbird	0.037	100.00	0.00	0.000
yellow-rumped warbler	0.037	100.00	0.00	0.000
dark-eyed junco	0.032	100.00	0.00	0.000
northern shrike	0.032	50.00	0.00	0.000
western bluebird	0.032	100.00	0.00	0.000
loggerhead shrike	0.023	75.00	0.00	0.000
spotted towhee	0.018	0.00	N/A	N/A
violet-green swallow	0.011	100.00	0.00	0.000
merlin	0.011	100.00	0.00	0.000

Table 3.6.1-3: Mean exposure indices calculated by species observed during fixed-point surveys at the Project site.

Species/Group	Overall Mean Use	% Flying	% Flying within RSA	Exposure Index
sharp-shinned hawk	0.011	100.00	0.00	0.000
chukar	0.011	0.00	N/A	N/A
Say's phoebe	0.006	100.00	0.00	0.000
ruby-crowned kinglet	0.006	100.00	0.00	0.000
western kingbird	0.006	100.00	0.00	0.000
Bullock's oriole	0.005	100.00	0.00	0.000
Townsend's warbler	0.005	100.00	0.00	0.000
mourning dove	0.005	100.00	0.00	0.000
unidentified hummingbird	0.005	100.00	0.00	0.000
rock wren	0.006	0.00	N/A	N/A
California quail	0.005	0.00	N/A	N/A
unidentified empidonax	0.005	0.00	N/A	N/A
unidentified falcon	0.005	0.00	N/A	N/A
unidentified gull	N/A	100.00	0.00	N/A
unidentified buteo	N/A	0.00	N/A	N/A

Flight paths for large birds are found in Exhibit 14, Figures 12-15. A few spatial patterns of raptor use appear to exist. The ridge along Whiskey Dick Creek near station G is effectively perpendicular to prevailing winds. There appears to be a pattern of raptor flight paths flying parallel to the western side of the ridge, which is consistent with behavior observed in similar situations. The one bald eagle observed was flying along the Whiskey Dick drainage (Exhibit 14, Figure 13). There appears to be little pattern in the flight paths in the areas of the Project with less topographic relief, such as near station D and E. The raptor flight paths near station C at the highest point of the Project sometimes follow the main Whiskey Dick Mountain ridgeline and other times cross the ridgeline. The main ridgeline in this case is not perpendicular to the prevailing wind direction, likely affecting patterns of use in this area. The turbine arrangement near station C with gaps along the ridgeline may pose less collision risk for raptors compared to a long string of turbines along this ridgeline with no gaps based on these patterns of use. Most prominent saddles along the Whiskey Dick Mountain Ridge, which may have higher bird use, do not contain turbine locations. American kestrel observations did not show distinctive patterns in use of topography, but did appear more abundant near Station E, the one station where no turbines are proposed.

Raptor Nests

The majority of the study area is dominated by sagebrush habitats ranging from flat to steeply sloping draws. Raptor nesting habitat within these canyons includes relatively tall shrubs, widely scattered cliffs and rock outcrops, and occasional patches of ponderosa pine with some intermixed aspen and/or cottonwood. A few patches of ponderosa pine are also present on the north end of the search area. Overall, habitat for above ground nesting raptors is very limited within the search area.

A total of 23 nests were found during surveys, 11 of which showed no signs of raptor activity (Table 3.6.1-4). Species observed with active nests include red-tailed hawk, American crow and common raven. One great-horned owl was observed flying from a tree with a nest structure, but relatively dense branches prevented a good view of the nest. The status of the great-horned owl nest is considered unknown. One adult prairie falcon was observed perched on a cliff face and may have an unobserved nest within a pothole or cavity. One inactive nest was located in an area described as a historic golden eagle nest within the northern portion of the search area. No active golden eagle nests were found.

Table 3.6.1-4. Raptor and other nests observed within the two-mile search buffer of the Project.

Species	**Number of Nests**	**Nest Substrate**				
		Cottonwood	*Shrub*	*Pine*	*Radio Tower*	*Rock or Cliff*
Red-tailed Hawk	6	2	0	2	0	2
Great-horned Owl	1	1	0	0	0	0
Prairie Falcon	1	0	0	0	0	1
American Crow	3	1	0	0	0	2
Common Raven	1	0	0	0	1	0
Inactive	11	5	1	2	0	3
Total	**23**	**9**	**1**	**4**	**1**	**8**

<u>Sage Grouse Surveys</u>

No sage grouse observations (leks or flushed birds) were observed during any of the sage grouse surveys or during other activities.

<u>Big Game Survey</u>

Mule deer (Odocoileus hemionus) were commonly observed near points E, F and G. Observations of 3-11 individuals were commonly observed in the spring/summer, with 6 or fewer individuals observed throughout the winter and fall for each observation. Elk (Cervis elaphus) were observed in groups of 7-26 individuals near the northern points (A, D, F and G) during the spring/summer and winter surveys, with no observations made in the fall period.

Observations of 331 mule deer within 27 groups were recorded during the raptor nest survey. In addition, 129 elk observations within 17 groups were observed. Density from this survey is approximately 7 deer per square mile and 3 elk per square mile based on this one survey. Big game likely move between the survey area, the state wildlife areas to the east, private range and agricultural lands to the west and south, and the forested lands to the north of the Project.

<u>Other Wildlife Observations</u>

Reptiles and Amphibians:

The only reptiles observed during the field studies were short-horned lizards (Phrynosoma douglassii).

Other Mammals:
Townsend's ground squirrels[3] (Spermophilus townsendii nancyae) were seen regularly within the Project site but most commonly around Station B. Coyotes (Canis latrans) were observed on a regular basis, and white and black-tailed jackrabbits were observed in a few locations.

3.6.2 Impacts of the Proposed Action

3.6.2.1 Potential Wildlife Impacts

Bats
The potential for bats to occur is based on key habitat elements such as food sources, water, and roost sites. Potential roost structures such as trees are in general are limited within the Project to "the Pines" area near Government Springs and within the riparian corridors along Whiskey Dick and Skookumchuck Creeks. The various springs within the Project area may be used as foraging and watering areas. Little is known about bat species distribution, but several species of bats could occur in the Project area based on the Washington GAP project and inventories conducted on the Hanford Site, Arid Lands Ecology Reserve (ALE) located in Benton County to the south and east (Table 3.6.2-1).

Table 3.6.2-1. Bat species of potential occurrence in the Project area

Common Name Scientific Name	Typical Habitat	Expected Occurrence in Project Area	Occurrence Documentation
California bat *Myotis californicus*	Generally found in open habitats where it forages along tree edges, riparian areas, open water; roosts in cliffs, caves, trees	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; Fitzner and Gray, 1991
small-footed myotis *Myotis ciliolabrum*	Varied arid grass/shrublands, ponderosa pine and mixed forests; roosts in crevices and cliffs; hibernates in caves, mines	Possible; documented on ALE	WA GAP Analysis Project, 1999; England ,2000; West et al., 1998, 1999

[3] There is some confusion over taxonomic status (Derek Stinson, pers. comm.) Referred to as Piute's in Wilson and Ruff (1999) and Townsend's in Yentsen and Sherman (2003).

Table 3.6.2-1. Bat species of potential occurrence in the Project area			
Common Name Scientific Name	**Typical Habitat**	**Expected Occurrence in Project Area**	**Occurrence Documentation**
long-eared myotis *Myotis evotis*	Primarily forested habitats and edges, juniper woodland, mixed conifers, riparian areas; roosts snags, crevices, bridges, buildings, mines	Unlikely due to habitat; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
little brown bat *Myotis lucifugus*	Closely associated with water; riparian corridors; roosts buildings, caves, hollow trees; hibernates in caves	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
fringed myotis *Myotis thysanodes*	Primarily forested or riparian habitats; roosts buildings, trees; hibernates in mines and caves	Possible in suitable habitat; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
long-legged myotis *Myotis volans*	Coniferous and mixed forests, riparian areas; roosts caves, crevices, buildings, mines	Possible in suitable habitat; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; Fitzner and Gray, 1991
yuma myotis *Myotis ymanensis*	Closely associated with water; varied habitats: riparian, shrublands, forests woodlands; roosts in mines, buildings, caves, bridges	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
hoary bat *Lasiurus cinereus*	Forested habitats, closely associated with trees; roosts in trees; migratory species	Possible in suitable habitat; probable migrant; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
silver-haired bat *Lasionycteris noctivagans*	Forested habitats; generally coniferous forests; roosts under bark; believed to be a migratory species	Possible in suitable habitat; probable migrant; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999

Table 3.6.2-1. Bat species of potential occurrence in the Project area			
Common Name Scientific Name	**Typical Habitat**	**Expected Occurrence in Project Area**	**Occurrence Documentation**
western pipistrelle *Pipistrellus hesperus*	Primarily desert lowlands; desert shrublands; canyons; roosts under rocks, crevices and possibly in sagebrush	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
big brown bat *Eptesicus fuscus*	Generally deciduous forests; buildings; roosts in buildings, trees, crevices; hibernates in caves, mines	Possible; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999
spotted bat *Euderma maculatum*	Varied habitat—pine forests to desert scrub with nearby cliffs; roosts in crevices, cliff faces	Unlikely due to rarity; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
Townsend's big-eared bat *Corynorhinus townsendii*	Varied habitats—forests to desert scrub; roosts in buildings, caves, mines, bridges; hibernates in caves	Possible in suitable habitat; not documented on ALE	WA GAP Analysis Project, 1999; England, 2000; TNC, 1999
pallid bat *Antrozous pallidus*	Generally occurs in arid regions, desert scrub habitats; roosts in cliff faces, caves, mines, buildings	Unlikely due to lack of suitable habitat; documented on ALE	WA GAP Analysis Project, 1999; England, 2000; West *et al.*, 1998, 1999

[a] *GAP Analysis Program (GAP). The Washington State Gap Analysis Project is based on a two primary data sources: vegetation types (actual vegetation, vegetation zone, and ecoregion) and species distribution. The two data sources are combined to map the predicted distribution of vertebrate species. More information about the Washington Gap Analysis Project can be found on the WDFW web page: www.wa.gov/wdfw/wlm/gap/dataprod.htm*

Construction:
Impacts to bats or bat habitat on the site are unlikely during construction.

Operations:
Bat research at other wind plants indicates that migratory bat species are at some risk of collision with wind turbines, mostly during the fall migration season (Johnson et al. 2003b). It is likely that some bat fatalities would occur during operation of the Project. Most bat fatalities found at wind plants have been tree-dwelling bats, with hoary and silver-haired bats being the most prevalent fatalities. Both hoary bats and silver-haired bats may use the forested habitats near the Project site and may migrate through the Project. Some mortality of mostly migratory bats, especially hoary and silver-haired bats, is anticipated during operation of the Project. At the Buffalo Ridge Wind Plant, Minnesota, based on a 2-year study, bat mortality was estimated to be 2.05 bats per

turbine per year (Johnson et al. 2003b). At the Foote Creek Rim Wind Plant, based on 3+ years of study, bat mortality was estimated at 1.34 bats per turbine per year (Young et al. 2003). At the Vansycle Ridge Wind Plant in Oregon, bat mortality was estimated at 0.74 bats per turbine for the first year of operation (Erickson et al. 2000). At the Klondike Wind Project, bat mortality was estimated at 1.16 bat fatalities per turbine per year (Johnson et al. 2003a). At the Stateline Wind Project, bat mortality was estimated at approximately 1 bat fatality per turbine per year (Erickson et al. 2003a) from July 2001 through December 31, 2002. At the Nine Canyon Wind Project, bat mortality was estimated at approximately 3 bat fatalities per turbine per year (Erickson et al. 2003b).

Although potential future mortality of migratory bats is difficult to predict, an estimate can be calculated based on levels of mortality documented at other wind plants. Using the estimates from other wind plants, operation of the Project could result in approximately 100 to 400 bat fatalities per year. Actual levels of mortality are unknown and could be higher or lower depending on regional migratory patterns of bats, patterns of local movements through the area, and the response of bats to turbines, individually and collectively. Mortality will likely involve silver-haired and hoary bats, two relatively common migratory species.

The significance of this impact is hard to predict since there is very little information available regarding bat populations. Studies do suggest resident bats do not appear to be significantly impacted by wind turbines (Johnson et al. 2003b, Johnson 2003, Gruver 2002), since almost all mortality is observed during the fall migration period. Furthermore, hoary bat, which is expected to be the most common fatality, is one of the most widely distributed bats in North America. Pre-construction surveys to predict impacts to bats may be relatively ineffective, because current state-of-the-art technology for studying bats does not appear to be highly effective for documenting migrant bat use of a site (Johnson et al. 2003b).

Big Game

The Project is located within habitats designated by WDFW as winter range for mule deer and elk, is located adjacent to the Quilomene migration corridor, and the northern boundary of the Project is approximately ½ mile (0.80km) from the Colockum elk calving area (Exhibit 14, Figure 16). The Quilomene elk winter range is approximately 83,000 acres in size and winters approximately 1,500-2,000 elk. The Quilomene mule deer winter range is approximately 40,000 acres in size and winters approximately 700-800 deer. The Project area is not located within the high-density deer sub-area of Quilomene mule deer winter range that typically supports 100-200 deer. This area begins approximately 1.5 miles (2.4 km) to the north east of the Project area, and extends to the east towards the Columbia River. The Project area is also located outside of the Quilomene primary winter range, a sub-area of the Quilomene winter range, which winters approximately 500 elk.

Wintering elk forage on native grass species such as Sandberg's bluegrass, which greens up with fall and winter rains, while mule deer likely utilize more shrub species in the Project area. Wind-blown slopes and ridges remain snow-free most of the year. West and south-facing slopes green up earlier and provide accessible nutritious forage during the harsh winter months. Mule deer and elk also use the site during the other seasons. The riparian corridors of Whiskey Dick Creek provide some cover and the various developed and undeveloped springs provide a constant water source. Mule deer and elk hunting have been allowed on the Project area lands historically.

The site appears to get some year-round use by mule deer and elk, but is more concentrated in the winter. The biologist conducting the helicopter survey on April 14, 2003 identified 129 elk in 15 groups and 331 mule deer in 27 groups within 2 miles of the Project site. Several large groups (~ 4) of 50 or more elk were observed in March during reconnaissance level surveys of the Project site.

Aerial surveys were conducted for deer and elk near the project in February and March by WDFW. The Project area is overlapped by four different deer survey units (Exhibit 14, Appendix B). Three of the units were surveyed in March 2003, and a total of 1,065 deer were observed. The Project area (approximately 8,600 acres) comprises about 20% of the area surveyed in 2003. Historical WDFW elk and deer survey units and counts from WDFW surveys near the Project area are shown in Exhibit 14, Appendix B.

The WDFW has expressed some concern over the potential effects of wind project development and operation on wintering big game. Winter is a crucial period of time for the survival of many big game species. Deer, for example, cannot maintain body condition during the winter because of reduced forage availability combined with the increased costs of thermogenesis (Reeve and Lindzey 1991). In other words, as deer expend more energy than they take in, body condition gradually declines throughout the winter (Short 1981). Unnecessary energy expenditures may increase the rate at which body condition declines, and the energy balance determining whether a deer will survive the winter is thought to be relatively narrow, especially for fawns (Wood 1988). Overwinter fawn survival may decrease in response to human activity or other disturbances (Stephenson et al. 1996). Roads and energy development may also fragment otherwise continuous patches of suitable habitat, effectively decreasing the amount of winter range available for big game. Fragmentation of habitat may also limit the ability of big game populations to move throughout the winter range as conditions change, causing big game to utilize less suitable habitat (Brown 1992).

Construction:
During the construction period, it is expected that elk and mule deer will be temporarily displaced from the site due to the influx of humans and heavy construction equipment and associated disturbance (e.g., noise, blasting). All heavy construction, including road and foundation construction and blasting, will occur between April 15 and November 15, outside the critical winter periods. Construction activities in the winter will only include survey and design activities, which may have some minor displacement impacts to big game and elk. These activities in the winter would likely have a very minor reduction in the quantity and quality of big game winter range. The Quilomene elk winter range is approximately 83,000 acres in size and the Quilomene deer winter range is approximately 40,000 acres in size. The Project area is located south east of the Quilomene elk

migratory corridor. During winter construction activities, elk moving to winter range east of the Project may avoid areas of human disturbances locally within the Project, but overall increases in distances needed to travel would be insignificant. Following completion of the Project, the disturbance levels from construction equipment and humans will diminish dramatically and the primary disturbances will be associated with operations and maintenance personnel, occasionally vehicular traffic, and the presence of the turbines and other facilities.

Operations:
A few published studies of big game winter use may be relevant to the development of wind turbines and wintering deer and elk (Rost and Bailey 1979; Brakken and Musser 1993, Van Dyke and Klein 1996, Johnson et al. 2000c, Wisdom et al. 2002). Van Dyke and Klein (1996) documented elk movements through the use of radio telemetry before, during and after the installation of a single oil well within an area used year round by elk. Drilling activities during their study ceased by November 15, however, maintenance activities continued throughout the year.

Elk showed no shifts in home range between the pre and post drilling periods, however, elk shifted core use areas out of view from the drill pad during the drilling and post drilling periods. Elk also increased the intensity of use in core areas after drilling and slightly reduced the total amount of range used. It was not clear if the avoidance of the well site during the post-drilling period was related to maintenance activities or to the use of a new road by hunters and recreationalists. The authors concluded that if drilling activities occupy a relatively small amount of elk home ranges, that elk are able to compensate by shifting areas of use within home ranges.

WDFW conducted a radio telemetry study of the Colockum Elk herd between July 1987 and June 1992 (Brakken and Musser 1993). Elk showed some selection for areas close to roads, but these results are suspect because of incomplete road GIS coverage, and absence of traffic counts associated with the roads. In addition, elk also showed selection of habitat close to water sources, and distance to water sources and distance to roads were positively correlated, suggesting a confounding between the effect of water and roads. These positive relationships between elk selection and distance to roads occurred in spring, summer and fall, while in winter, no relationship between selection and distance to roads was observed.

Studies have been conducted at the Starkey Research Unit, a large fenced experimental study area near La Grande in northeast Oregon, using radio-collared elk and deer. Results of spring studies (April – early June) suggest that elk habitat selection may be negatively related to traffic and other human disturbance (Johnson et al. 2000c). Elk also tended to increase movement distances as a function of increased use by humans, including ATV use, hiking, and horse back riding (Wisdom et al. 2002). Mule deer habitat selection, on the other hand, appears to primarily be related to elk distribution, with mule deer avoiding areas used by elk. Traffic and roads did not appear to be an important factor in spring distribution of mule deer. In fact, there was some selection for areas close to roads with medium levels of traffic, but the cause of this relationship is unknown. Mule deer showed some increase in movement distances as a function of increased use by humans, including ATV use, hiking and horseback riding (Wisdom et al. 2002), but much less response than elk showed. Rost and Bailey (1979) found that wintering mule deer and elk avoided areas within 656 ft (200m) of roads in eastern portions of their Colorado study area, where presumably greater amounts of winter habitat were present. Road avoidance was greater where roads were more traveled. Only mule deer showed a clear avoidance of roads in the western portion of their study area, where winter range was assumed to be more limiting. Mule deer also showed greater avoidance of roads in shrub habitats versus more forested areas. The authors concluded that impacts of roads depended on the availability of suitable winter range away from roads, as well as the amount of traffic associated with roads.

There is little information regarding the specific effects of wind projects on big game. At the Foote Creek Rim wind project in Wyoming, pronghorn observed during raptor use surveys were recorded year round (Johnson et al. 2000b). The mean number of pronghorn observed at the six survey points was 1.07 prior to construction of the wind plant and 1.59 and 1.14/survey the two years immediately following construction, indicating no reduction in use of the immediate area. Mule deer and elk also occurred at Foote Creek Rim, but their numbers were so low that meaningful data on wind plant avoidance could not be collected.

Due to the lack of knowledge regarding the potential impacts of energy development on big game, it is difficult to predict with certainty the effects of the Project on mule deer and elk. Van Dyke and Klein (1996) showed wintering elk shifted use of core areas out of view of human related activities associated with an oil well and access road. Most turbines and roads in the Project area will be located on ridges and will be visible over a fairly large area. While human related activity at wind turbines during regular maintenance will be relatively infrequent, it is not known if human activity associated with regular maintenance activity will exceed tolerance thresholds for wintering elk. If tolerance thresholds during regular maintenance activities were exceeded, elk would likely permanently utilize areas away from the wind development. The Project area proposed for development has historically received regular use throughout the year by hunters and other recreationalists including motorcycle and ATV riders, campers, birders and hikers. Access during construction and operation of the Project will be controlled by the Applicant and disturbance to big game may be minimized and actually less than that which occurred pre-development.

WDFW has also expressed concern regarding the potential for wind projects to increase elk and mule deer damage claims on private agricultural lands near wind projects. Elk and mule deer, if displaced from the Project area, may increase their utilization of agricultural lands in the vicinity of the Project area. If elk and mule deer are not displaced from the Project, then WDFW is concerned that the Project may create a "sanctuary" if hunting is not allowed in the Project area, and therefore limiting WDFW's ability to manage the herds. The Applicant has agreed to work with WDFW to allow for management of herds within the Project area if this becomes a problem. In addition, the

Applicant has agreed to allow controlled hunting within the Project area. With this management, the likelihood of the project becoming an elk sanctuary is remote.

The Project area is located south east of the Quilomene elk migratory corridor. Elk moving to winter range east of the Project may avoid areas close to the project and travel farther to the north. Given that the Project is located to the southeast of this movement corridor, the increase in distances needed to travel would not appear to be very large.

Other Mammals

Other mammals that are likely exist within the Project site include, badger, coyote, pocket gopher, Paiute ground squirrels and other small mammals such as rabbits, voles and mice. Construction of the Project may affect these mammals on site through loss of habitat and direct mortality of individuals occurring in construction zones. Excavation for turbine pads, roads, or other wind project facilities could kill individuals in underground burrows. Road and facility construction will result in loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals will lose a limited amount of the use of the permanently impacted areas; however, they are expected to repopulate the temporarily impacted areas. Some small mammal fatalities can be expected from vehicle activity during operations. Impacts are expected to be very low and not significant.

Reptiles and Amphibians

Twenty-seven species of reptiles and amphibians occur in Kittitas County and could be present in the Project area. Short-horned lizards were commonly observed within the Project area. Other reptiles that may likely occur in the Project site include snakes such as the yellow-bellied racer and rattlesnakes. Amphibian and aquatic reptile habitat is limited within the Project area. No migration corridors for reptiles or amphibians are known to be present in the Project area. Many amphibians migrate short distances during spring or fall breeding periods to and from suitable wetlands and during fall dispersal of juveniles.

Construction:

Impacts to reptiles and amphibians on the Project site may occur through loss of habitat and direct mortality of individuals occurring in construction zones. No wetlands will be impacted by the Project, so habitat loss for amphibians would be minimal. Because best management practices will be employed on site and compliance with applicable permits regarding runoff and sediment control will be maintained, no amphibians should be affected by construction or operation of the Project. The level of mortality to reptiles on site associated with construction would be based on the abundance of species on site. Some mortality may be expected as common reptiles that may occur on site such as short-horned lizards and yellow-bellied racers often retreat to burrows underground for cover or during periods of winter dormancy. Excavation for turbine pads, roads, or other Project facilities could kill individuals in underground burrows. While above ground, yellow bellied racers and other snakes are likely mobile enough to escape construction equipment, however, short horned lizards do not move fast over long distances and rely heavily on camouflage for predator avoidance. Some individual lizard fatalities can be expected from vehicle activity.

Operations:
No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation are likely limited to some potential direct mortality due to vehicle collisions. While above ground, yellow bellied racers and other snakes are likely mobile enough to escape most vehicles, however, short horned lizards do not move fast over long distances and rely heavily on camouflage for predator avoidance. Some individual lizard fatalities can be expected from vehicle activity.

<u>Birds</u>
Primary habitats for birds on the Project area are the grassland/shrub-steppe and riparian communities, although some species will utilize lithosol type habitats for various resources. The various springs on site likely provide important water sources for avian species.

Migration Routes:
The Project area is located within the Pacific Flyway, one of four principal north-south bird migration routes in North America. Bounded roughly by the Pacific Ocean and the Rocky Mountains, the Pacific Flyway extends from the arctic regions of Alaska and Canada to Central and South America. Within the flyway, certain groups of birds may travel along narrower migration corridors. The Project's location along the east flank of the Cascades places it within possible migration corridors of several bird species. Given the limited riparian and other important stopover habitat (water bodies), use by migratory birds is likely low. It would be expected that areas further to the east along and closer to the Columbia River would be more important to migrating birds, including songbirds, waterfowl and raptors.

Information about bird fatalities at other wind projects suggests that a wide variety of species and groups are susceptible to collision with turbines. Some evidence also suggests that peak mortality may occur during migration periods although some mortality has been documented throughout all seasons (see Erickson *et al.* 2000, Young *et al.* 2003, Johnson *et al.* 2002, Erickson *et al.* 2003a*,* Erickson *et al.* 2003b).

Potential impacts to birds using the study area include fatalities from collision with wind turbines or from construction equipment, loss of habitat, disturbance to foraging and breeding behavior, collision with overhead power lines, and electrocution. Project-related human activity could alter bird behavior and cause displacement during the construction phase of the Project, and the post-construction density of turbines and facilities on the developed portion of the site may alter avian use.

Construction:
Project construction may affect birds through loss of habitat, potential fatalities from construction equipment, and disturbance/displacement effects from construction and human occupation of the area. Vegetation type/habitat losses from the Project are addressed in Section 3.4 'Vegetation and Wetlands' and in Exhibit 1d. Potential mortality from construction equipment on site is expected to be quite low. Equipment

used in wind plant construction generally moves at slow rates (e.g., cranes) or is stationary for long periods. The risk of mortality from construction to avian species is most likely limited to potential destruction of a nest with eggs or young for ground and shrub nesting species when equipment initially disturbs the habitat. Disturbance type impacts can be expected to occur if construction activity occurs near an active nest or primary foraging area. Birds displaced from these areas may move to areas with less disturbance, however, breeding effort may be affected and foraging opportunities altered during the period of the construction (under one year). The proposed Project construction schedule is shown in Table 2.2.6.2-1. Proposed construction of roads and tower foundations is planned for the spring through the fall, and will have some effect on nesting birds and their young. No disturbance or displacement impacts to raptor nests are anticipated, since no active raptor nests were identified within ½ mile (0.80km) of Project facilities (Exhibit 14, Figure 6).

Operations – Mortality:

All Birds:
Bird fatality projections of 0.6 to 3.5 bird fatalities per turbine year are anticipated, based on the results of completed studies conducted at the Vansycle wind project in Umatilla County, Oregon (Erickson *et al.* 2000), the Foote Creek Rim Phase I wind project in Carbon County, Wyoming (Young *et al.* 2003), the Klondike Wind Project in Sherman County, Oregon (Johnson *et al.* 2003a), the Buffalo Ridge wind project in southwestern Minnesota (Johnson *et al.* 2002), the Stateline Wind Project in Umatilla County, Oregon and Walla Walla County, Washington (Erickson *et al.* 2003a), and the Nine Canyon Wind Project in Benton County, Washington (Erickson *et al*. 2003b). Most of the fatalities will likely involve resident songbirds such as horned lark, vesper sparrow, and western meadowlark, and other common species. Some upland gamebird fatalities are anticipated. Occasional nocturnal migrating songbird fatalities are also anticipated, but the risk of large mortality events would appear to be very low (Erickson *et al.* 2001). Waterfowl and other waterbird (e.g., gulls) mortality are estimated to be low, given the low use of the Project area by these groups. Low raptor mortality is anticipated.

Raptors:
Raptor use at the Project is estimated to be similar or lower compared to other wind projects with similar turbine types. Data were recorded in the field to allow standardization to 10, 20 and 30 minute survey duration, to allow comparison to survey data from other wind projects. As a group, raptor use ranged from 0.122 per 20 minute survey in the winter, to 0.41 and 0.35 in the spring and fall respectively. Raptor use at the Vansycle wind project in Oregon and the Buffalo Ridge wind project in Minnesota is estimated similar to the Wild Horse Project (0.36 and 0.49 raptors per 20-minute survey respectively). Raptor use at the Foote Creek Rim wind project was approximately 0.73 raptors per 20-minute survey.

Raptor mortality at new generation wind projects has been low. The estimate of raptor mortality at the Foote Creek Rim wind project in Wyoming, which is located in native grassland and shrub steppe habitat, was estimated at 0.03 raptors per turbine per year based on a three-year study of 69 turbines (Young *et al.* 2002). No raptor mortality was observed at the Vansycle wind project in Oregon during a one-year study (Erickson *et al.* 2000); and 1 raptor fatality was recorded over a four-year study at the Buffalo Ridge wind project (Johnson *et al.* 2002). No raptor fatalities were observed at the 16-turbine Klondike wind project in Sherman County, Oregon (Johnson *et al.* 2003a), and one American kestrel fatality has been observed at the Ponnequin Wind Project in Weld County, Colorado (Kerlinger pers. comm.). Raptor mortality estimates from the Stateline Wind Project (Erickson *et al.* 2003a) and the Nine Canyon Wind Project (Erickson *et al.* 2003b) have ranged from 0.05 to 0.07 raptor fatalities per turbine per year, with most fatalities consisting of red-tailed hawks and American kestrels. Completed studies at other small wind projects have not documented any raptor fatalities (Erickson *et al.* 2001).

Considering these mortality results as well as raptor use estimates at these wind projects, it is estimated that potential raptor mortality at the Project will be within the range of raptor mortality observed at other wind projects in the west and midwest. We expect approximately 1 to 10 raptor fatalities per year at the Project if 136 turbines are constructed. It should be noted that the fatality estimates may vary from the expected range based on many factors, including the number of occupied raptor nests near the wind Project after construction, turbine size and other site specific and/or weather variables.

American kestrels and red-tailed hawks account for much of the diurnal raptor use at the site, and are expected to be the two species of raptors with the highest fatality rates over the life of the Project. Species with low risk of collisions includes northern harrier, golden eagle, rough-legged hawk, great horned owl and Swainson's hawk. Northern goshawk, bald eagle, Cooper's hawk and sharp-shinned hawk are expected to have a very low risk of collision. Turkey vultures appear less susceptible to collision that most other raptors (Orloff and Flannery 1992). Very few northern harrier fatalities, Cooper's hawks, sharp-shinned hawks and no rough-legged hawk or bald eagle fatalities have been observed at wind projects to date. Golden eagle use of the site is low relative to other wind sites and the mortality risk for golden eagles is also expected to be very low.

Passerines:

Passerines have been the most abundant avian fatality at other wind projects studied (see Johnson *et al.* 2002; Young *et al.* 2002; Erickson *et al.* 2000, Erickson *et al.* 2001), often comprising more than 80% of the avian fatalities. Both migrant and resident passerine fatalities have been observed. Given that passerines make up the vast majority of the avian observations at the Project site, it is expected passerines will make up the largest proportion of fatalities. Species most common to the study area will likely be most at risk, including western meadowlark, vesper sparrow and horned lark. Horned larks have been the most commonly observed fatality at several wind projects, including Vansycle, Foote Creek Rim, Stateline, and Nine Canyon (Erickson *et al.* 2000, Young *et al.* 2002, Erickson *et al.* 2003a, Erickson *et al.* 2003b). A few large flocks of birds such as snow buntings were observed, but given their infrequent use, mortality would be expected to be low. Some nocturnal migrating songbird fatalities are expected. However, no large events have been documented at wind projects. Only two small events have been reported. At Buffalo Ridge in Minnesota, fourteen migrating passerine fatalities (vireos, warblers, flycatchers) were found at two turbines during a single night in May 2002 (Johnson *et al*. 2002). Approximately 25 to 30 migrating passerine fatalities (mostly warblers) were observed near three turbines and a well-lit substation at the Mountaineer wind project in West Virginia. Based on the mortality estimates from the other wind projects studied, between 50 and 300 passerine fatalities may occur per year at the Project if 136 turbines are constructed.

Carcass search studies at the Foote Creek Rim Wind Plant, Wyoming, have found avian casualties associated with guyed met towers. Based on searches of five permanent met towers at Foote Creek Rim over a three-year period, it was estimated that these towers resulted in approximately 8.1 avian casualties per tower per year (Young *et al.* 2002). The vast majority of these avian casualties were passerines. The nine permanent met towers proposed for the Project would be expected to result in collision deaths for passerines at the site, although the use of bird flight diverters on guy wires should reduce the risk of collision.

Waterfowl:
Some waterfowl mortality has been documented at other wind plants (Erickson *et al.* 2001, Johnson *et al.* 2002 2003a, Kerlinger pers. comm., Erickson *et al.* 2003). However, studies at Foote Creek Rim, Vansycle, and Buffalo Ridge have not documented mortality of Canada geese, the only waterfowl species observed flying over the Project area. Two Canada geese fatalities were recorded at the Klondike project, in an area where relatively high use has been documented (Johnson *et al.* 2003a), and one Canada goose fatality has been documented at the Stateline Wind Project (Erickson *et al.* 2003). Because of the low use of the site by waterfowl, little waterfowl mortality would be expected from the Project.

Other Avian Groups/Species:
Some upland game bird mortality has been documented at wind projects (Erickson *et al.* 2001, Erickson *et al.* 2003). Based on habitat and use, there is potential for mortality of some upland gamebirds such as chukars and gray partridge. Other avian groups (e.g., doves, shorebirds) occur in relatively low numbers within the study area and mortality would be expected to be very low.

Operations – Disturbance:

Most studies of disturbance or displacement effects have been conducted in Europe, and most of the impacts have involved wetland habitats and groups of birds not common on this Project, including waterfowl, shorebirds and waders (Larsen and Madsen 2000; Pederson and Poulsen 1991; Vauk 1990; Winkelman 1989; Winkelman 1990; Winkelman 1992). Most disturbance has involved feeding, resting, and migrating birds in these groups (Crockford 1992). European studies of disturbance to breeding birds suggest negligible impacts and disturbance effects were documented during only one study (Pedersen and Poulsen 1991). For most avian groups or species or at other

European wind plants, no displacement effects on breeding birds were observed (Karlsson 1983; Phillips 1994; Winkelman 1989; Winkelman 1990).

Avian disturbance or displacement associated with wind power development has not received as much attention in the U.S. At a large wind project on Buffalo Ridge, Minnesota, abundance of shorebirds, waterfowl, upland game birds, woodpeckers, and several groups of passerines was found to be significantly lower at survey plots with turbines than at plots without turbines. There were fewer differences in avian use as a function of distance from turbine, however, suggesting that the area of reduced use was limited primarily to those areas within 328 ft (100m) of the turbines (Johnson *et al.* 2000a). A sizeable portion of these effects are likely due to the direct loss of habitat near the turbine for the turbine pad and associated roads. These results are similar to those of Osborn *et al.* (1998) who reported that birds at Buffalo Ridge avoided flying in areas with turbines. Also at Buffalo Ridge, Leddy *et al.* (1999) found that densities of male songbirds were significantly lower in Conservation Reserve Program (CRP) grasslands containing turbines than in CRP grasslands without turbines. Grasslands without turbines as well as portions of grasslands located at least 591 ft (180m) from turbines had bird densities four times greater than grasslands located near turbines. Reduced avian use near turbines was attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness due to the presence of access roads and large gravel pads surrounding turbines (Leddy 1996; Johnson *et al.* 2000a).

Construction and operation of the Foote Creek Rim wind plant did not appear to cause reduced use of the wind plant and adjacent areas by most avian groups, including raptors, corvids, or passerines (Johnson *et al.* 2000b). Some reduced use of the areas near turbines was apparent for a local population of mountain plovers, although a regional downward trend was also observed during the same time period (Young, 2003 pers. comm.). A pair of golden eagles successfully nested ½ mile (0.80km) from the wind plant after one phase was operational and another phase was under construction.

Development of wind turbines near raptor nests may result in indirect and direct impacts to the nesting birds; however, the only report of avoidance of wind plants by raptors occurred at Buffalo Ridge, where raptor nest density on 261 km^2 of land surrounding a windplant was 5.94/100 km^2, yet no nests were present in the 32 km^2 windplant facility itself, even though habitat was similar (Usgaard *et al*. 1997). The difference between observed (0 nests) and expected (2 nests) is not statistically significant. Similar numbers of raptor nests were found before and after construction of Phase 1 of the Montezuma Hills, California windplant (Howell and Noone 1992). A pair of golden eagles successfully nested 0.8 km from the Foote Creek Rim, Wyoming wind plant for three different years after it became operational (Johnson *et al*. 2000b), and a Swainson's hawk nested within 0.8 km of a small wind plant in Oregon (Johnson *et al*. 2003a). Anecdotal evidence indicates that raptor use of the Altamont Pass, California wind resource area (WRA) may have increased since installation of wind turbines (Orloff and Flannery 1992, American Wind Energy Association 1995).

Operation of the proposed Project would not affect raptor nests unless there were disturbance or displacement effects that caused raptors to not return to the nests close to the Project site. Such impacts are expected to be low since no active raptor nests were identified within ½ mile (0.80km) of proposed turbine sites, and since there is very little raptor nesting habitat near the wind turbines.

Based on the available information, it is probable that some disturbance or displacement effects may occur to the grassland/shrub-steppe avian species occupying the study area. The extent of these effects and their significance is unknown and hard to predict but could range from none to several hundred feet, resulting in a low level of impacts.

<u>*Potential Effects of Decommissioning:*</u>
Impacts from decommissioning the proposed Project would be lower than those for construction, as no access roads would need to be built and thus there would be less heavy equipment and ground disturbance. The period of disturbance for decommissioning would also be much shorter than for construction. Vehicles would travel on established roadways which would not impact habitat for special status species. Dismantling the project would eliminate avian and bat mortality caused by the presence of wind turbines. Wildlife habitat would have the potential to return to pre-project conditions over time, and disturbed areas would be reseeded with appropriate seed mixes to accelerate revegetation of these areas. Therefore impacts from decommissioning would be low.

A more detailed discussion of decommissioning and site restoration plans is provided in Section 4.8, 'Initial Site Restoration Plan'.

3.6.2.2 Critical Areas

The Kittitas County Code Title 17A defines "critical areas" as the following:

(1) wetlands;
(2) areas with a critical recharging effect on aquifers used for potable water;
(3) fish and wildlife habitat conservation areas;
(4) frequently flooded areas; and
(5) geologically hazardous areas.

Wetlands are addressed in Section 3.4 'Vegetation and Wetlands'; water resources (including aquifers and floodplains) are addressed in Section 3.3 'Water'; and geologically hazardous areas are addressed in Section 3.1 'Earth'.

The Kittitas County Code (Title 17A.02.090) further defines "fish and wildlife habitat conservation areas" as:

(1) Those lands in Kittitas County owned or leased by the Washington State Department of Fish and Wildlife;

(2) Those lands donated to or purchased by Kittitas County for corridors pursuant to RCW 36.70A.160;
(3) Wetlands;
(4) Big game winter range;
(5) Riparian habitat;
(6) Habitats for species of local importance.

Items 1, 4, and 6 are relevant to this section (wetlands and riparian habitat are addressed in Section 3.4 'Vegetation and Wetlands'). Based on the above definitions, the WDFW section within the Project area is considered a Kittitas County Critical Area. Big game winter range is also considered a Kittitas County Critical Area; however, by definition, the winter range is limited to areas owned or leased by WDFW (Kittitas County Code 17A.02.040) and therefore consists only of the one section of WDFW-owned land mentioned above within the Project area. Coordination for this project has involved contact with numerous federal, state, and local wildlife specialists and no habitats for species of local importance have been identified other than species and habitats previously addressed (see Sections 3.4.1.2, 3.4.1.3, and 3.6.3).

3.6.3 Unique Species

A list of state and federally protected species that potentially occur within the Project area was generated to assess the potential for impacts to these species (See Table 3.6.3-1). Species were identified based on the WDFW Species of Concern list, which includes state listed endangered, threatened, sensitive and candidate species; and the USFWS, Central Washington Ecological Services office list of Endangered, Threatened, Proposed, Candidate and Species of Concern for Kittitas County.

Information about occurrence of these species in the Project area is based largely on the following resources:

- Habitat mapping and predicted distribution from Washington State Gap Analysis Program (GAP) project;
- WDFW Priority Habitats and Species (PHS) records for the project area and a buffer or approximately 5 miles (8km);
- Breeding Bird Atlas of Washington State, Location Data and Predicted Distributions (Smith *et al.* 1997);
- Baseline field studies being conducted on site (this report); and
- Other published literature where available.

3.6.3.1 Critical Habitat

The Endangered Species Act defines critical habitat for threatened or endangered species as specific area(s) within the geographical range of a species where physical or biological features are found that are essential to the conservation of the species and which may require special management consideration or protection. Critical habitat is a specific geographic area designated by the USFWS for a particular species.

Under the ESA, it is unlawful to adversely modify designated critical habitat. According to the USFWS letter, critical habitat for the northern spotted owl may be present at or near the proposed wind plant. However, it was determined that no critical spotted owl habitat is present within the Project area after further review of critical habitat maps by the USFWS (Skip Stonesifer, USFWS, pers. comm.) Therefore, construction, maintenance, and operation of the proposed Project will not adversely modify critical habitat for endangered or threatened species.

3.6.3.2 No Effect

The USFWS indicated that bald eagle, gray wolf, bull trout, Canada lynx, northern spotted owl, Ute's ladies tresses orchid, western sage grouse, and western yellow-billed cuckoo potentially occur in the Project area due to potential species ranges. Resource investigations indicated that gray wolf, bull trout, Canda lynx, northern spotted owl, and western yellow-billed cuckoo are not likely to occur in the Project area due to lack of essential habitat for these species. The Project will not affect these species.

Western sage grouse is included on the USFWS list of candidate species but receives no protection under the Endangered Species Act. Western sage grouse is state listed, and is further discussed in section 3.6.3.4. No Ute's ladies tresses, a wetland plant species, were located in the Project area during surveys for this species, and the Project will not affect any wetlands. Bald eagle is the only federally listed species documented on the Project site, however, use of the site by bald eagle is very low (only one observed). Because use of the site by bald eagle was essentially incidental, based on best judgment, we cannot meaningfully measure, detect, or evaluate an effect or even expect an effect to occur. Therefore, the appropriate conclusion is that the project will not adversely affect bald eagle. In addition, no bald eagle fatality has ever been observed at a wind power project. The potential for the project to affect bald eagle is considered extremely unlikely and essentially immeasurable.

The Project will have no effect or is not likely to adversely affect federally threatened or endangered species. Should new information indicate the present of a federally listed species or if the proposed Project changes so that it may affect listed species, the appropriate actions under the Endangered Species Act will be taken. If power generated by the Project is purchased by the Bonneville Power Administration (BPA) or is transmitted across BPA lines, and new information indicates the Project may affect a federally threatened or endangered species, a Biological Assessment (BA) will be prepared to initiate consultation with the USFWS. If power generated by the Project is purchased by a private utility, and new information indicates that the Project may cause the take of a listed species, a Habitat Conservation Plan (HCP) will be prepared to acquire an incidental take permit from the USFWS.

Table 3.6.3-1. Species of special status documented as occurring or likely to occur within the vicinity of the Project area.

Group/Species	Status[a]	Notes

Table 3.6.3-1. Species of special status documented as occurring or likely to occur within the vicinity of the Project area.		
Group/Species	**Status[a]**	**Notes**
Mammals		
black-tailed jack rabbit (*Lepus californicus*)	SC	Documented as occurring near the Project area. The species is likely to occur within the Project area due to the presence of suitable sagebrush and shrub habitats.
white-tailed jack rabbit (*Lepus townsendi*)	SC	Documented as occurring near the Project area. The species is likely to occur within the Project area due to the presence of suitable sagebrush and shrub habitats.
brush prairie pocket gopher (*Thomomys talpoides douglasi*)	SC	Project occurs within the potential range of the species. No individuals have been documented near the Project area.
Merriam's shrew (*Sorex merriami*)	SC	Project occurs within the potential range of the species. No individuals have been documented near the Project area.
Townsend's big-eared bat (*Coryhorhinus townsendii*)	SC	Project occurs within the potential range of the species. No individuals have been documented near the Project area.
Amphibians and Reptiles		
Columbia spotted frog (*Rana luteiventris*)	SC	The Project area occurs within the potential range for the species. However, no impacts to wetlands or springs from the Project are anticipated, and no impacts to the species are anticipated.
western toad (*Bufo boreas*)	SC	The Project area occurs within the potential range for the species. However, no impacts to wetlands or springs from the Project are expected, and no impacts to the species are anticipated.
sharptail snake (*Contia tenuis*)	SC	The Project area occurs within the potential range for the species.
striped whipsnake (*Masticophis taeniatus*)	SC	The Project area occurs within the potential range for the species.
Raptors		
bald eagle (Haliaeetus leucocephalus)	ST FT	One bald eagle was observed during the winter. No documented breeding records within two miles of the Project. Bald eagles may rarely fly through the Project area, especially in the winter. No impacts to bald eagles are anticipated. Potential reduction of cattle grazing may reduce bald eagle use and risk, due to reduction of carrion.

Table 3.6.3-1. Species of special status documented as occurring or likely to occur within the vicinity of the Project area.		
Group/Species	**Status[a]**	**Notes**
golden eagle (Aquila chrysaetos)	SC	WDFW has historic nesting records within two miles of the Project area. No active golden eagle nests were observed during raptor nest surveys in 2003. Mean use of the Project area was low overall, but highest in the fall (0.143 observations / 30-minute survey) and winter (0.082 observations / 30 minute survey). Two individuals were observed during the in-transit surveys.
peregrine falcon (Falco peregrinus)	SS	Potential exists for species to rarely fly through the Project area during migration or rarely to forage in breeding season. No peregrine falcons were observed during raptor nest, fixed-point, in-transit count surveys. Active eyries do exist more than 6.5 miles (10.5km) to the east of the Project between the Quilomene Creek and Vantage. No impacts to peregrine falcons are expected.
burrowing owl (Athene cunicularia)	SC	One documented burrowing owl breeding area occurs 3- 4 miles (5-6km) southeast of the Project area and transmission route. However, no burrowing owls were observed during surveys within the Project area, and no impacts to the species are expected.
ferruginous hawk (Buteo regalis)	ST	The species is considered a rare migrant and potential breeder within the Project area. No ferruginous hawks were observed during fixed-point, in-transit, or raptor nest surveys. No impacts to the species are anticipated.
merlin (Falco columbarius)	SC	Two observations of merlins were noted during fixed point surveys. The species is considered a rare migrant through the Project area and is not likely to breed within the Project area. No impacts to migrating merlins are expected.
flammulated owl (Otus flammeolus)	SC	The Project occurs within the potential range of flammulated owls. Suitable habitat exists for the species within patches of conifer within and to the north of the Project area. If flammulated owls occur within the Project area, a low potential exists for the species to collide with turbines. Only one flammulated owl has been documented as a fatality at wind plants within the U.S. (Erickson et al. 2001).

Table 3.6.3-1. Species of special status documented as occurring or likely to occur within the vicinity of the Project area.		
Group/Species	**Status[a]**	**Notes**
northern goshawk (Accipiter gentiles)	SC	Two observations of two individuals were made within the Project area during the winter of 2002 - 2003. Overall use of the Project area by breeding northern goshawks appears to be relatively low, and no impacts to the species are anticipated.
Grouse		
sage grouse (Centrocercus urophasianus)	ST FC	The Project area occurs within a mapped area of historic high use. One documented lek is present approximately 2.75 miles (4.43km) from the proposed PSE transmission feeder line route. No sage grouse or leks were observed during fixed point or lek surveys within the Project area, although pellets were found incidentally on the south side of Whiskey Dick Mountain in the fall. Although potentially used historically, the Project area is not currently occupied by sage grouse leks, and no to very low impacts to the species are anticipated. The project is located within the Colockum Management Unit in the Draft Washington Recovery Plan for Sage-grouse. This management unit is most important for potential connectivity between the breeding population on the Yakima Training Center and the populations in Douglas County.
sharp-tailed grouse (Tympanuchus phasianellus)	ST	The WDFW has one record of a sharp-tailed grouse sighting from 1981 approximately 4 – 6 miles (6-10km) from the Project area and a transmission feeder line. No sharp-tailed grouse were observed during surveys. It is unlikely that the species occupies the Project area and no impacts are expected.
Waterbirds/ Waterfowl		
common loon (Gavia immer)	SS	Common loons are considered a rare migrant through the Project area. No loons were observed during surveys, and no impacts to the species are anticipated.
western grebe (Aechmophorus occidentalis)	SC	Western grebes are considered a rare migrant through the Project area. No grebes were observed during surveys, and no impacts to the species are anticipated.
Songbirds		

Table 3.6.3-1. Species of special status documented as occurring or likely to occur within the vicinity of the Project area.		
Group/Species	**Status[a]**	**Notes**
Lewis' woodpecker (Melanerpes lewis)	SC	The Project occurs within the potential range of the Lewis' woodpecker. Suitable habitat exists for the species within patches of conifer within and to the north of the Project area. However, no Lewis' woodpeckers were observed during surveys, and no impacts to the species are anticipated.
white-headed woodpecker (Picoides albolarvatus)	SC	The Project occurs within the potential range of the white-headed woodpecker. Suitable habitat exists for the species within patches of conifer within and to the north of the Project area. However, no White-headed woodpeckers were observed during surveys, and no impacts to the species are anticipated.
loggerhead shrike (Lanius ludovicianus)	SC	Three observations totaling four individuals were observed within the Project area during the spring of 2002 and 2003. One observation was made along the PSE transmission route. Overall use of the Project area by breeding loggerhead shrikes appears to be relatively low, and low impacts to the species are anticipated.
sage sparrow (Amphispiza belli)	SC	Sage sparrows are documented as occurring within sagebrush habitats within and surrounding the Project area during fixed point surveys and by the WDFW. The potential exists for the migrating individuals to collide with turbines. Observations of breeding individuals indicate that the species generally does not fly within the Rotor Swept Area (RSA).
sage thrasher (Oreoscoptes montanus)	SC	Sage thrashers are documented as occurring within sagebrush habitats within and surrounding the Project during the fixed and in-transit surveys. The potential exists for the migrating individuals to collide with turbines. Observations of breeding individuals indicate that the species generally does not fly within RSA.
Vaux's swift (Chaetura vauxi)	SC	The Project area occurs within the potential range of the Vaux's swift. No individuals were observed during fixed point surveys. The potential exists for migrating individuals to collide with turbines, however, the overall risk to the species is considered low.

FE	*Federal Endangered,*	*SE*	*State Endangered*
FT	*Federal Threatened*	*ST*	*State Threatened*
FC	*Federal Candidate*	*SC*	*State Candidate*
FSC	*Federal Species of Concern*	*SS*	*State Sensitive*

3.6.3.4 Potentially Impacted Species

Impacts to wildlife species and in particular avian and bat species are expected to occur from the Project. Measured use of the site by avian species in addition to mortality estimates from other existing wind plants is used to predict mortality of birds and bats from the Project. For example, use of the site by raptors is relatively low compared to other wind plants and mortality estimates of raptors from other "newer generation" wind plants are relatively low (e.g. 0.07 raptors/turbine/year for Nine Canyon Wind Project, <0.04 raptors/turbine/year for Foote Creek Rim wind project, Wyoming; <0.01 raptors/turbine/ year for the Buffalo Ridge wind project, Minnesota). Therefore mortality estimates for raptors from the Project are expected to be low. Post construction monitoring is proposed to validate mortality predictions and monitor the actual level of mortality from the Project.

Other impacts include direct loss of habitat due to the Project facilities, and indirect impacts such as disturbance and displacement from the wind turbines, roads and human activities. Both construction (e.g., blasting) and operations impacts are discussed. Potential impacts are discussed for fish, bats, big game, other mammals, reptiles and amphibians, and birds. Discussion of potential impacts to unique species including State and Federal listed species is also included.

<u>*Birds*</u>

Bald Eagle:
Only one bald eagle was observed during surveys within the Project area. The bald eagle was observed during the winter, and no bald eagle nests were observed during raptor nest surveys. No bald eagle fatalities have been observed at other wind projects (Erickson *et al.* 2001), and many have estimated bald eagle use similar or higher than this site. Based on the apparent incidental use of the Project area by bald eagles, impacts to the species cannot be meaningfully measured, detected, evaluated and are not expected and are therefore considered negligible.

During Project construction the possibility of mortality effects to bald eagles is considered negligible and extremely unlikely to occur. Heavy construction activities will not occur in the winter, and the low levels of bald eagle use are expected to be confined to winter and early spring. If a Bald eagle were to fly through the area during the construction period it is unlikely to occur within the construction zones due to disturbances and therefore unlikely to be at risk of construction related mortality.

During Project operations, based on the available information about bald eagle use of the site as well as Kittitas County, potential bald eagle mortality due to operation of the wind plant will confined to the winter and early spring seasons. Bald eagles will not be at risk from the wind plant in the summer or fall. Bald eagles are not expected to frequently occur within the wind plant and operation of the wind plant should have no disturbance on bald eagles.

The range of the bald eagle is not expected to change due to the Project. Bald eagle populations appear to be generally increasing and the USFWS has proposed the species for delisting (USFWS 1999). Bald eagle populations in Washington and throughout North America will continue to increase during and after Project construction.

Golden Eagle:
During Project construction the possibility of mortality effects to golden eagles is considered negligible and very unlikely to occur. Golden eagles in the area during the construction period are unlikely to occur within the construction zones due to disturbances and therefore unlikely to be at risk of construction related mortality. No disturbance impacts to golden eagle nests from construction activities are anticipated since no active nests were documented within 2 miles of the project area. Although no active nests were documented during nest surveys, golden eagles were observed during fixed point surveys throughout the year and golden eagles have nested historically within two miles of the Project area. Overall use of the Project area by golden eagles is relatively low compared to other wind plants where golden eagle fatalities have been documented. While the potential exists for golden eagles to collide with turbines, overall risks to golden eagle populations are considered low and only a few individuals at most are expected to collide with turbines over the life of the Project.

Sage Sparrow and Sage Thrasher:
Sage sparrows and sage thrashers breed within sagebrush and shrub habitats within the Project area. During Project construction there is some likelihood of mortality of sage sparrows and sage thrashers from collision with construction equipment. Proposed construction of roads and tower foundations are planned for spring through fall, and could therefore have some effect on nesting birds and their young. Construction tasks such as wind turbine assembly and erection may occur during the nesting period for songbirds and raptors, and may disturb or otherwise impact nesting activity.

Most sagebrush and other shrub habitats within the Project area occur on the sides of ridges and in drainages, while most turbines will be located on ridge tops lacking dense shrub habitats. Observations of breeding individuals indicate that the species generally does not fly within the Rotor Swept Area (Exhibit 14, Table 7 and 9). The potential exists for the migrating individuals to collide with turbines. It is likely that the presence of turbines, roads and associated facilities will result in local displacement of breeding sage sparrows and sage thrashers from shrub habitats near Project facilities. However, based on research in Minnesota, displacement effects will likely be limited to areas within 328 ft (100m) of turbines and associated facilities (Johnson *et al.* 2000a). Overall impacts to sage sparrow and sage thrasher populations are considered negligible.

Sage Grouse:
The Project area has been used historically by sage grouse (WDFW, PHS Data). Sage grouse have historically been observed in the Project area, especially in the fall and winter, with the most recent observations that were entered into the WDFW PHS data occurring in the fall 1997. Portions of the project area are identified as a regular large concentration of sage grouse (WDFW, PHS Data). No leks have been observed near the

Project area based on systematic searches, as well as incidental observations. The nearest known lek is 5 miles (16km) south of the Project area and 2.75 miles (4.4km) at the closest point to the proposed PSE transmission feeder line (Exhibit 14, Figure 6). At least one brood was observed in the general vicinity of the Project in the early 1990's, suggesting nesting may have occurred near the Project at that time (WDFW PHS). No sage grouse or leks were observed during targeted surveys in March and April 2003 within and surrounding the proposed Project area. In addition, no sage grouse were observed during avian use surveys between May 10, 2002 and May 22, 2003. Two sage grouse pellet groups were observed on the south side of Whiskey Dick Mountain during the Fall of 2002.

Currently, two populations of sage grouse remain in Washington; one within the Yakima Training Center in Yakima and Kittitas counties south of the Project area, and one within Douglas and Grant counties to the northeast of the Project area. The sage grouse population in 1997 was estimated at approximately 1000 birds, with 600 located in Douglas County and 400 birds on the YTC (Hays *et al.* 1998).

The Project area is located within the western portion of the Colockum sage grouse management unit, as defined in the Draft Washington Sage Grouse Recovery Plan (Stinson *et al.* 2003). The Colockum management unit is approximately 128,000 acres in size and primarily provides a possible corridor between the sage grouse population within the Yakima Training Center (YTC) to the south of the Project and the populations to the north and west of the Project in Douglas County population. The potential function of the Colockum management unit includes secondary breeding[4], connectivity[5], and seasonal use[6] with uncertain but apparently limited potential for reintroduction and established breeding. Approximately 90% of this management unit is steppe habitat (Table 8 in Stinson et al. 2003). Limiting factors of this unit for providing these functions is the rugged terrain, much of which is unsuitable for sage grouse.

Historic data suggest the potential for sage grouse to use the proposed Project area for winter habitat and for potential movement between the YTC and Douglas County populations. It would appear there is currently much less likelihood of consistent use of the Project area for nesting, based on no documented birds observed in the Project vicinity during the breeding season in the past 10 years, the current nesting habitat quality, and other factors (Stinson *et al.* 2003). Important components to nest sites and nest success include a large grass and sagebrush canopy cover (Sveum 1995). The grass cover component would appear to be lacking within the Project area, due to current grazing practices.

There is very limited information on the potential disturbance and displacement impacts of wind projects on sage grouse, and no controlled studies. Presence of young broods at the Foote Creek Rim wind project suggest nesting has likely occurred somewhere near a wind project, although the exact nesting location relative to wind turbines is not known

[4] areas that may support limited breeding
[5] providing habitat connectivity between breeding areas or seasonal use areas
[6] areas likely to be used seasonally during winter, summer, or fall.

(D. Young, WEST, Inc., pers. comm.). Studies of prairie chickens suggest they avoid suitable habitat within ½ mile of residences, well-traveled roads and compressor stations, and did not nest in suitable habitat near a coal-fired generation station (Robel 2002). Sage grouse nested farther from leks in areas classified as disturbed compared to less disturbed areas in Wyoming (Lyons 2001).

The Project area is located on the western edge of the proposed sage grouse management area. It would appear the Project will not significantly impact connectivity between Douglas County populations and the Yakima and Kittitas County populations, given that the shrub steppe habitats (Whiskey Dick and Quilomene Wildlife Areas and private lands between the two Wildlife areas) to the east of the Project would remain intact. In addition, while turbine strings are linear features, they are highly permeable to wildlife movement because of the separation between turbines. Approximately 100 acres of shrub-steppe habitat will be permanently impacted by the footprint of the Project out of more than 8,600 acres of shrub-steppe habitat within the Project area. The 8,600 acres is approximately 7% of the 128,000 acre Colochum management area. The loss of 100 acres of this unit represents a loss of less than 0.08%.

Proposed mitigation measures include elimination of livestock grazing within parts of the Project area (Section 27), which likely would improve residual grass cover and potential nesting, brood-rearing and wintering habitat for sage grouse. It is not known what impact the Project will have on seasonal movements and movements, if they exist, between the two existing populations. Relatively large blocks of shrub-steppe habitats still exist within WDFW and WDNR lands to the east of the Project site that may serve to connect the two populations. The Quilomene Wildlife Area (17,803 acres) and the Whiskey Dick Wildlife Area (28,549 acres) and the private lands between them have vegetation similar to the Project area, but lower in elevation. Controlled access to the Project area during operations will limit human activity, and in fact, may reduce human disturbance levels compared to current levels.

Peregrine Falcon:
The nearest known peregrine eyrie is located approximately 6.5 miles (10.5km) from the Project area. No peregrine falcon eyries were located during raptor nest surveys. Cliff habitat is present within two miles of the Project area, and the potential exists for peregrine falcons to nest within these cliff habitats. However, most suitable peregrine falcon nesting habitat is located along the Columbia River and it is unlikely that peregrine falcons will nest within two miles of the Project area. Use of the Project area by peregrine falcons is likely limited to rare dispersal events or occasional individuals migrating or hunting within the Project area. No construction impacts are expected. Over the life of the Project there is a very low risk that an individual peregrine falcon will collide with turbines, however, there will be no effect to peregrine falcon populations from the Project.

Burrowing Owl:
Although no burrowing owls have been documented within the Project area during surveys, burrowing owl breeding areas have been designated by the WDFW 3-4 miles (5-

6km) southeast of the Project area. The potential exists for breeding burrowing owls to occur within the Project area. However, considering the lack of sightings within the Project area, burrowing owls likely occur only occasionally within the Project area, and no construction or operations impacts to burrowing owls are expected.

Other Bird Species:
The potential range of several other species listed as candidates under the Washington Endangered Species Act overlap with the Project, including ferruginous hawk, flammulated owl, merlin, northern goshawk, sharp-tailed grouse, common loon, western grebe, Lewis' woodpecker, white-headed woodpecker, and Vaux's swift (Table 3.6.3-1). The potential exists for these species to occur within the Project area; however, use of the Project area by these species is expected to occur very rarely during migration or dispersal events. The potential exists for a few individuals of each species to collide with turbines over the life of the Project; however, no population impacts to these species are anticipated.

Additional species not discussed above (Federal or State Threatened, Endangered or Candidate) but with documented declining populations in the Columbia Plateau that were also documented on the Wild Horse site are: American kestrel, Brewer's blackbird, Brewer's sparrow, horned lark, loggerhead shrike, western meadowlark, mourning dove and killdeer. Many of these species are very common and widely distributed (e.g., western meadowlark, horned lark, American kestrel), but nevertheless have shown apparent declines in abundance in shrub-steppe habitats from BBS data (Sauer 1999). The proposed Project construction schedule is shown in Table 2.2.6.2-1. Proposed construction of roads and tower foundations is planned for the spring through the fall, and will have some effect on nesting birds and their young. The risk of mortality from construction to avian species is most likely limited to potential destruction of a nest with eggs or young for ground and shrub nesting species when equipment initially disturbs the habitat. Disturbance type impacts can be expected to occur if construction activity occurs near an active nest or primary foraging area. Birds displaced from these areas may move to areas with less disturbance, however, breeding effort may be affected and foraging opportunities altered during the period of the construction (under one year). Of these species, horned lark, American kestrel, and western meadowlark appear to have the highest collision risks due to their abundance at the Project site.

Mammals:
The Project occurs within the potential range of several species of federally and state protected mammals, which are unlikely to occur within the Project area due to habitat constraints and/or uncertain population status in Washington. These species include Townsend's big-eared bat, long-legged myotis, and long-eared myotis. These species are not expected to occur within the Project area and no impacts to these species are likely to occur.

Both the white-tailed and black-tailed jackrabbits have been documented in the Project area. The potential exists for individuals to be killed by vehicles on roads, and some suitable habitat for these species will be lost to turbine pads and road construction. Limits on vehicle speeds within the Project will minimize the potential for road kills, and the permanent loss of suitable habitat is relatively small. Overall, impacts to these species should be minimal.

Suitable habitat for three bat species, which are listed as federal species of concern, is present within the Project area: fringed myotis, small-footed myotis and Yuma myotis. However, only general descriptions of habitat requirements and potential distribution are available for the three species. Very little is known concerning the ecology of the three species, making it even more difficult to accurately predict potential impacts to these species. To date, we are unaware of any documented fatalities of these species at wind projects within the U.S.

Merriam's shrew has been documented within Kittitas County, and suitable habitat for the species occurs within the Project area. The potential also exists for the brush prairie pocket gopher to occur within the Project area. Assuming these species are present within the Project area, the construction of turbine pads and roads, and vehicle traffic have the potential to crush individuals within burrows or moving above ground. Overall, total impacts to habitat are expected to be small and no significant impacts to populations of these species are expected to occur as a result of this Project.

Reptiles and Amphibians:
The Project area occurs within the potential range of the striped whipsnake, sharptail snake, western toad and Columbia spotted frog. There is very little suitable habitat for amphibians or aquatic reptiles (e.g., turtles) in the study area. None of these sensitive status reptiles or amphibians were documented on the Project site and no impacts are anticipated.

3.6.4 Comparison of Impacts of Proposed Scenarios

Due to the relatively recent commercial introduction of wind turbines with rotor diameters greater than 70 meters, there is very little information comparing avian and bat fatality rates of 90 meter rotor diameter (RD) turbines to 60 meter RD turbines. New generation wind projects where standardized mortality studies have been conducted in the West and Midwest include turbines ranging from 30 m to 70 m RD (Erickson et al. 2001, Erickson et al. 2003a, Erickson et al. 2003b, Johnson et al. 2003a). Some characteristics of the larger turbines may lead to fewer raptor, resident passerines and other diurnal birds fatalities because of the lower RPM's (revolutions per minute) of the turbine blades and the higher tip clearance (above the ground.) The tip clearance for the 90 m RD turbine on an 80 m tower is 35 m, while the tip clearance for the 60 m RD turbine on a 60 m tower is 30 m. Most of the daytime passerines flight heights observed at this and other projects are below 35 m (Johnson et al. 2000a, Johnson et al. 2000b, Erickson et al. 2003c, Young et al. 2003a).

Models developed by Tucker (1996a, 1996b) suggest a lower theoretical collision risk per MW of nameplate capacity as the length of the rotors of the turbines increase and the RPM's decrease. Earlier work by Howell (1997) suggested lower raptor collision risk with 33 m RD turbines compared to 18 m RD turbines in California. Nocturnal migrating songbirds, which fly at higher altitudes, may be more at risk to collision with taller, larger RD turbines compared to shorter, smaller RD turbines. For the purposes of the mortality estimates discussed in this report and to incorporate uncertainty into the predictions, the Applicant's biologists used the range of mortality observed (instead of average) during all studies in the West and Midwest (based on turbines ranging from 30 m rotor diameter to 70 m rotor diameter).

3.6.5 Impacts of the No Action Alternative

Under the No Action Alternative, the project would not be constructed or operated, and the environmental impacts described in this ASC 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.6.6 Mitigation Measures

The potential direct wildlife from the Project can be grouped into two main categories, loss of habitat from construction and operation of the Project, and potential mortality to individual birds or other animals from construction and operation of the Project. The loss of habitat associated with the Project can be further broken down into "temporary" and "permanent" habitat impacts. "Temporary" impacts are those arising from ground disturbance necessary for the construction of Project infrastructure but that will be not be permanently occupied once construction is complete. Examples include trenches for underground electrical collector cables, construction staging areas, etc. These areas will be disturbed during the construction period but will be reseeded and restored after construction is finished. The vast majority (approximately 75%) of the total area impacted by construction of the Project will only be temporarily disturbed (i.e. for less than one year.) The remainder, (approximately 25%) will continue to be occupied by the Project, such as string roads, turbine foundation pads, Project substation and the O&M facility. These are considered "permanent" impacts for the purpose of this analysis.

Potential indirect impacts to plants and animals are more diffuse and could be caused by habitat fragmentation, wildlife disturbance or avoidance of the Project site, and introduction of noxious weeds and/or wildfire.

A comprehensive mitigation package for plants and animals is proposed for this Project. It consists of several categories of actions, including:

- Thorough study and analysis to avoid impacts;
- Project design features to minimize impacts;
- Construction techniques and (Best Management Practices) BMPs to minimize impacts;
- Post-construction restoration of temporarily disturbed areas;
- Operational BMPs to minimize impacts;
- Monitoring and adaptive management to minimize impacts during operations; and
- Protection and enhancement of on-site habitat; specifically providing protection for the life of the Project for over 600 acres of shrub steppe and riparian habitat in Section 27 and the fencing of springs in other areas of Project to protect the springs from degradation by livestock.

3.6.6.1 Study and Analysis

The Applicant has commissioned extensive studies by qualified wildlife biologists at the Project site to avoid impacts to sensitive populations. These studies, results of which are included as Exhibits 12 & 14, include:

- Rare plant surveys;
- Habitat mapping;
- Avian use point count surveys;
- Aerial raptor nest surveys;
- Sage grouse surveys
- Big game surveys;
- Non-avian wildlife surveys;

The results and recommendations of these studies have been incorporated into the proposed design, construction, operation and mitigation for the Project.

3.6.6.2 Project Design

The proposed design of the Project incorporates numerous features to avoid and/or minimize impacts to plants and wildlife. These features are based on site surveys, experience at other wind power projects, and recommendations from consultants performing studies at the site. Features of the Project that are designed to avoid or minimize impacts to wildlife include the following:

- Avoidance of construction in sensitive areas such as streams, riparian zones, wetlands, forested areas;
- Avoidance of locating wind turbines in prominent saddles along the main Whiskey Dick Ridge
- Minimization of new road construction by improving and using existing roads and trails instead of constructing new roads;
- Choice of underground (vs. overhead) electrical collection lines wherever feasible to minimize perching locations and electrocution hazards to birds;
- Choice of turbines with low RPM and use of tubular towers to minimize risk of bird collision with turbine blades and towers;
- Use of bird flight diverters on guyed permanent meteorological towers or use of unguyed permanent meteorological towers to minimize potential for avian collisions with guy wires;
- Equipping all overhead power lines with raptor perch guards to minimize risks to raptors; and
- Spacing of all overhead power line conductors to minimize potential for raptor electrocution.

3.6.6.3 Construction Techniques

Construction of the Project has the potential to impact both habitat and wildlife in a variety of ways. The Applicant proposes the use of construction techniques and Best Management Practices (BMPs) to minimize these potential impacts. These include the following:

- Use of BMPs to minimize construction-related surface water runoff and soil erosion (these are described in detail in Section 3.3.2.1, 'Water – Impacts of the Proposed Action – Construction - Surface Water runoff/Absorption');
- Use of certified "weed free" straw bales during construction to avoid introduction of noxious or invasive weeds;
- Flagging of any sensitive habitat areas (e.g. springs, raptor nests, wetlands, etc.) near proposed areas of construction activity and designation of such areas as "off limits" to all construction personnel;
- Development and implementation of a fire control plan, in coordination with local fire districts, to minimize risk of accidental fire during construction and respond effectively to any fire that does occur;
- Establishment and enforcement of reasonable driving speed limits (max 25 mph) during construction to minimize potential for road kills;
- Proper storage and management of all wastes generated during construction;
- Require construction personnel to avoid driving over or otherwise disturbing areas outside the designated construction areas;

- Limiting construction activities during winter months to minimize impacts to wintering big game;
- Designation of an environmental monitor during construction to monitor construction activities and ensure compliance with mitigation measures.

3.6.6.4 Post Construction Restoration

All temporarily disturbed areas which have been cleared of vegetation will be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed to accelerate the revegetation of these areas and to the prevent spread of noxious weeds. The Applicant will consult with Washington Department of Fish and Wildlife regarding the appropriate seed mixes for the Project area.

3.6.6.5 Operational BMP's

During Project operations, appropriate operational BMPs will be implemented to minimize impacts to plants and animals. These include the following:

- Implementation of a fire control plan, in coordination with local fire districts, to avoid accidental wildfires and respond effectively to any fire that might occur;
- Establishment and enforcement of reasonable driving speed limits (max 25 mph) during operations to minimize potential for road kills;
- Operational BMPs to minimize storm water runoff and soil erosion;
- Implementation of an effective noxious weed control program, in coordination with the Kittitas County Noxious Weed Control Board, to control the spread and prevent the introduction of noxious weeds;
- Identification and removal of all carcasses of livestock, big game, etc. from within the Project that may attract foraging bald eagles or other raptors;
- Control public access to the site to minimize disturbance impacts to wildlife, especially in the winter months;
- Allow limited and controlled hunting on the site and allow WDFW access to the site to manage big game herds and minimize potential big game damage to nearby agricultural lands.

3.6.6.6 Monitoring and Adaptive Management

The Applicant plans to convene a Technical Advisory Committee (TAC) to evaluate the mitigation and monitoring program and determine the need for further studies or mitigation measures. The TAC will be composed of representatives from Washington Department of Fish and Wildlife, EFSEC, Kittitas County, local interest groups (e.g., Kittitas Audubon Society), Project landowners, and the Applicant. The role of the TAC will be to review results of monitoring studies to evaluate impacts to wildlife and habitat, and address issues that arise regarding wildlife impacts during operation of the Project. The post-construction monitoring plan will be developed in coordination with the TAC.

The Applicant proposes to develop a post construction monitoring plan for the Project to quantify impacts to avian species and to assess the adequacy of mitigation measures implemented. The monitoring plan will include the following components: 1) fatality monitoring involving standardized carcass searches, scavenger removal trials, searcher efficiency trials, and reporting of incidental fatalities by maintenance personnel and others; and 2) a minimum of one breeding season raptor nest survey of the study area and a 1 mile buffer to locate and monitoring active raptor nests potentially affected by the construction and operation of the Project.

The protocol for the fatality monitoring study will be similar to protocols used at the Vansycle Wind Plant in northeastern Oregon (Erickson *et al.,* 2000) and the Stateline Wind Plant in Washington and Oregon (FPL *et al.,* 2001).

3.6.7 Significant Unavoidable Adverse Impacts

With mitigation, no significant unavoidable adverse impacts are anticipated for birds or other wildlife. The mitigation parcel for replacement of permanent and temporary habitat loss from the Project exceeds the mitigation ratios defined in the WDFW Wind Power Guidelines. Protection of springs through livestock exclusion will provide additional mitigation for impacts to wildlife. It is currently not clear what indirect impacts the Project may have on big game winter range and big game movements. It is anticipated that the mitigation (exclusion of livestock from springs) and elimination of grazing on the mitigation parcel will improve big game habitat. Controlled access and controlled hunting on the site will allow WDFW to properly manage the herds, should eliminate the potential for creating a refuge for big game, and minimize stress to big game in the winter. The level and effect of disturbance impacts to big game from maintenance operations is not known, and may or may not be significant.

3.7 FISHERIES

3.7.1 Existing Conditions

There are no fish-bearing streams within the Project area according to the WDFW habitats and species maps and the StreamNet database (WDFW 2003). However, the majority of the streams, which are mapped as intermittent, within the Project area drain into fish-bearing streams and/or priority fish-bearing streams. Priority fish are defined as any federal or state listed threatened, endangered, or candidate species, or any special status species of concern. The USFWS identified bull trout, a threatened species, as potentially occurring within the Project area, however, there is no bull trout habitat or fish-bearing streams in the Project area.

The nearest fishery is located along Quilomene Creek approximately 1 mile (1.6 km) north of the Project and will not be impacted by the Project. Downstream from the Project area, the lower ends of Whiskey Dick, the North Forks of Whiskey Dick and Skookumchuck Creeks contain rainbow trout, and summer steelhead are identified along the lower end of Whiskey Dick Creek as well. These fisheries are more than five miles to the east of the Project. Livestock grazing has likely affected the portions of the above-mentioned creeks that run through the Project area to some degree in terms of reducing the amount of riparian vegetation present. In any event, the portions of these streams that occur within the Project are intermittent and not fish bearing (WDFW 2003).

No other waterbodies in the Project area, including wetlands and the Highline irrigation canals contain any priority fish species based on WDFW habitat and species maps. If any fish species are present in these other water bodies, they would most likely be warm-water fish that would not be subject to federal or state mitigation requirements.

3.7.2 Impacts of the Proposed Action

The Project would result in an impact to fish if:

- A population of a threatened, endangered, regulated, or other sensitive species were affected by a reduction in numbers; alteration in behavior, reproduction, or survival; or a loss or disturbance of habitat;
- There were a substantial adverse effect on a species, natural community, or habitat that is recognized specifically as biologically significant in local, state, or federal policies, statutes, or regulations; or
- There were any impedance of fish migration routes that lasts for a period that significantly disrupts migration.

3.7.2.1 Within Project Area

No streams or riparian areas will be impacted from construction disturbances related to wind turbines and roads. No wind turbine foundations or other infrastructure is proposed to be constructed within any streams or riparian areas, as illustrated in Exhibit 1-B, 'Project Site Layout'. No Project access roads cross any streams or riparian areas.

All Project facilities will be located a considerable distance from wetlands in the Project area. The closest Project facility is a turbine access road between String Q and String R with an underground collector cable, a low intensity use, which will be located approximately 200 feet away from a small unnamed spring. The maximum setback that would be required by Washington DOE guidelines and EFSEC's proposed rules for Combustion Turbine Standards would be 50 feet. There would be no setback required by Kittitas County. The construction methods and control measures discussed in Section 3.3.2, 'Water - Impacts of the Proposed Action', will be adequate to protect all wetlands and riparian corridors.

The BPA transmission feeder line involves a proposed riparian crossing of Parke Creek. However, based on a field investigation with WDFW staff and Project biologists, the proposed construction activities for the BPA transmission feeder line will not impact fish. Exhibit 11 contains a letter from WDFW acknowledging that there is no anticipated impact and that no hydraulic permit approval will be required for the Project. All construction related to the BPA feeder line will be at least 200 feet from the bank of Parke Creek and no construction activity will take place in the stream bed. Provided best management practices are employed on site and compliance with applicable permits regarding runoff and sediment control is maintained, no fish should be affected by construction or operation of the Project. No bull trout habitat occurs in the Project and there are no fish bearing streams in the Project (WDFW 2003). There will be no impacts to listed fish from the Project.

3.7.2.2 Downstream of Project Area

The main environmental impacts of the proposed action upon fisheries resources include potential adverse impacts to downstream fisheries resources. Given the nearest downstream fishery is over 5 miles east of the Project site, no impacts are anticipated. Provided best management practices are employed on site and compliance with applicable permits regarding runoff and sediment control is maintained, no fish should be affected by construction or operation of the Project.

3.7.2.3 Comparison of Impacts of Proposed Alternatives

All design scenarios will adhere to the wetland, stream and riparian setbacks outlined above.

Best management practices will be employed on site and compliance with applicable permits regarding runoff and sediment control will be maintained in all design scenarios. It is anticipated that these measures will adequately protect fish from any impacts that may result from construction or operation of the Project.

3.7.3 Impacts of No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.7.4 Mitigation Measures

The Project layout (Exhibit 1-B) has been designed to avoid any impacts to streams and riparian areas. Roads, underground cables, turbine foundations, transmission poles and other associated infrastructure will not be located within any riparian areas or streams. Many of the wildlife measures outlined in Section 3.6.6, 'Wildlife - Mitigation Measures', also apply here. BMPs would be initiated to retain sediment from disturbed areas and minimize areas of disturbance. In addition, the proposed construction activities for the transmission feeder lines will not involve the use of any heavy equipment in stream beds or riparian areas.

3.7.5 Significant Unavoidable Adverse Impacts

With appropriate mitigation, no significant unavoidable adverse impacts to fish resources are expected as a result of the proposed Project.

3.8 ENERGY AND NATURAL RESOURCES

3.8.1 Existing Conditions

3.8.1.1 Introduction

The Project will consume limited amounts of energy and natural resources primarily during construction. Operation of the Project will consume very limited amounts of natural resources, as the wind turbine generators will use wind, an abundant, naturally occurring renewable resource, to generate electricity. By using wind, rather than non-renewable fossil fuels, to generate electricity, operation of the Project will help reduce overall consumption of non-renewable natural resources.

Numerous independent life cycle analyses of wind power projects have shown that wind farms have a very high "energy payback" (ratio of energy produced compared to energy expended in construction and operation), and that wind's energy payback is higher than that of thermal power plants. Several studies have found that it generally takes less than six months of operation for a wind farm to produce the total amount of energy used to construct the equipment and build the project. (Energy Center of Wisconsin, 1999; Grum-Schwensen, 1990; G. Hagedorn et al, 1991; Gydesen. D et al, 1990.)

The consumption of energy and material quantities of consumables involves:

- The consumption of electricity and natural resources to produce the durable equipment and construction supplies used to build the Project;
- The consumption of electricity during construction and operation;
- The consumption of gasoline and diesel oil for motor vehicles during construction and operations; and
- The consumption of lubricating oil, greases, and hydraulic fluids for operating Project equipment controls and for providing lubrication of moving parts in wind turbine generators.

3.8.2 Impacts of the Proposed Action

3.8.2.1 Consumption of Energy and Natural Resources During Construction

Estimates for materials consumed during construction are summarized in Table 3.8.2-1 below.

Table 3.8.2-1 Materials Consumed During Construction

Resource	Quantity
Electricity	0
Diesel Fuel (gal)	150,000

Gasoline (gal)	30,000
Sand (cu yd)	38,700
Gravel (cu yd)	246,600
Water (gal)	10,700,000
Notes: *Estimated quantities are rounded* *Assumes 10 construction weeks for roads & foundations* *Assumes gas-powered vehicle consumption at 20% of diesel consumption* *Assumes 60/40 gravel/sand concrete mix* *Assumes construction office will be powered by diesel generator*	

3.8.2.2 Sources of Natural Resources Used During Construction

Fuel Sources

Where practical, construction vehicles and trucks will be refueled at existing fuel distributors or gas stations near Kittitas or Ellensburg. For construction vehicles on-site, temporary refueling stations will be established at on site fuel storage tanks dedicated to vehicle refueling. Section 2.2.3, 'Project Facilities' describes the fuel storage tanks in detail.

Water Sources

Water consumed during construction activities will be purchased by the EPC contractor from an off-site vendor with a valid water right and transported to the site in water-tanker trucks as described in Section 3.3.2, 'Water- Impacts of the Proposed Action'. The City of Kittitas has confirmed in writing their interest as one possible water vendor for the Project and would supply potable water from their water tower or standby well for all construction purposes, including dust control (See Exhibit 13, 'Letter of Interest from City of Kittitas').

Gray water from gravel operations is not expected to be re-used during construction. The portable concrete batch plant and portable rock crusher require potable-quality water for machinery and dust-control water spray function. Similarly, water tanker trucks equipped with spray nozzles for dust control will utilize potable quality water to reduce the possibility for clogging valves and nozzles.

Electricity Sources

It is anticipated that electricity for construction use will be generated using portable generators.

Cement, Sand, Aggregate and Gravel Sources

Cement, sand and some aggregate will be purchased from existing suppliers in the area that operate permitted quarries. The on-site gravel pits and their locations are described in Section 2.2.3, 'Project Facilities'.

Consumption of Non-Renewable Natural Resources

Grazing Land:
The permanent footprint of the Project will remove approximately 165 acres from open space and grazing uses for the life of the Project (at least 20 years). The remaining approximately 8,400 acres within the Project boundary will remain undeveloped, and may or may not allow grazing as discussed in Section 3.5, 'Agricultural Crops and Livestock'. At a maximum, the removal of approximately 5,300 acres of land from the approximately 445,000 acres of pasture or unimproved grazing land in Kittitas County (Kittitas County Comprehensive Plan, 2003) would represent a reduction of 1.2%.

Petrified Forest Deposits:
There appears to be no relationship between this site and the Gingko petrified forest resources. No petrified wood deposits similar to the gingko deposits located in the Gingko Petrified Forest (approximately 5 miles from the Project site) have been discovered at the Project site and no petrified gingko was observed during the geotechnical reconnaissance work at the Project site. The likelihood that any such resources would be affected by the Project is low given the relatively small disturbed area within the Project site.

The Gingko Petrified Forest State Park is described in Section 3.11.2.1, 'Visual Resources Light and Glare – Existing Conditions - Regional and Local Landscape Settings'. Because the Project will not be visible from the portions of the park in which there are developed facilities (see Section 3.11.2.), the Project will have little impact on the aesthetic experience of park users.

3.8.2.3 Consumption of Energy and Natural Resources During Operation

Operation of the Project will consume very limited amounts of energy and non-renewable natural resources. Energy will be generated using the kinetic energy in wind, transformed by the wind turbine generators into useful electricity. Types and quantities of energy and natural resources consumed during operations will primarily consist of the following:

- <u>Fuel for O&M vehicles:</u> Annual consumption is expected to be about 11,500 gallons.
- <u>Lubricating oils, greases and hydraulic fluids for the wind turbine generators:</u> Annual consumption is expected to be about 18,000 gallons of lube and hydraulic oils and approximately 5,500 gallons of cooling fluid.
- <u>Water for domestic use at the O&M facility and incidental maintenance uses:</u> Expected to be substantially less than 1,000 gallons/day
- <u>Electricity for Project operations:</u> The Project will generate power output approximately 80% of the time and will consume a small amount of electricity from the grid during periods of low wind as station stand-by power. The Project is estimated to consume less than 1% of Project energy generation.
- <u>Wind Integration:</u> In order to be interconnected to either the BPA or PSE grids, the Project will require an interconnection and transmission agreement which

complies with FERC (Federal Energy Regulatory Commission) and NERC (National Electric Reliability Council) standards. This ensures the safe and reliable delivery of power from the Project to the grid. Power from the Project will be integrated into the overall grid system which is handled by BPA and/or PSE system operations groups who are responsible for scheduling and managing their respective grid control areas. By definition, the injection of power to the grid from any power project does not consume power. In order to maintain system balance, during periods of high wind power output from the Project, system operators will be able to reduce the amount of other power being injected into the grid from other sources. Hourly power output fluctuations from the Project are typically less than 30% of nameplate capacity which is significantly smaller than load swings on either the BPA or PSE systems.

3.8.2.4 Sources of Natural Resources Used During Operation

Fuel used for O&M vehicles will be purchased from local gas stations. Lubricating oils and hydraulic fluids used for wind turbine generator maintenance will be purchased from distributors of such materials. The final selection of these distributors will depend on the specific turbine model chosen for the Project.

Electricity for Project operations will mostly be generated by the Project itself. During periods when the wind turbines are not generating power; it will be purchased from the regional utility.

Water consumed during operations would be purchased from a local vendor with a valid water right and transported by a water tanker truck. The supply requirement is estimated at a maximum of 1,000 gallons per day for domestic usage and light maintenance duties.

3.8.2.5 Comparison of Impacts of Proposed Scenarios

Construction

As described in Section 3.1.2 'Earth – Impacts of the Proposed Action', there is no change to the length or width of Project components, including roads, substations, O&M facilities, rock quarries, underground or overhead lines, permanent met towers, batch plant, or rock crusher under the different turbine size scenarios. These components comprise the vast majority of acreage impacted by the Project, and because they remain unchanged under all scenarios, the total acreage and construction quantities are very similar under all scenarios. This is because the scenarios utilize a similar layout, with greater or fewer WTGs along each string, but with the same beginning and end points for each string. For a specific comparison of the relative areas impacted under each scenario, refer to Table 3.1.2-2: Comparison of Area Impacts of the Proposed Scenarios.

The construction impacts are also substantially similar under the different design scenarios. There is no significant change to peak and total earthmoving quantities, or to peak and total production volumes at the batch plant or rock crusher. This is because the

Large WTG Scenario utilizes larger foundations for a smaller number of WTGs while the Small WTG Scenario utilizes smaller foundations for a larger number of WTGs.

Table 3.8.2-2 illustrates the variance in quantities consumed under the different scenarios, as compared with the 72m WTG (Most Likely) quantity presented in Table 3.8.2-1. The maximum variance (either increase or decrease) from the Most Likely scenario is a change of 3.9%.

Table 3.8.2-2 Materials Consumed During Construction

	Most Likely WTG Quantity	Large WTG	Small WTG
Electricity	0	0	0
Diesel Fuel (gal)	150,000	150,000	150,000
Gasoline (gal)	30,000	30,000	30,000
Sand (cu yd)	38,700	37,200	39,000
Gravel (cu yd)	246,600	244,300	246,900
Water (gal)	10,700,000	10,500,000	10,800,000

Operation

The consumption of energy and natural resources during operations will be the same for any of the proposed scenarios, with the exception of annual quantities of maintenance fluids (lube oil and cooling fluid), which are presented below in Table 3.8.2-3. The amount of power generated would be greater with the Large WTG scenario (312 MW of nameplate capacity) as compared to the other scenarios.

Table 3.8.2-3: Annual WTG Maintenance Fluid Quantities Under Different Scenarios

Turbine Component	Fluid Type	Replacement Interval (months)	Large WTG Scenario (gal/yr)	Most Likely Scenario (gal/yr)	Small WTG Scenario (gal/yr)
Gearbox lubrication	Lubricating oil	12	11,440	12,240	11,060
Generator cooling	Glycol-water mix	12	5,720	5,440	4,740
Hydraulic systems	Hydraulic oil	18	5,893	5,893	4,740

Note: Estimates are extrapolated from Table 3.16.2-2 data.

3.8.3 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.8.4 Mitigation Measures

As the Project would have a positive impact overall on the use of non-renewable resources, no mitigation is necessary or proposed.

3.8.4.1 Conservation and Renewable Resources Measures

During construction, conservation measures will include recycling of construction wastes where possible and encouragement of carpooling among construction workers to reduce emissions and traffic.

Several conservation measures will be undertaken during operations:

- The O&M facility will utilize station power for electricity needs.
- Water usage at the site will be closely monitored during operations due to the limited capacity of the on-site water storage tank.
- Carpooling and among operations workers will be encouraged.
- Recycling of waste office paper and aluminum will be encouraged.

3.8.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are expected as a result of the Project.

3.9 NOISE

This section presents an evaluation of potential noise resulting from the construction and operation of the Project. An essential part of this assessment is a comparison of expected noise levels from the Project with acceptable noise levels presented in applicable regulations. The noise criterion for this Project is WAC 173-60. This section, Exhibit 15A, Residences within 'Project Vicinity Map', and Exhibit 15B, 'Results of Noise Impact Model' together provide all the information necessary to demonstrate compliance with this criterion.

3.9.1 Existing Conditions

3.9.1.1 Fundamentals of Acoustics

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Table 3.9.1-1 summarizes the technical noise terms used in this subsection.

Table 3.9.1-1: Definitions of Acoustical Terms

Term	Definitions
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content, as well as the prevailing ambient noise level.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the base 10 logarithm of the ratio of the reference pressure to the sound pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.
Decibel A-weighted sound level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted unless stated otherwise.

Table 3.9.1-1: Definitions of Acoustical Terms	
Term	**Definitions**
Decibel C-weighted sound level (dBC)	The sound pressure level in decibels as measured on a sound level meter using the C-weighted filter network. The C-weighted filter does not de-emphasize the very low and very high frequency components of the sound. It is a flatter weighting in that each frequency has an almost equal weighting. It is therefore more sensitive to low frequencies than the A-weighting.
Equivalent noise level (L_{eq})	The energy average A-weighted noise level during the measurement period.
Percentile noise level (L_n)	The A-weighted noise level exceeded during n % of the measurement period, where n is a number between 0 and 100 (e.g., L_{90})
Community noise equivalent level (CNEL)	The average A-weighted noise level during a 24-hour day, obtained after the addition of 5 decibels to sound levels from 7 p.m. to 10 p.m. and after the addition of 10 decibels to sound levels between 10 p.m. and 7 a.m.
Day-night noise level (Ldn or DNL)	The average A-weighted noise level during a 24-hour day, obtained after the addition of 10 decibels from 10 p.m. to 7 a.m.

Sources: Beranek, 1988; California Department of Health Services, 1977.

In this subsection, some statistical noise levels are stated in terms of decibels on the decibel A-weighted scale (dBA). Noise levels stated in terms of dBA reflect the response of the human ear's audible range by filtering out some of the noise in the low- and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most noise ordinances and standards. The equivalent sound pressure level (L_{eq}) is defined as the average noise level, on an energy basis, for a stated period of time (such as hourly).

In practice, the level of a sound source is typically measured using a sound level meter that includes an electrical filter corresponding to the A-weighted curve. The sound level meter also performs the calculations required to determine the L_{eq} for the measurement period. The following measurements relate to the noise level distribution during the measurement period. The L_{90} is a measurement that represents the noise level exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

The effects of noise on people fall into three general categories:

1. Subjective effects of annoyance, nuisance, and dissatisfaction;
2. Interference with such activities as speech, sleep, and learning;
3. Physiological effects such as startling and hearing loss.

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the third category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily a result of the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it with the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual (CEC, 2001).

With regard to increases in A-weighted noise level, knowledge of the following relationships is helpful in understanding this subsection (Kryter, 1970):

- Except in carefully controlled laboratory experiments, the human ear cannot perceive a change of 1 decibel (dBA).
- Outside the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response can be expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and would likely cause an adverse response.

The referenced dB increases are for noise of similar nature (e.g., increased traffic noise compared with existing traffic noise). Table 3.9.1-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table 3.9.1-2: Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	**A-Weighted Sound Level in Decibels (dBA)**	**Noise Environment**	**Subjective Impression**
	140		
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Pain threshold
	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	—		
	90	Boiler room	
Freight cars (50 feet)	—	Printing press plant	
Pneumatic drill (50 feet)	80	In kitchen with garbage disposal running	
Freeway (100 feet)	—		
	70		Moderately loud
Vacuum cleaner (10 feet)	60	Data processing center	

Table 3.9.1-2: Typical Sound Levels Measured in the Environment and Industry			
Noise Source at a Given Distance	**A-Weighted Sound Level in Decibels (dBA)**	**Noise Environment**	**Subjective Impression**
Department store	—		
Light traffic (100 feet)	50	Private business office	
Large transformer (200 feet)	—		
	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	10		Hearing threshold

Source: Peterson and Gross, 1974.

3.9.1.2 Noise Standards

173-60 WAC provides the applicable noise standards for Washington State, including Kittitas County. Kittitas County has not promulgated independent state-approved noise standards pursuant to WAC 173-60-110. WAC 173-60 establishes maximum permissible environmental noise levels. These levels are based on the environmental designation for noise abatement (EDNA) that is defined as "an area or zone (environment) within which maximum permissible noise levels are established. " There are three EDNA designations (WAC 173-60-030), which roughly correspond to residential, commercial/recreational, and industrial/agricultural uses:

1. Class A: Lands where people reside and sleep (such as residential)
2. Class B: Lands requiring protection against noise interference with speech (such as commercial/recreational); and
3. Class C: Lands where economic activities are of such a nature that higher noise levels are anticipated (such as industrial/agricultural).

As used in this section, "noise-sensitive areas" are equivalent to Class A EDNA areas. Table 3.9.1-3 summarizes the maximum permissible levels applicable to noise received at noise sensitive areas (Class A EDNA) and at industrial/agricultural areas (Class C EDNA) from an industrial facility (Class C EDNA).

Table 3.9.1-3: State of Washington Noise Regulations (173-60-040 WAC)

	Maximum Permissible Noise Levels (dBA) from a Class C EDNA		
	Class A EDNA Receiver		**Class C EDNA Receiver [1]**
Statistical Descriptor	**Daytime (7 a.m. – 10 p.m.)**	**Nighttime (10 p.m. – 7 a.m.)**	**Anytime**
L_{eq}	60	50	70
L_{25}	65	55	75
$L_{16.7}$	70	60	80
$L_{2.5}$	75	65	85

Note: 1. Standard applies at the property line of the receiving property Source: WAC 173-60.

The following are exempted from the limits presented in Table 3.9.1-3 (per 173-60-050 WAC):

- Construction noise (including blasting) between the hours of 7 a.m. and 10 p.m.
- Motor vehicles when regulated by 173-62 WAC ("Motor Vehicle Noise Performance Standards" for vehicles operated on public highways)
- Motor vehicles operated off public highways, except when such noise affects residential receivers
- Noise from electrical substations is exempted from the nighttime limits (173-60-050(2)(a) WAC).

Note that 173-60-50(6) WAC states, "Nothing in these exemptions is intended to preclude the Department from requiring installation of the best available noise abatement technology consistent with economic feasibility."

173-62 WAC, "Motor Vehicle Noise Performance Standards," regulates noise generated by vehicles traveling on public roads.

3.9.1.3 Affected Environment

As with most wind projects, this Project is located in a rural area with a low population density. Most of the Project site is located on privately-owned land. Some parcels are owned by WDNR and WDFW, as indicated in Exhibit 1-B, 'Project Site Layout'. The proposed PSE interconnect substation also lies on privately-owned land. The Applicant has obtained an option to purchase the private land within the Project site boundary from the landowner and has executed a lease with WDNR for wind power on the Project site.

The closest distance between a residence and a wind turbine is nearly two miles, as shown on Exhibit 15b, 'Noise Impact Model'. Background noise level measurements are not warranted given the large distance between the Project and closest residential receivers. Noise levels at that distance are anticipated to be inaudible or at most similar in level to a soft whisper. For those reasons, Project noise estimates and impact analysis have been based on manufacturers' noise emission data and internationally recognized noise modeling standards.

3.9.2 Impacts of the Proposed Action

3.9.2.1 Construction

Noise generated by construction of the Project is expected to vary, depending on the construction phase (see Section 2.2.6, 'Project Construction Schedule and Workforce'). Table 3.9.2-1 lists the typical noise levels associated with common construction equipment at various distances.

All noise generating construction activities will be conducted between the hours of 7 a.m. and 10 p.m. and are therefore exempt from the limits presented in Table 3.9.1-3 (per 173-60-050 WAC). Blasting is anticipated for the foundations and potentially some road areas. Blasting will be conducted only between the hours of 7 a.m. and 10 p.m. and is anticipated to occur over a period of eight weeks. Blasting activities are specifically exempted from the noise regulations (per WAC 173-60-050 (1)(c)).

Table 3.9.2-1: Noise Levels from Common Construction Equipment at Various Distances (dBA)

Construction Equipment	Typical Sound Pressure Level at 50 feet	Expected Sound Pressure Level at		
		1,000 feet	2,500 feet	5,000 feet
Bulldozer (250 to 700 horsepower)	88	62	54	48
Front-end loader (6 to 15 cubic yards)	88	62	54	48
Truck (200 to 400 horsepower)	86	60	52	46
Grader (13- to 16-foot blade)	85	59	51	45
Shovel (2 to 5 cubic yards)	84	58	50	44
Portable generators (50 to 200 kilowatts)	84	58	50	44
Mobile crane (11 to 20 tons)	83	57	49	43
Concrete pumps (30 to 150 cubic yards)	81	55	47	41
Tractor (3/4 to 2 cubic yards)	80	54	46	40

Note: Estimated levels include attenuation due to distance only (geometric spreading). Atmospheric effects (molecular absorption and excess attenuation) for standard day conditions (59°F, 70% relative humidity) would reduce levels by an additional 3, 7 and 11 dBA at 1000, 2500 and 5000 feet respectively.
Source: Barnes et al., 1977.

3.9.2.2 Operation

Overall, wind turbines are typically quiet, especially when compared to their combustion-based alternatives. The noise generated by wind turbines is likely to be most noticeable when wind speeds are low (8-12 mph) at receptors. Wind turbine noise tends to be masked by other background sources (i.e., the sound generated by the wind) at higher wind speeds.

The procedures for determining sound power levels from wind turbines are defined in International Electrotechnical Commission (IEC) 61400 Wind Turbine Generator Systems Part 11: Acoustic Noise Measurement Techniques (Reference Number: IEC 61400-11:1998(E)). The measurement technique outlines procedures to determine corrections for background noise, apparent sound power level, and wind speed dependence.

Although the exact turbine model to be used for the Project has not been determined yet, conservative values for the type of equipment being considered for this Project have been used for the noise analysis. The turbines are expected to be warranted by the manufacturer not to exceed a maximum sound power level 110 dBA with a wind speed of 18 mph (8 meters per second) at 33-feet (10 meters) in accordance with the protocol established in IEC 61400. This is approximately equivalent to a sound pressure level of 78 dBA at 50 feet from the turbine. Measurements conducted by others at existing wind power projects substantiate that the guaranteed sound power levels are realized under field conditions. More typical guaranteed sound power levels for modern wind turbines are 6 dBA lower (104 dBA) than those used in the model. Measurement data suggests that actual noise levels are several dBA lower than guaranteed values.

Audible noise from the high voltage transmission feeder line(s) will comply with the level specified in 173-60-040 WAC (see Table 3.9.1-3).

Substation transformers and high voltage switching equipment shall be specified or designed to comply with the level specified in 173-60-040 WAC (see Table 3.9.1-3) namely the 70 dBA limit at all Class C EDNA (industrial/agricultural) property lines and 60 dBA at all residences (Class A EDNA).

3.9.2.3 Comparison of Impacts of Proposed Scenarios

Construction noise levels and durations will be the same, regardless of the type of turbine used for the Project. All of the noise analysis and study work was performed for turbine source noise level of 110dBA, which is higher than the guaranteed noise level of all turbine scenarios under consideration and evaluation for the Project. State of Washington Noise Regulations will be observed in all cases.

3.9.2.4 Modeling Results and Regulatory Compliance

The Applicant is committed to designing and operating the Project in a manner that complies with all applicable noise standards.

A three-dimensional noise model was developed using CADNA/A, a sophisticated program developed by DataKustik, GmbH, Munich, Germany. The algorithms in CADNA/A are based on the International Standard ISO –9613-2 "Attenuation of Sound During Propagation Outdoors". Octave band sound power levels (determined in accordance with IEC 61400) for the wind turbines and topographic information from the USGS were input into the model.

The wind turbine noise emissions are required by 173-60 WAC not to exceed 70 dBA at all Class C EDNA (industrial/agricultural) property boundaries. The Project will comply with this requirement at all adjacent property boundaries.

Residential daytime levels are required by 173-60 WAC not to exceed 60 dBA while nighttime levels are not to exceed 50 dBA. As shown in Exhibit 15-B, 'Noise Impact Zones', the Project will comply with the more restrictive nighttime limit of 50 dBA at all existing residential structures.

The Applicant and Applicant's consulting team are unaware of any wind turbine Project where ground borne vibration from an operating wind turbine has adversely impacted a residential or other use. The closest residence is over two miles away and no operational vibration impacts are anticipated.

3.9.2.5 Decommissioning

Decommissioning activities would result in less noise than those for construction, as little or no blasting would be necessary and heavy equipment would be used for a shorter period. Noise generating decommissioning activities would be conducted between 7 a.m. and 10 p.m.

3.9.3 Impacts of the 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 Kittitas County's zoning code, the Commercial Agriculture zone is dominated by farming, ranching, and rural lifestyles, and permitted uses include residential, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.9.4 Mitigation Measures

There would be no significant construction or operation noise impacts; therefore, no mitigation would be planned.

3.9.5- Significant Unavoidable Adverse Impacts

There are no significant unavoidable construction or operation impacts with regard to noise.

3.10 LAND USE

3.10.1 Existing Conditions

3.10.1.1 Land Use

Section 463-42-362 of the *Washington Administrative Code* (WAC) does not specify the land use survey distances for wind power projects; however, for electric transmission routes, one mile on either side of the center line is specified. One mile is also appropriate distances for wind generation projects, given that they, like transmission lines, are above ground and extend over substantial area. Therefore, the study area for this land use analysis is the acreage located within one mile on either side of the wind turbine strings and/or transmission feeder lines.

The Project will be located in central Washington's Kittitas Valley, on high open ridge tops between the towns of Kittitas and Vantage. The general study area is characterized by a hilly rural landscape of dry, rocky grasslands with some areas covered with a mixture of sagebrush, bitterbrush, and bunch grasses. The overall population density in the area is very low. There are no dwellings at the Project site. A seasonal use dwelling is located approximately one and a half miles north of the Project and an established residence (Campbell) is located approximately one and a half miles south of the Project. Land use in the entire study area consists of open space and livestock grazing and publicly-owned land (WDNR and WDFW.) Forest cover exists to the north of the Project, but there are no commercial forestry operations taking place in the immediate vicinity of the Project. There are no Conservation Resource Program (CRP) lands or prime soils in the study area. Seasonal hunting is allowed on some parcels with landowner permission.

Additional land uses in the general area, beyond the 1-mile study area, are indicated in Exhibit 16, 'Land Use Map', and include:

- A County-operated landfill approximately 2 miles south of the Project (across from the Project's access road entrance on the south side of Vantage Highway);
- A silage pit 2 to 3 miles southwest of the Project, south of Vantage Highway and west of the County landfill;
- A BPA electric transmission line running northwest to southeast, located 5 miles east of the Project;
- A Puget Sound Energy (PSE) electric transmission line running approximately east to west, 3.5 miles south of the Project;
- The Iron Horse State Recreation Trail, which follows the same path as the PSE transmission line noted above;
- Microwave communication towers in T 18 N, R 21 E, Section 34;
- Kittitas radio and microwave facility located approximately 2 miles south of the Project at the County landfill;

- One county road, Vantage Highway, running east to west, 2 miles south of the Project;
- One primary private road, a graveled, two lane road entering the Project site from the south and continuing almost to the top of Whiskey Dick Mountain;
- Lands owned by the Washington Department of Natural Resources, as indicated in Exhibit 16, 'Land Use Map'.
- Wildlife areas owned by WDFW, as indicated in Exhibit 16, 'Land Use Map'. The Quilomene unit and Whiskey Dick unit of the L.T. Murray Wildlife Area are located east of the Project, with Quilomene to the north and Whiskey Dick to the south. The Colockum Wildlife Area is north of the Quilomene. Both the Quilomene and Whiskey Dick areas are within one mile of the Project.

3.10.1.2 Zoning

Most of the property on which the wind turbines will be located is zoned Forest and Range, while the southeast corner of the Project area is zoned Commercial Agriculture. The areas west of the Project are also zoned Forest and Range, and further west, lands are zoned Agriculture-20. A proposed 230/287-kV feeder line that will connect the Project with an existing BPA transmission line will cross the Forest and Range zone to the west. Forest and Range land continues to the south of the Project site, as well as Agriculture 20 land further south and to the southwest. These zones will be crossed with a 230-kV feeder line, connecting the Project to the PSE transmission line. Lands located to the east and southeast of the Project site are primarily zoned Commercial Agriculture. Forest and Range lands continue to the north of the Project site, and further north, land is zoned Commercial Agriculture. See Exhibit 17, 'Zoning Designations', which indicates where these County zoning designations fall within the Project area. The County does not anticipate zoning changes in the Project area.

According to the County's zoning code, the intent of the Forest and Range zone is to provide areas of Kittitas County where natural resource management is the highest priority and where the subdivision and development of lands for uses and activities incompatible with resource management are discouraged.

The Commercial Agriculture zone covers areas where farming and ranching are the priority. The intent of this zoning classification is to preserve fertile farmland from encroachment by nonagricultural land uses and protect the rights and traditions of those engaged in agriculture.

<u>3.10.2 Impacts of the Proposed Action</u>

3.10.2.1 Land Use

The primary land use in the area, livestock grazing, can continue around Project facilities and transmission feeder lines. Land use impacts associated with construction and operation of the Project and associated transmission feeder lines will be negligible because they will not impair or impact current land uses, change land use patterns, or be incompatible with existing uses or zoning ordinances.

3.10.2.2 Consistency with Comprehensive Plan

Land use in Kittitas County is guided by the Kittitas County Comprehensive Plan (Kittitas County, 2003) that implements the planning requirements and goals of the 1990 Washington State Growth Management Act. The Comprehensive Plan is implemented through the adoption of ordinances and codes designed to achieve the objectives and policies outlined in the Plan. It does not contain policies specifically related to wind power projects.

The Plan was reviewed for this land use analysis to assess the Project's consistency with County policies. Only the policies listed below were determined to be potentially relevant to the proposed Project. The policy number is provided, followed by the policy itself in quotation marks. The analysis of the Project's consistency is indented below the policy statement.

Chapter 2 - Land Use

> ***"GPO 2.114B.*** *Economically productive farming should be promoted and protected. Commercial agricultural lands includes those lands that have the high probability of an adequate and dependable water supply, are economically productive, and meet the definition of "Prime Farmland" as defined under 7CFR Chapter VI Part 657.5…."*

The proposed Project will be developed on non-irrigated land, mostly used for grazing. This land does not meet the definition of Prime Farmland. Removal of minor amounts of rangeland will not affect the productivity of grazing operations. Therefore, the Project will be consistent with this land use policy.

> ***"GPO 2.118.*** *Encourage development projects whose outcome will be the significant conservation of farmlands."*

The permanent footprint of the Project will remove approximately 165 acres from open space and grazing uses for the life of the Project (at least 20 years). The remaining 8,400 acres within the Project boundary will remain undeveloped, and may or may not allow grazing as discussed in Section 3.5, 'Agricultural Crops and Livestock'. At a maximum, the removal of approximately 8,600 acres of land from the approximately 445,000 acres of pasture or unimproved grazing land in Kittitas County (Kittitas County Comprehensive Plan, 2003) would represent a reduction of 1.9%.

However, the Project area does not comprise farmlands, and the Project will promote significant conservation through a variety of avenues by:

1. Removing the non-permanent portion of the Project footprint (approx. 8,400 acres) from future intensive development,

2. Protecting mitigation parcels within the Project area,
3. Providing recurring lease payments to WDNR, and possibly to WDFW, that will enable those agencies to operate with a stable source of funding that can be applied to conservation activities, if desired.

Table 3.10.2.2-1, 'Land Use Acreage Comparison' compares zoning acreage within Kittitas County and zoning acreage within the Project boundary for the zoning designations overlaying the Project.

Table 3.10.2.2-1: Land Use Acreage Comparison

Zone Designation	Acres in County	Acres in Project Boundary
Commercial Ag	357,728	1,300
Forest & Range	292,235	7,300
Other Designations	836,513	-
Total	1,486,476	8,600

Source: Kittitas County Comprehensive Plan, December 2003

For the above reasons, and because the Project does not comprise farmland, development of the Project will not conflict with the above policy.

Chapter 5 - Capital Facilities Plan

> ***"GPO 5.110A.*** *Capital facilities and utilities may be sited, constructed, and operated by outside public service providers (or sited, constructed, and/or operated jointly with a Master Planned Resort (MRP) or Fully Contained Community to the extent elsewhere permitted), on property located outside of an urban growth area or an urban growth node if such facilities and utilities are located within the boundaries of such resort or community which is approved pursuant to County Comprehensive Plan policies and development regulations."*

The Project is located outside any urban growth area or urban growth node, but the policy does not apply to the Project; the policy relates to utility facilities associated with MRPs or Fully Contained Communities, rather than to utility facilities for general public service.

> ***"GPO 5.110B.*** *Electric and natural gas transmission and distribution facilities may be sited within and through areas of Kittitas County both inside and outside of municipal boundaries, UGAs, UGNs, Master Planned Resorts, and Fully Contained Communities, including to and through rural areas of Kittitas County."*

The transmission feeder line(s) associated with Project would be considered electric transmission and/or distribution facilities, this Policy allows their placement in rural areas of the County.

<u>Chapter 6 - Utilities</u>

> ***"GPO 6.7.*** *Decisions made by Kittitas County regarding utility facilities will be made in a manner consistent with and complementary to regional demands and resources."*

The proposed Project will draw upon a County resource (wind) to provide energy to meet the regional power demands. Therefore, development of the Project will be consistent with, and complementary to, regional utility demands and local resources.

> ***"GPO 6.9.*** *Process permits and approvals for all utility facilities in a fair and timely manner, and in accordance with development regulations that ensure predictability and project concurrency."*

The proposed Project will be developed in accordance with all local and state wind power development regulations and will, therefore, be consistent with this policy.

> ***"GPO 6.10.*** *Community input should be solicited prior to county approval of utility facilities which may significantly impact the surrounding community."*

EFSEC, the County and the Applicant will solicit community input on the proposed wind farm prior to approval.

> ***"GPO 6.18.*** *Decisions made regarding utility facilities should be consistent with and complementary to regional demand and resources and should reinforce an interconnected regional distribution network."*

This policy is similar to GPO 6.7. The proposed Project will significantly reinforce an interconnected regional power transmission and distribution network by connecting to Puget Sound Energy's (PSE) and/or Bonneville Power Administration's (BPA) electric power grid. Therefore, the Project is consistent with this policy.

> ***"GPO 6.21.*** *Avoid, where possible, routing major electric transmission lines above 55 kV through urban areas."*

The high voltage transmission feeder line(s) associated with the Project that will connect to existing BPA and/or PSE high voltage transmission line(s) will not be located in or near any urban areas. The collector cables that connect each wind turbine and strings of turbines are below 55 kV (the collector lines operate at 34.5 kV) will be located underground. In addition, the Project will not be developed in an urban area; therefore, it is consistent with this policy.

> *"GPO 6.32. Electric and natural gas transmission and distribution facilities may be sited within and through areas of Kittitas County both inside and outside of municipal boundaries, UGAs, UGNs, Master Planned Resorts, and Fully Contained Communities, including to and through rural areas of Kittitas County."*

This policy is identical to Policy GPO 5.11B and has been addressed previously.

<u>*Chapter 8 - Rural Lands*</u>

> ***"GPO 8.7.*** *Private owners should not be expected to provide public benefits without just compensation. If the citizens desire open space, or habitat, or scenic vistas that would require a sacrifice by the landowner or homeowner, all citizens should be prepared to shoulder their share in the sacrifice."*

The proposed Project and associated transmission feeder lines will be constructed on privately-owned and publicly-owned (WDNR and WDFW) land through lease agreements and purchases with willing landowners. This comprehensive plan policy suggests that landowners should be compensated when providing public benefits.

> ***"GPO 8.24.*** *Resource activities performed in accordance with county, state and federal laws should not be subject to legal actions as public nuisances."*

The proposed Project, to the extent it is a "resource activity" and uses the area's wind resource, will be constructed and operated in accordance with all county, state, and federal laws, and thus is consistent with this policy.

> **"*GPO 8.42.*** *The development of resource based industries and processing should be encouraged."*

Wind energy production is a type of resource-based industry in that it uses a natural renewable resource, the wind. The proposed Project can be considered to be consistent with this policy as it encourages such industries.

> ***"GPO 8.62.*** *Habitat and scenic areas are public benefits that must be provided and financed by the public at large, not at the expense of individual landowners and homeowners.*

This policy is similar to GPO 8.7 and implies that landowners should be compensated if denied the opportunity to develop wind generation on their properties.

3.10.2.3 Consistency with Zoning

On December 3, 2002, the Kittitas County BOCC changed the zoning ordinance pertaining to wind farm development, to shift responsibility for reviewing and permitting wind farms from the Board of Adjustment to the BOCC (Kittitas County Code Chapter 17.61 A , included as Exhibit 3A). Wind farms are a permitted use in a Wind Farm Resource Overlay Zoning District. A wind farm may be authorized by the BOCC through approval of a Wind Farm Resource Development Permit, in conjunction with approval of a development agreement, rezone to Wind Farm Resource Overlay Zoning

District and a site-specific comprehensive plan amendment. Exhibit 3 contains copies of Kittitas County land use plans and zoning ordinances pertinent to the Project area.

The development agreement may be conditioned upon development standards such as densities, number, size, setbacks, location of turbines, mitigation measures, and other appropriate development conditions to protect the surrounding area. The BOCC may approve the requested land use changes only if the BOCC determines that: 1) the proposal is essential or desirable to the public convenience; 2) the proposal is not detrimental or injurious to the public health, peace, safety, or to the character of the surrounding neighborhood; and 3) the proposed use at the proposed location(s) will not be unreasonably detrimental to the economic welfare of the County nor will it create excessive public cost for facilities and service.

The Applicant intends to file an application with Kittitas County for permission under - or a change to - the County's zoning ordinance, along with the other land use applications, if necessary, that would resolve land use noncompliance related to the Project site. Applicant intends to make such application within a reasonable period after filing this Application for site certification with EFSEC.

The Project will be considered desirable to public convenience because it will use a renewable resource to provide clean, safe, quiet, non-polluting energy to help the region meet its energy needs. It will be located on private and publicly owned property, and no public access to the wind turbines will be allowed. It will not be detrimental or injurious to the public health, peace, or safety.

Alterations to the surrounding area will consist of visual changes, resulting from the addition of wind turbines and transmission feeder line(s) to the local landscape. However, the inherent rural character of the surrounding area will not significantly change. Potential visual impacts of the Project are discussed in Section 3.11, 'Visual Resources/Light and Glare'.

Development of the Project will generate additional local tax revenues and provide substantial economic benefits to Kittitas County during both construction and operation. Local products and services will be purchased during the construction phase, and hundreds of construction jobs will be created. In addition, lease payments will be made to landowners throughout the life of the Project. The portions of the easements and Project located on DNR property will generate lease revenues that will be applied to local public schools through the state's Common School Fund. The Project will not increase the need for public services such as schools, roads, police and fire service, or water and sewer service because no facilities will be developed that require these services (see Section 3.13, 'Public Services and Utilities/Recreation').

Operation of the Project will not require the use of hazardous materials; therefore, there are no safety risks associated with hazardous materials. In some cases, existing private roads will be widened to accommodate construction vehicles. The Project will be constructed and operated in accordance with the latest industry standards and available technology.

Wind farms are generally considered compatible with agricultural and grazing uses. Land use impacts associated with construction and operation of the Project and associated transmission feeder lines will be negligible because they will not impair or impact current land uses, change land use patterns, or be incompatible with existing uses or zoning ordinances.

3.10.2.4 Comparison of Impacts of the Proposed Scenarios

None of proposed scenarios would impair or impact current land uses, change land use patterns, or be incompatible with existing uses or zoning ordinances.

3.10.3 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or “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.) See Section 2.3, ‘Alternatives’.

3.10.4 Mitigation Measures

The Project has been designed to minimize impacts to local land uses. No mitigation is required as there will be no significant impacts to land use.

3.10.5 Significant Unavoidable Adverse Impact

No significant unavoidable adverse impacts to local land uses are expected to result from the construction and/or operation of the Project and/or associated transmission feeder lines.

3.11 VISUAL RESOURCES/LIGHT AND GLARE

3.11.1 Introduction

3.11.1.1 Purpose and Scope

Visual or aesthetic resources are generally defined as the natural and built features of the landscape that can be seen. The combination of landform, water, and vegetation patterns represent the natural landscape features that define an area's visual character while built features such as buildings, roads and other structures reflect human or cultural modifications to the landscape. These natural and built landscape features or visual resources contribute to the public's experience and appreciation of the environment. Visual resource or aesthetic impacts are generally defined in terms of a project's physical characteristics and potential visibility and the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located.

In response to EFSEC's requirements for assessment of a proposed project's aesthetic and light and glare impacts, this chapter documents the visual conditions that now exist in the area in which the Wild Horse Wind Power Project (Project) is located and evaluates the implications that the Project would have for the public's experience of the area's aesthetic qualities, and day and night light conditions.

3.11.1.2 Overview of Wind Energy Aesthetics Issues

Wind energy has a long history in that it has been used for centuries for grinding grain and pumping water. As a consequence in many places, including ranches in the American west, windmills have been a long-established and well-accepted part of the landscape. In the United States, large-scale use of wind power to generate electricity first took place in California in the 1980's with establishment of wind farms such as those in the Altamont, Tehachapi, and San Gorgonio Passes involving large numbers (thousands) of small turbines that were closely spaced. Many of these early turbines were supported on lattice steel towers that were similar in appearance to the towers frequently used for transmission lines. These wind farms were located on highly visible sites, in many cases, within close range view of major freeway corridors, and generated considerable discussion about their appearance. Reaction to the wind farms was split. In the view of some, the turbines were visually dominant technological structures that adversely affected the natural or rural character of the landscapes in which they were located. In the view of others, though, the wind turbines were visually interesting technological objects, and the strings of turbines along the ridgelines were seen as delineating and emphasizing the topography's variations. In addition, the movement of the turbines in the wind was seen as introducing an unusual kinesthetic dimension to the visual experience. To some extent, the turbines became a point of visual interest, and were featured in films and advertisements, and were depicted on post cards sold in the regions around the facilities. Although many appreciated the early California wind farms as positive visual features, they created a number of specific aesthetic problems. These problems included creation of dense, disorderly, cluttered-appearing arrays of turbines on hillsides; use of rickety appearing lattice steel towers with awkward designs; use of a variety of highly divergent turbine designs of varying heights in a single installation, creating a sense of visual disunity; the presence of non-operating turbines; visual impacts related to poorly engineered road cuts; and visible erosion of hillsides related to improper drainage of access roads. This experience in California provided valuable lessons that have been drawn on in planning and designing subsequent wind energy installations in a way that avoids the aesthetic issues associated with these early projects.

Perception research validates that even though these early California wind farms created specific aesthetic problems, the public perceptions of them, although mixed, were generally favorable. For example, research on public perceptions of the Altamont Wind Energy Area by Thayer and Freeman (1987) found that those surveyed perceived the wind farms in the Altamont Pass area to be highly visible, constructed environments, but that more respondents tended to like wind energy developments than dislike them. However, when asked to rate photos of the wind installations on a scale from beautiful to ugly, respondents rated the views as neutral to slightly ugly. Thayer and Freeman discovered that reactions to the Altamont wind energy installations were complex, and factors other than beauty played a major role in determining them. The symbolic or connotative aspects of the wind energy facilities were found to be particularly important in influencing reactions. Those who indicated strongly positive attitudes toward the wind energy facilities were likely to find them to be appropriate, efficient, safe, natural (in the production of energy) progressive, and a sign of the future. Those who indicated strongly negative attitudes tended to cite the visual conspicuousness, clutter, and unattractiveness of the facilities. This finding led Thayer and Freeman to conclude that the two groups focused on different aspects of the facilities "…with the 'like' group responding strongly to the symbolic, referential attributes not automatically associated with the visual stimuli. This group was willing to forgive the visual intrusion of the turbines on the existing landscape for the presumably higher goals of the project where dislikers were not." (Thayer and Freeman 1987, p. 394)

One of Thayer and Freeman's key findings related to the importance of symbolic aspects in influencing evaluations of wind energy developments is that viewers have negative responses when they see turbines that are not operating. They discovered that viewers expect the turbines to turn when the wind is blowing, and when these expectations are not met, they have negative reactions. Based on their research, Thayer and Freeman reached a number of conclusions related to design measures that could improve the public's perceptions of wind farm attractiveness. Design measures supported by their research include (Thayer and Freeman 1987, pp. 395-396):

- Use of neutral colors for turbines;
- Evenly spaced arrays;
- Consistency in turbine type and size within arrays;
- Use of fewer, larger turbines versus use of more smaller ones;
- Minimization of conspicuously malfunctioning turbines

The proposed Wild Horse Wind Power Project builds on and applies the lessons learned from the California experience. Development of the Project's proposed layout and operational plans were informed by the design principles identified by Thayer and Freeman, and other observers of recent wind energy experience in California and in Europe as well, where the level of concern with landscape values is particularly high. In addition, the Project will make use of the latest generation of turbines, which are larger, more widely spaced and rotate at lower RPM (revolutions per minute) than those used in earlier projects. The equipment being used reflects design refinements made by industrial designers intended to make the turbine towers, nacelles, and rotors, sleek and attractive elements in the landscape.

3.11.1.3 Methodology

This analysis of the visual effects of changes that might occur with implementation of the proposed wind energy facility is based on field observations and review of the following information: research about wind energy facility visual effects, public perceptions of wind energy facilities, and design measures for integrating wind energy facilities into their landscape settings; local planning documents; Project maps, drawings, and technical data; computer-generated maps of the areas from which the Project facilities are potentially visible; aerial and ground level photographs of the Project area; and computer-generated visual simulations. Site reconnaissance was conducted from March 2003 through June 2003 to observe the Project area, to take representative photographs of existing visual conditions and to identify key public views appropriate for simulation.

The visual study employs assessment methods based, in part, on the U.S. Department of the Transportation Federal Highway Administration (FHWA) (US DOT 1988) and other accepted visual analysis techniques as summarized by Smarden et al. (1988). The study is also designed to respond to the provisions of the Washington Administrative Code (WAC 463-42-362 Built Environment – Land and Shoreline Use) that specify the analysis of aesthetic and light and glare issues as part of the EFSEC process. Included are systematic documentation of the visual setting, an evaluation of visual changes associated with the Project and measures designed to mitigate the Project's visual effects, including lessening of any light and glare impacts and restoration or enhancement of any portions of the landscape that may have been disturbed during construction.

3.11.2 Existing Conditions

3.11.2.1 Regional and Local Landscape Settings

The lands on which the Wild Horse Wind Power Project is sited extend across a roughly 4 mile by 5 mile area located in the upland areas on and to the immediate north of Whiskey Dick Mountain, a 3,873 foot high ridge located approximately 14 miles to the east of the City of Ellensburg, and 9 miles east of the town of Kittitas. Whiskey Dick Mountain is a small part of a large region of ridgelands that frames the eastern edge of the Kittitas Valley, and separates it from the Columbia River to the east.

The Project area has an open, windswept appearance. Most of the ridgetops on which the Project facilities would be located consist of dry, rocky grasslands used for grazing, and areas covered with a mixture of sagebrush bitterbrush, and bunchgrasses. In scattered locations in draws and adjacent to springs, there are small clusters of ponderosa pines.

Most of the Project site is a portion of a much larger (~25,000 acres) private ranch property, and it also includes four sections of land that belong to the Washington Department of Natural Resources and one section that belongs to the Washington Department of Fish and Wildlfe. The property is not crossed or bordered by any public roads. The closest public roadways are Vantage Highway, which lies a minimum of 1.3 miles south of the Project area's southern boundary, and Parke Creek Road, which lies a minimum of 4.0 miles from the Project area's western perimeter. The only access into the Project area is by way private gravel roads, and over which the public does not have the right to pass. On the Project site and on the larger ranch parcel of which it is a part, there are no residential or agricultural structures. The only structures on the site consist of the collection of antennae at the communication facility on Cribb Peak, a 3,558 foot elevation peak in the eastern portion of the ridge formed by Whiskey Dick Mountain, and several meteorological test towers at locations scattered across the Project site. The safety lighting on these structures is also the only lighting in the area.

Large portions of the eastern slopes of the ridge area of which Whiskey Dick Mountain is a part are wildlife lands administered by the Washington Department of Fish and Wildlife as the Whiskey Dick and Quilomene units of the L. T. Murray Wildlife Area. These wildlife lands generally consist of steep, rocky slopes and narrow, riparian bottoms vegetated with sagebrush and bitterbrush, mixed with various bunchgrasses. The purpose of these wildlife lands is to provide habitat for the Colockum elk herd, as well as for mule deer and other wildlife. There are no developed uses on these lands, and the only access is by a system of rough, unpaved roads.

Gingko Petrified Forest State Park is a 7,470 acre state park that lies to the immediate east of the Whiskey Dick unit of the L.T. Murray Wildlife area, and encompasses lands located on both the northern and southern sides of I-90. The park was established in the 1930's to protect the large area of both exposed and buried petrified wood located within its boundaries. Most of the land in the park is undeveloped, and managed either as grazing land or as undisturbed shrub-steppe landscape. Developed park facilities are concentrated at the Wanapum Recreation Area, which lies along the Wanapum Reservoir on the Columbia River in the area south of I-90, where there are a boat ramp, picnic, and swim area, and 50 camp sites; at the Heritage Area just north of Vantage, where there is an interpretive center and picnic area; and at the Natural Area located along the north side of the Vantage Highway, two miles west of Vantage, where there is a 2.5 mile trail system that includes a 1.5 mile interpretive trail. In 1997, the park attracted over half a million visitors.

Under the Kittitas County Comprehensive Plan (Kittitas County 2001) and Zoning Ordinance, the lands on the Project site have been zoned as Forest and Range and as

Commercial Agriculture. The Comprehensive Plan does not acknowledge any special scenic or visual resource values in the Project area, and does not include any policies that are specifically oriented to protection of Project area scenic qualities. Inquiries with the Washington Department of Natural Resources (Beach 2003) and the Washington Department of Fish and Wildlife (Clausing 2003) revealed that these two agencies do not have adopted plans for their lands in and around the project site that identify scenic resources on these lands or that include policies to protect these lands' scenic qualities.

3.11.2.2 Project Site Visibility

Exhibit 18-C, 'Potential Project Visual Impact', provides a generalized indication of the areas from which the proposed wind turbines will be potentially visible. This visibility analysis was prepared using the "Zones of Visual Influence" (ZVI) feature of the WindPro software system, a sophisticated program developed to assist in the planning, design, and environmental assessment of wind energy projects (EMD 2002). To identify the areas from which the turbines are potentially visible, the ZVI module makes use of a digital height model generated from digital height contour lines. The module calculates lines of sight between each point on the land surface and the tops of each of the proposed turbines, and notes whether there is an unobstructed view toward the turbine. When the analysis is complete, the module produces maps showing the areas from which the turbines will be potentially visible, and can create the maps in a way that indicates the numbers of turbines that are potentially visible from each point in the surrounding landscape on a clear day.

The visibility data presented in Exhibit 18-C represents the potential visibility of the turbine towers, which will extend up to 262 feet above the surface of the ground, and the rotor blades, which will extend up to 410 feet above the ground surface. Both figures were prepared using the 20 foot contour lines from the USGS topographic maps available for the region. Both figures represent "worst case" assessments of potential Project visibility because they do not take into account the effect that other structures or trees close to viewers might have on obstructing views toward the turbines and thus overstate the potential visibility of the turbines to some degree. The overstatement of the potential visibility is particularly pronounced in areas to the north of the Project site, where the presence of forest cover will, in places, provide substantial screening of views.

Exhibit 18-C encompasses all of the Project area's foreground and middleground viewing areas (the areas up to 5 miles) and portions of the background viewing area extending out to up to 12 miles. These viewing areas derive from the landscape visual analysis systems developed by the US Forest Service and other agencies, which divide the landscape up into distance zones that are related to the degree to which landscape details are detectable to the viewer. The foreground distance zone is defined as the area within ¼ to ½ mile from the viewer, where the maximum discernment of detail is possible. The middleground is defined as the area from ¼ to 3 to 5 miles from the viewer, where there is visual simplification of vegetative surfaces into textures, overall shapes and patterns, and there is linkage between foreground and background parts of the landscape. The background is defined as the landscape zone 3 to 5 miles and further from the viewer in

which little color or texture is apparent, colors blur into values of blue or gray, and individual visual impacts become least apparent (USDA Forest Service 1973, pp. 56-57). The graphic display on this map provides an indication of the relative numbers of turbines that can be seen from each location in the surrounding landscape. Exhibit 18-C also encompasses the alignments of the transmission feeder lines that would connect the Project to BPA and/or PSE transmission corridors. The figure is annotated with numbers and arrows that indicate the locations from which the photos taken as the simulation views, presented as Exhibit 18-B, 'Visual Simulation Photos', Views 1-6, were taken.

Review of Exhibit 18-C suggests that four or more turbines will be visible to one degree or another from most of the valley and foothill areas to the west of the project, from many of the ridgetops in portions of the hill region lying between the Kittitas Valley and the Columbia River, and from lands lying the to the east of the Columbia. As this map indicates, for the most part, the turbines will not be visible from the area in the Columbia River gorge or from the portions of the Ginkgo Petrified Forest State Park in which there are developed facilities. Based on field work conducted in the area, it is fair to say that the seen area analysis presented on Exhibit 18-C substantially overstates the Project's potential visibility in that there are many areas, particularly in the City of Kittitas and other developed areas where structures and trees in the foreground of the view create substantial or complete blockage of views toward the distant ridge area where the Project will be located. An additional factor to be kept in mind in reviewing this figure is the effect of distance. In areas beyond about five miles from the Project site, even though turbines may be visible, they will be relatively small elements in the overall view, will tend to fade into the backdrop, particularly at times when the atmosphere is less than completely clear, and will have a limited effect on the overall character and visual quality of the landscape seen from those areas.

Review of Exhibit 18-C indicates that the greatest numbers of turbines will be visible from the Project site itself, and from the tops of ridges in the area to the north (although as noted earlier, the actual visibility of the Project from the area to the north is likely to be less than suggested by this figure because of the screening provided by the intermittent forest cover in this area). In the valley areas to the west of the Project and in the hilly lands to the south, many of the Project's turbines will not be visible because they are located in areas that are screened by the ridgeline of Whiskey Dick Mountain.

3.11.2.3 Viewing Areas

To structure the analysis of the Project's effects on visual resources, the Project area was divided up into a number of viewing areas – areas which offer similar kinds of views toward the Project site and/or within which there would likely be similar concerns about landscape issues. The existing visual conditions of views from these areas toward the Project site are described below and are presented in Exhibit 18-B, 'Visual Simulation Photos'. Within each of these viewing areas, a Simulation Viewpoint (SV) was selected as a location for taking a photo that could be used for the development of a simulated view of the Project that could form the basis for visualizing the Project's potential visual effects on that viewing area. Thus, the simulation viewpoints were established to capture views that are typical of the conditions that exist in each of the viewing areas, and the emphasis was placed on views from publicly accessible locations that would be likely to be seen by the largest numbers of people. Simulated photos and existing photos are presented in Exhibit 18-B, 'Visual Simulation Photos'.

3.11.2.4 Assessment of Scenic Qualities

To assess the scenic quality of the landscapes potentially affected by the proposed Project scenarios, the analyses of the views toward the Project site from each of the viewing areas includes an overall rating of the level of scenic quality prevailing in the views. These ratings were developed based on field observations made from March through June, 2003, review of photos of the affected area, review of methods for assessment of visual quality, and review of research on public perceptions of the environment and scenic beauty ratings of landscape scenes. The final assessment of scenic quality was made based on professional judgment that took a broad spectrum of factors into consideration, including:

- Natural features, including topography, water courses, rock outcrops, and natural vegetation;

- The positive and negative effects of man-made alterations and built structures on visual quality; and visual composition, including an assessment of the vividness, intactness, and unity of patterns in the landscape. Vividness is defined as the memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern. Intactness is defined as the integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment. Unity is defined as the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony of intercompatibility between landscape elements. (US DOT Federal Highway Administration 1988).

The final ratings assigned to each view fit within the rating scale summarized in Table 3.11.2-1. Development of this scale builds on a scale developed for use with an artificial intelligence system for evaluation of landscape visual quality (Buhyoff et al., 1994), and incorporates landscape assessment concepts applied by the U.S. Forest Service and the U.S. Department of Transportation.

Table 3.11.2-1 Landscape Scenic Quality Scale

Rating	Explanation
Outstanding Visual Quality	A rating reserved for landscapes with exceptionally high visual quality. These landscapes are significant nationally or regionally. They usually contain exceptional natural or cultural features that contribute to this rating. They are what we think of as "picture post card" landscapes. People are attracted to these landscapes to view them.
High Visual	Landscapes that have high quality scenic value. This may be due to

Table 3.11.2-1 Landscape Scenic Quality Scale

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

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

3.11.2.5 Assessment of Visual Sensitivity

The analysis of viewers, viewing conditions, and viewer sensitivity in each viewing area was structured to consider residential viewers, roadway viewers, and, to the extent to which they are present, recreational viewers. To summarize the insights developed through the analysis of viewer sensitivity, overall levels of visual sensitivity in each of the viewing areas were identified as being High, Moderate, or Low. In general, High levels of sensitivity were assigned in situations where turbines would be potentially visible within 0.5 mile or less from residential properties, heavily traveled roadways, or heavily used recreational facilities. Moderate levels of sensitivity were assigned to areas where turbines would be potentially visible within 0.5 to 5 miles within the primary view cone of residences and roadways. In distinguishing between moderate and low levels of sensitivity in the 0.5 to 5 mile zone, account was also taken of contextual factors, including the viewing conditions in the immediate foreground of the view. In areas lying 5 miles or more from the closest turbine, where a wind farm would be distant and relatively minor element in the overall landscape, a low level of sensitivity was assigned.

3.11.2.6 Existing Visual Conditions in the Landscape Viewing Areas

Landscape Area 1 Vantage Highway Corridor South of the Project Site

Landscape Description and Scenic Quality:
Landscape Area 1 encompasses the segment of the corridor along Vantage Highway in closest proximity to the Project site. As indicated in the review of the regional and local landscape setting in Section 3.11.2.1 above, there are no public roads that pass through or immediately adjacent to the Project site. The public road that is closest to the site is Vantage Highway, an east-west county road that extends from Ellensburg to the community of Vantage. This road was once a portion of Highway 10, a major east-west route across the state, but with the completion of I-90 several miles to the south, Vantage Highway now plays the role of a lightly traveled local road that provides access to the immediately surrounding area and serves as a back route between the Kittitas Valley and Vantage.

In the 15 mile wide region of hills that lies between the Kittitas Valley and the Columbia River at Vantage, the Vantage Highway's distance from the Project site ranges from 1.8 to 9 miles. The point at which Vantage Highway passes closest to the Project site is in Section 9 of Township 17 North, Range 21 East. It is at this point that a private, gated, unimproved road takes off from Vantage Highway, providing access into the site. This road will serve as the Project's main access road.

For motorists traveling eastward on Vantage Highway, as they enter the hill area to the east of Parke Creek Road, Whiskey Dick Mountain and the Project site are visible on the north side of the road. As motorists proceed further east along Vantage Highway, the lower slopes of the mountain close in on the road and screen views toward the Project site on its upper slopes. The view toward Whiskey Dick Mountain's ridgeline and the Project site opens up again as the road approaches Vantage Highway's high point in the area near the private road that provides access into the Project site. East of the private road providing access into the Project site, the Vantage Highway travels down Schnebly Coulee, and in this area, for eastbound travelers, views toward the Project site are completely screened by the steep slopes that define the north side of the coulee. For westbound motorists traveling up Schnebly Coulee, there are no views toward the Project site until reaching a point about 1.3 mile east of the Project site access road, where a break in the slopes defining the northern edge of the road corridor permits a brief view toward Whiskey Dick Mountain's ridgeline and the Project site. The view toward the mountain's ridge top and the Project site opens up more fully in the area along the highway that extends from a point about 0.4 mile east of the Project site access road to a point about 0.4 mile west of it. Westward of this point, the ridgetop and the Project site lie outside of the motorists' cone of vision.

Views from this Landscape Area are represented by Exhibit 18-B, view from Simulation Viewpoint 1, a point on Vantage Highway about 0.4 mile east of the private road that provides access into the Project site. This viewpoint lies a little over 1.5 miles south of the southern boundary of the Project site. This wide angle view toward the northwest extends from the cone-shaped 3,718-foot elevation peak known as Chinaman Hat at the left side of the photo to the peak with the communication towers on it known as Cribb Peak on the photo's right side. As review of Exhibit 18-B suggests, the landscape in this area consists of open sage brush and grazing lands, with little apparent development except for roads and utility lines. In much of the area along Vantage Highway, the level of visual quality is moderate, reflecting the fact that the landscape visible is relatively common in the region and has average scenic value. In views like the one seen in Exhibit 18-B, Figure 1, in which the ridgeline of Whiskey Dick Mountain provides a degree of topographic interest, the level of landscape visual quality is moderately high.

Viewers and Visual Sensitivity:
The traffic volume on Vantage Highway in this area is 400 vehicles per day, according to Kittitas County Department of Public Works. Because the relatively low traffic volumes and the fact that the highway at its very closest is 1.3 miles from the Project site, the overall level of view sensitivity in this area is moderate at most.

<u>Landscape Area 2- Valley Lands at Eastern Edge of Kittitas Valley</u>

Landscape Description and Scenic Quality:
Landscape Area 2 encompasses the flat, open, valley lands at the eastern edge of the Kittitas Valley and the area of gently rolling lands in the corridor along Parke Creek and Stevens Roads to the southwest of Whiskey Dick Mountain. From this area, the Project turbines on the ridgeline and south slopes of Whiskey Dick Mountain will be visible from 3 to 6 miles in the distance. In general, this is a landscape of large ranch parcels devoted to grazing and field crops. However, in the corridors along Vantage Highway, Parke Creek Road, and Stevens Road, there are areas that have been subdivided into smaller, rural residential-sized parcels. Although many of these parcels remain undeveloped, there are clusters of developed rural residential lots at the northwest corner of the intersection of Vantage Highway and Parke Creek Road, along Park Creek and Stevens Road south of Vantage Highway, and along Sunset Road.

Views from this Landscape Area are represented by Exhibit 18-B, Figure 2, the view from Simulation Viewpoint 2, a point on Vantage Highway at Parke Creek Road. This viewpoint, which is located approximately 4 miles west of the closest turbine location, is typical of views toward the Project site from Vantage Highway and is generally representative of views toward the site from residences in this area. As review of this figure suggests, the foreground of views in this area consists of a humanized landscape, with roads, utility lines, fences, buildings, tree plantations, and cultivated fields, while the slopes of Whiskey Dick Mountain seen in the background have a more natural appearing character. In general, the level of visual quality is moderately high, reflecting the moderately high level of vividness provided by the ridgeline of Whiskey Dick Mountain, and the moderate to moderately high levels of unity and intactness created by the generally orderly and attractive pattern of utility, agricultural and rural residential uses.

Visual Sensitivity:

In this area, the Project site is clearly visible within the cone of vision of eastbound travelers on Vantage Highway, and is also visible to some degree in the cone of vision of eastbound and northbound travelers on Stevens Road. The Average Daily Traffic on Vantage Highway in this area 688 vehicles, while traffic volumes on Stevens Road are assumed to be considerably less. Because most portions of these roadways in this area are located in the outer half of the 0.5 to 5 mile middleground distance zone, these roadway views have at most a moderate degree of sensitivity. In this area, there are on the order of 50 residences from which the Project site is potentially visible. From some of the residential properties, views toward the site may be screened to some degree by structures and trees located in the immediate foreground. Because, like the roadway segments from which the site is visible, these residences are located in the outer half of the 0.5 to 5 mile middleground distance zone, these residential views have a moderate degree of sensitivity.

Landscape Area 3 – Lands to the West, North and East of the Project Site

Landscape Description and Scenic Quality:
Landscape Area 3 encompasses the ridge and canyon lands around the western, northern, eastern, and southeastern fringes of the Project site. This is a region of high ridges dissected by narrow, steep sided canyons. For the most part, the vegetation consists of sagebrush and/or bitterbrush, mixed with bunchgrasses. At the higher elevations, particularly in the area to the north of the Project site, there are scattered groves of ponderosa pines, which in some places create continuous forest cover. Much of the land in the area lying between the Project site and the Columbia River is in state ownership. As indicated on Exhibit 18-A and 18-C, the Whiskey Dick unit of the Washington Department of Fish and Wildlife's L. T. Murray Wildlife Area, is located in the area north of Vantage Highway and to the east and southeast of the Project site and occupies over 28,500 acres. The Quilomene Unit of the L. T. Murray Wildlife Area is located to the north and northeast of the Project site and contains nearly 18,000 acres. To the north of the Quilomene unit lies the Colockum Wildlife Area, an 88,000-acre wildlife refuge that extends north into Chelan County. These wildlife refuges have been set up to provide habitat for the Colockum elk herd as well as for mule deer and other wildlife. A number of the sections to the north and east of the site and to the west to some extent as well, belong to the Washington Department of Natural Resources. Further to the east, portions of the 7,470-acre Ginkgo Petrified Forest State Park are located between the Whiskey Dick unit of the wildlife area and the Columbia River. As Exhibit 18-C indicates, the Project will not be visible from the park. Access into most portions of Landscape Area 3 is very limited, and there is little development, so overall, the landscape has a generally natural looking appearance. There is one area where there is a small pocket of development, along upper Parke Creek Road, an unpaved private road. In the area along this road corridor approximately a mile and a half north of the northern boundary of the Project site, a large lot subdivision has been created. Based on air flights over this area and review of air photos, it appears that 8 to 10 dwellings have been built on parcels in this subdivision, and that no more than four of these dwellings have unobstructed views toward the Project site. Because this area is difficult to access, particularly under winter snow conditions, the dwellings in this area are occupied on a seasonal basis only.

Views from this Landscape Area are represented by Exhibit 18-B, Figure 3, the view from Simulation Viewpoint 3, a location near Project site access Road on a ridgetop in Section 32 of Township 19 North, Range 21 East. This viewpoint is located approximately 2.5 miles north of the northern edge of the Project site on land that is owned by the Washington Department of Natural Resources. Although this view is intended to be representative of views toward the Project from the wildlife areas and from the area of scattered seasonal dwellings along upper Parke Creek Road, it can be considered to be a worst case view in that it is taken from a high elevation that provides an unobstructed view of most of the Project. As review of the viewshed map (Exhibit 18-C) indicates, in the areas off of the ridgetops, either the Project won't be visible at all, or the visibility will be limited. The view from Simulation Viewpoint 3 is a broad panorama of ridgetops covered with grass, shrubs, and some groupings of trees. Except for the barely detectable cluster of communications towers on Cribb Peak in the center of the view, no structures are visible, and the scene has a natural-appearing character. The level of visual quality is high, reflecting a moderately high level of vividness and high levels of visual unity and intactness.

Visual Sensitivity:
Viewers in this landscape area consist of users of the wildlife area lands and occupants of the seasonal residences. Review of use patterns on the wildlife refuge lands with the WDFW sergeant responsible for policing of this area revealed that for the Whiskey Dick and Quilomene units and in the Colockum Wildlife Area, there are a total of approximately 1,000 hunters who use these lands over the course of a year. The largest numbers of hunters come to the area during a several week period in late October and early November for the modern firearm elk season. Large numbers of hunters also come for the upland bird season, which takes place from October through January; much of this hunting takes place in the lower elevation areas where there is less snow. Non-hunting use of the WDFW lands in this area is very limited, consisting primarily of bird watching and hunting of shed antlers. Relatively little camping, hiking, and equestrian activity takes place, perhaps because of the high summer temperatures, limited timber and limited water sources. Approximately 80% of the people who use the wildlife refuge lands in this area gain access by way of Project site access Road, the private road that crosses through the Project site. Because of the relatively small numbers of users of the wildlife lands in this area, and because the use is oriented primarily toward wildlife hunting and viewing as opposed to sightseeing and landscape appreciation, the overall visual sensitivity of these visitors is assumed to be moderately sensitive at most.

In the area along upper Parke Creek Road, there are approximately 8 to 10 dwellings that are used on a seasonal basis. These dwellings are located 1.5 mile and further to the north of the Project site's northernmost edge, which means that the Project site is in the middleground zone of the views from these structures. In most cases, the views from these dwellings would not be as wide or as open as the view represented in Exhibit 18-B, Figure 3 because these dwellings tend to be located in sheltered locations in the canyons and on the slopes of the ridges rather than on the ridgetops, and in many cases, they are sited in or in proximity to groups of trees that would have the effect of providing partial to full screening of views toward the Project site. The level of visual sensitivity of the views from these dwellings is considered to be low to moderately high, depending on the degree of screening of views toward the Project.

Landscape Area 4 – Kittitas and Surrounding Valley Areas

Landscape Description and Scenic Quality:
Landscape Area 4 encompasses the region of valley lands in and around the community of Kittitas. As the viewshed map (Exhibit 18-C) indicates, from this area, the turbines on the ridgeline and southern slopes of Whiskey Dick Mountain will be visible at distances ranging from about 7 to over 12 miles. Views from this Landscape Area are represented by Exhibit 18-B, Figure 4, the view from Simulation Viewpoint 4, which is located on the eastern edge of the community of Kittitas near the water tower at the intersection of Patrick Avenue and No. 81 and Clerf Roads. The photo captures the view looking east-northeast toward Whiskey Dick Mountain and the Project site. This view is fairly typical of views toward the Project site from the open countryside around Kittitas and from the segments of the Iron Horse Trail and I-90 that pass through this area. From within the community of Kittitas, the views toward the Project site are more limited because they tend to be obstructed to one degree or another by trees and structures in the immediate foreground. As study of Exhibit 18-B, Figure 4 suggests, in this area, what is seen in the foreground and middleground zones is a humanized landscape, with roads, utility lines, fences, buildings, tree plantations, and cultivated fields. Whiskey Dick Mountain serves as the backdrop to the scene. Because of the mountain's distance in the view, the details of its landscapes are not apparent, and what is seen are the mountain's overall form, and the generalized patterns formed by the areas of grass and shrubs on its slopes. In general, the level of visual quality in this area is moderate to moderately high, reflecting the moderately high level of vividness provided by the ridgeline of Whiskey Dick Mountain and the views across the valley, and the moderate to moderately high levels of unity and intactness created by the generally orderly and attractive pattern of utility, agricultural and rural residential uses.

Visual Sensitivity:
In this area, the Project site is visible to varying degrees from residences in the community of Kittitas and from residences scattered across the surrounding rural area. In addition, it is clearly visible within the cone of vision of eastbound travelers on I-90, Vantage Highway, and various local roads. It is also clearly visible from the Iron Horse Trail.

Kittitas is an incorporated community with approximately 400 housing units and 900 residents. Because the Project site is nine miles and further from Kittitas, and because many views from the community toward the site are partially to fully screened by foreground structures and vegetation, the sensitivity of residential and other views from Kittitas to the visual changes the Project might create is low.

Interstate 90, the most important east/west cross-state route in Washington, travels in an east/west alignment across the flat valley lands in the area about a half a mile south of

Kittitas. WDOT figures indicate that the average daily traffic on I-90 in the area between Kittitas and Vantage is 11,000 vehicles per day. As Exhibit 18-C indicates, from much of the area along I-90 east of Kittitas, views toward Whiskey Dick Mountain and the Project site are screened by the range of low hills that lies north of the Interstate in this area. West of Kittitas, the views are more open, and the Project site lies within the primary cone of vision of drivers. Although open views toward the Project site are available from these portions of I-90, the level of visual sensitivity is low because the Project site is so far distant (nine miles and greater) in the view.

The local roads in the Kittitas area carry considerably less traffic than I-90. For example, at the point where the photo in Exhibit 18-B, Figure 4, was taken (at the intersection of Patrick Avenue and No. 81 and Clerf Roads), the traffic count is 1,100 vehicles per day. From the eastbound lanes of these roads, and to some extent the northbound lanes, Whiskey Dick Mountain and the Project site are visible within the drivers' primary cone of vision. However, as is the case with the views from I-90, the level of viewer sensitivity is low because the Project site is located well within the background zone of the view.

The John Wayne trail is a hiking, biking, and equestrian trail that has been developed in the Iron Horse State Park, a state park created on the former right of way of the Milwaukee Road railroad, which was acquired by Washington State Parks in the 1980s. The John Wayne Trail extends 109 miles from a trailhead near North Bend on the west to the Columbia River on the east. In the Kittitas area, the trail has a southeastward trending alignment and passes along the southern edge of the City of Kittitas' original residential and commercial area. In this area, the trail has a wide gravel surface, and is paralleled by the PSE Intermountain Power electric transmission line carried on wood poles. Washington State Parks reports that in 2001, the entire segment of the John Wayne Trail extending from Thorp eastward to Vantage had 21,079 visitors, and that most visits took place during the summer season. This is considerably lower than the 163,532 visitor figure for the segment to the west between North Bend and Thorp, where the trail passes through Snoqualmie Pass and the trail is closer to the population centers of the Puget Sound area, the scenery is more outstanding and where the trail ties in with other recreational facilities. In the Kittitas area, because of the trail's character as an engineered right-of-way that has a wide gravel surface and is paralleled with high voltage transmission lines, its visual sensitivity is assumed to be lower than that of a more conventional park or wildland trail. In light of the trail's visual character, the moderate level of trail use this segment receives, and the background viewing distances toward the Project area, the level of sensitivity of views from the trail to potential Project-related visual changes is low.

Landscape Area 5 – Lands East of the Columbia River

Landscape Description and Scenic Quality:
Landscape Area 5 encompasses the area to the east of the Columbia River. As indicated by the view shed map (Exhibit 18-C) the turbines on the Project site will not be visible from the Columbia River itself, but will be visible from the tops and sides of some of the plateaus on to the river's east. From the areas where the Project site is potentially visible,

the viewing distance is a minimum of 7 miles. For the most part, the landscape on the east side of the river consists of open lands covered with shrub-steppe vegetation or devoted to grazing or agricultural use. Viewing areas of potential concern in the area east of the Columbia include the corridor along I-90, and the Gorge Amphitheater. The project would not be visible from Sunland Estates, a river-oriented residential development located in the canyon, where views toward the project site are screened by the canyon's walls. The only place where there is planned future development in areas on the east side of the river that lie within 12 miles of the Project site and where the Project site is visible is a site along I-90 at Silica Road where an amendment to the Grant County Comprehensive Plan has been approved that would permit a project known as Sun Canyon that would include a mix of commercial and residential uses.

Exhibit 18-B, Figure 5, the view from Simulation Viewpoint 5, which is located on along I-90 in the area between the Silica Road Exit and the Columbia River is representative of view from this landscape area. This photo captures the view looking west/southwest toward Whiskey Dick Mountain and the Project site. This view is typical of views toward the Project site from the plateau areas east of the Columbia River. In many areas, such as the one depicted in Exhibit 18-B, Figure 5, the foreground and middleground zones consist of open landscapes covered with low sage-scrub vegetation, and have a natural appearance. In other portions of this area, the landscape in the foreground and middleground has been altered through its use for field crops and grazing, and in the case of the Gorge amphitheater, for a major performance complex. From all of these areas, Whisky Dick Mountain and associated ridges on the west side of the river provide a distant backdrop. Because of the distance of these ridges in the view, what is apparent is their overall form and the generalized patterns formed by the areas of grass and shrubs on their slopes, rather than the details of their landscapes. In general, the level of visual quality in this area is moderate to moderately high, reflecting the moderately high level of vividness provided by the line of distant ridges on the west side of the Columbia and the views across the valley, and the moderate to moderately high levels of unity and intactness of the lands visible in the foreground and middleground of views.

Visual Sensitivity:
In this area, I-90 carries an average of 13,000 vehicles per day. Just to the east of the crossing of the Columbia at Vantage, there is a segment of the interstate that runs for about five miles in a north/south direction along the plateau lands on the east side of the river. From this area, the Project site is not within the cone of vision of drivers. To the east of this area, the alignment shifts to a northeast/southwest oriented alignment for about six miles until reaching the community of George. Along this portion of the route, there are many areas where the Project site falls within the cone of vision of westbound travelers. Exhibit 18-B, Figure 5 is typical of these views. Although the site is within the line of sight for westbound travelers, the level of sensitivity to visual changes on the Project site is low because the site lies 10 miles and further from the segments of the Interstate from which it is potentially visible.

On the eastern side of the river, the residences that are closest to the Project site are those in Sunland Estates, a recreation-oriented development located in the Columbia Gorge alongside the portion of the river that has been dammed by the Wanapum Dam to create Wanapum Lake. As indicated on Exhibit 18-C, because the high, steep sided slopes screen views from within the gorge toward the Project site, the Project will not be visible from Sunland Estates. The Project will, however, be visible to those driving to Sunland Estates on the access road at the top of the bluff. Because the areas of the access road with potential views toward the Project site are 7 miles and more from the Project site, the sensitivity of views from these areas to Project-related visual changes is low.

The Gorge Amphitheatre is an outdoor performance facility of regional importance that is located at the edge of the bluffs overlooking the Columbia gorge in the area near Sunland Estates. It has a seating capacity of 20,000 and is the site of large concerts that take place during a season that runs from mid-May through the end of September. In addition to the performance area, concessions, and parking, the facility also includes a campground. The amphitheater's seating area is located on the slopes of the bluff, and the stage is sited so that the Columbia River and the distant ridges to the west of the Columbia serve as the backdrop. Although the Project site falls within the line of sight of views from some portions of the amphitheater facility, the level of visual sensitivity is low because the Project site is located in the view's background zone, nine miles and further from viewers at the amphitheater.

Landscape Area 6 – I-90 in the Vicinity of the PSE Interconnect

Landscape Description and Scenic Quality:
Landscape Area 6 encompasses the short segment along I-90 between Kittitas and Vantage from which there will be views of the transmission line and substation that will provide the electrical connection between the Project and the PSE transmission system. Views in this area are represented by Exhibit 18-B, Figure 6, the view from Simulation Viewpoint 6, a point at the edge of the westbound lanes of I-90, located just east of the freeway's overcrossing of Stevens Road. This view looks westward toward the proposed alignment of the Project's 230 kV PSE feeder line and the location of the Project's proposed PSE Interconnect Substation. The landscape visible in this view is one that has been highly modified to accommodate the Interstate highway, a railroad trestle, the existing PSE transmission line, a canal that cuts across the side of the slope visible in the middleground, and a wireless communications tower. Given the moderately low levels of vividness, unity, and intactness of this landscape, the overall level of visual quality is low to moderately low.

Visual Sensitivity:
In this area, I-90 carries an average of 11,000 vehicles per day. Because for westbound travelers, and to a much smaller degree for eastbound travelers the transmission line alignment and substation site fall within the immediate foreground of the view, the level of viewer visual sensitivity is considered to be high.

3.11.3 Impacts of the Proposed Action

3.11.3.1 Analysis Procedure

The impact analysis is based primarily on the Federal Highway Administration (FHWA) methodology for determining visual resource change and assessing viewer response to that change (US DOT, 1988). The analysis is focused on evaluating impacts and recommending measures to minimize adverse visual effects. Central to this assessment is an evaluation of representative public views from which the Project would be most visible. To document the visual changes that would occur, visual simulations show the proposed Project from a set of 6 viewpoints selected to be representative of views toward the Project from a range of locations. The visual simulations are presented as "before" and "after" images from each of these simulation viewpoints. Presented as the "a" and "b" variants of Exhibits 18-B, Figures 1 through 6, the photos of existing conditions and the companion simulation images provide a clear image of the existing character and quality of the views from each of the simulation viewpoints and of the scale, and visual appearance of the changes that would be brought about by the proposed Project. The computer-generated simulations are the result of an objective analytical and computer modeling process and are accurate within the constraints of the available site and Project data.

The simulations were developed using photographs taken with a 35 mm camera, using a 50 mm focal length. The Photomontage module of the WindPro software program (a widely accepted and applied program used for planning and assessing wind generation projects) was used to carry out the computer modeling and rendering required to produce the images of the Project facilities that were superimposed on the photographs to create the simulations. Existing topographic and site data provided the basis for developing an initial digital model. The Applicant provided site plans and digital data for the proposed wind turbines. These were used to create three-dimensional (3-D) digital models of these facilities. These models were combined with the digital site model to produce a complete computer model of the wind farm. For each viewpoint, viewer location was digitized from topographic maps, using 5 feet as the assumed eye level. The WindPro program overlaid computer "wire frame" perspective plots on the photographs of the views from the Simulation Viewpoints to verify scale and viewpoint location. Digital visual simulation images were produced as a next step based on computer renderings of the 3-D model combined with high-resolution digital base photographs. The final "hardcopy" visual simulation images that appear in this document were produced from the digital image files using a color printer.

The visual impact assessment was based on evaluation of the changes to the existing visual resources that would result from construction and operation of the Project. These changes were assessed, in part, by evaluating the "after" views provided by the computer-generated visual simulations and comparing them to the existing visual environment. Consideration was given to the following factors in determining the extent and implications of the visual changes:

- The specific changes in the affected visual environment's composition, character, and any specially valued qualities;

- The affected visual environment's context;
- The extent to which the affected environment contains places or features that have been designated in plans and policies for protection or special consideration; and
- The relative numbers of viewers, their activities, and the extent to which these activities are related to the aesthetic qualities affected by the expected changes. Particular consideration was given to effects on views identified as having high or moderate levels of visual sensitivity.

Levels of impact were classified as high, moderate, and low. In general, High levels of aesthetic impacts were assigned in situations in which turbines would be highly visible in areas with sensitive viewers, and would alter levels of landscape vividness, unity, and intactness to the extent that there would be a substantial decrease in the existing level of visual quality. Moderate levels of aesthetic impact were assigned in situations in which turbines would be visible in areas with high levels of visual sensitivity in which the presence of the turbines would alter levels of landscape vividness, unity and intactness to the extent that there would be a moderate change in existing visual quality. Moderate levels of visual impact were also found in situations in which the presence of turbines in the view would lead to more substantial changes in visual quality, but where levels of visual sensitivity were moderate to low. Low levels of visual impact were found in situations where the Project would have relatively small effects on overall levels of landscape vividness, unity, and intactness and/or where existing levels of landscape aesthetic quality are low or where there are low levels of visual sensitivity.

3.11.3.2 Construction

Construction activities

The on-site activities that will be required as a part of Project construction are described in Section 2.2.5 'Construction Methodology'. Project construction is expected to take place over a period of approximately 12 months. During that time, temporary laydown areas will be set up near turbine E1 on the ridge line of Whiskey Dick Mountain and at several locations in the plateau area to the north. The laydown areas will be used for temporary storage of turbine components, equipment, and vehicles. Grading will be required to create access roads and 30 by 60-foot flat, gravel-covered areas at the base of each tower site that will accommodate the cranes required to erect the turbines.

Visual Effect of Construction Activities

During the expected 12 month construction period, large earth moving equipment, trucks, cranes, and other heavy equipment will be highly evident features in views toward the Project site from nearby areas. At some times, small, localized clouds of dust created by road-building and other grading activities may be visible at the site. Active dust suppression should minimize the frequency of such dust events. Because of the construction-related grading activities, areas of exposed soil and fresh gravel that contrasts with the colors of the surrounding undisturbed landscape will be visible. In close-at-hand views, which for this Project would be limited to those from nearby segments of Vantage Highway, the visual changes associated with the construction activities will be moderately to highly visible and will have a moderate level of visual impact. From more distant viewing locations, the visual effects will be relatively minor and will have little or no impact on the quality of views. From the middleground areas with the greatest numbers of viewers, i.e. the areas to the south and west, much of the area in which construction activities will be taking place will not be visible because it will be hidden behind the ridgeline formed by Whiskey Dick Mountain. It is important to note that because construction activities take place over a period of only 12 months, the construction impacts will be relatively short in duration. After construction, is complete, all construction-related debris will be removed from the site and areas disturbed during construction will be replanted to recreate the appearance of their original vegetative cover.

3.11.3.3 Operations

The Project's operational period is assumed to be 20 years. At the time the Project begins to reach the end of its useful life, the Project owner will either make plans to remove the Project from the site, or will initiate the permitting process required to obtain permission to replace the turbines with new equipment (repowering). The Project's aesthetic impacts during the operational period are presented in Table 3.11.3-1. As these tables indicate, the Project has the potential to create Moderate levels of visual impact in areas at the eastern edge of the Kittitas Valley and in the upland areas to the west, north, and east of the Project site where there are wildlife reserve lands and a small number of seasonal residences. In the other areas evaluated, the Project's aesthetic effects would be low.

Project Appearance

The physical elements of the Project are described in detail in Section 2.2.2 Project Facilities. Exhibit 1-B, 'Project Site Layout', is a general site layout that indicates the locations of the proposed roads, overhead and underground transmission lines, substations, operations and maintenance facility, and other features that comprise the Project.

The Project will include up to 158 turbines. The turbines will be mounted on tubular steel towers that will be approximately 18 feet in diameter at the base and will rise to a hub height of up to 262 feet. Each tower will support a nacelle that houses a drive train, gearbox, generator, and other generating equipment. The nacelles will be approximately 30 to 37 feet long, 10 to 11 feet wide and 10 to 12 feet high. The nacelles will be completely sheathed in an aerodynamically shaped fiberglass or metal shell. The rotors will be attached to the front of the nacelles, which are mounted on the tops of the towers. The rotors will have three blades, and will have a diameter of 197 feet to 295 feet. Although not required for functionality, each rotor will have an aerodynamic appearing nose cone to improve its appearance. The dimensions provided here represent the entire range of sizes of the various turbine models being considered for this Project.

The Applicant is considering several turbine models from different vendors. The final decision regarding turbine and tower dimensions is driven largely by Project economics such as turbine pricing and the performance of specific turbines under different wind conditions. The primary difference among the turbine models being considered is the rotor diameter, which could range from 197 feet to 295 feet. Most of the visual simulations presented here are based on a turbine with a hub height of 213 feet and a rotor diameter of 236 feet, which are representative of the dimensions of the turbines that are being considered for the Project. For two of the simulation views, simulations are provided of the turbines with dimensions at the high and low ends of the dimension range (Exhibits 18-B, Figures 2c and 2d and Figures 4c and 4d) to permit the appearance of the slightly larger and slightly taller turbines being considered to be compared with that of the turbines most likely to be used, which have been simulated in all the views.

The surfaces of the turbine towers, rotors, and nacelles will be neutral gray in color and will be given a finish that has a low level of reflectivity. Data from the turbine manufacturers indicates that the turbines and nacelles will be coated with a semi-gloss material and that the two products available for this purpose have gloss ratings of 70% and 75%. The rotors will be made of materials similar to those used for rotors on turbines installed in other wind generation facilities developed recently in Washington, and as is that case with the existing turbines, the rotors on the planned turbines will not have surfaces that are highly reflective. Over time, the surfaces of the turbine equipment, like any coated surface exposed to the elements, will tend to weather, and the effect of this weathering will be to dull the surfaces, producing a further decreases in the levels of reflectivity.

The power generated by the turbines will be delivered to the Project substation by means of a largely underground electric collection system. Small, pad-mounted transformers located at the base of each turbine tower will convert the electricity produced by the turbine to a transmission voltage of 34.5 kV and will connect to the underground collection lines. Each of the transformers will be housed in a metal-sided case that is approximately 8 feet wide, 8 feet long, and 8 feet high. The transformer housings will be painted in earth tone colors using paint with a low-reflectivity finish. An approximately 2 mile long segment of the collection system connecting the northern and southern portions of the Project will be above ground due to the large amount of power flowing through this portion of the collection system, as indicated in Exhibit 1, Project Site Layout. The first proposed collector line begins at a point at the north end of String E, and would extend to the site of the proposed PSE step-up substation located just west of String H. This portion of the collection system would be carried on single wood poles with dual cross arms that are 40 to 60 feet tall. Because this line would be located in an area that lies to the north of the high ridgeline formed by Whiskey Dick Mountain, it would not be visible from areas lying to the south and west.

The network of roads that will provide access to each of the turbines will consist of both existing and new roads which will have a compacted gravel surface and a width of 20 feet where possible and 34 feet in other areas (approximately half the road miles will be 20 feet wide and the other half will be 34 feet wide). In areas with steeper slopes, cutting and filling will be required to keep grades below 15%.

The proposed operations and maintenance (O&M) facility will be located on a flat area just north of the crest of Whiskey Dick Mountain near turbine E1. To construct this facility, the existing shrub-steppe vegetation on the site will be cleared and the site will be graded and fenced. The primary structure in the O&M facility will be a main building that is approximately 50 feet wide, 100 feet long, and 35 feet high. This building will house offices, spare parts storage, and a shop area. This building will have siding that will be painted with low reflectivity paints in earth-tone colors that blend well with the surrounding landscape. The outdoor areas devoted to parking and vehicle turning will be covered with gravel to minimize dust and runoff.

A small visitor kiosk is planned for a site located on a small, flat plateau located approximately 0.1 mile north of Vantage Highway and along the west side of the road that will provide access from Vantage Highway into the Project site.

Two sites have been proposed as locations for step-up substations. The site for the substation that would transform power for transmission to the Bonneville Power Authority grid would be located in the plateau area north of the ridgeline formed by Whiskey Dick Mountain in the area near String J. The site for the substation that would step up power for transmission to the PSE system would also be located in the plateau area, but at a location further south, near String H. It is possible that either or both of these sites would be developed. In either case, the substation(s) would occupy an area of 2 to 3 acres that would need to be cleared and graded. The primary elements of a substation on either site would include a outdoor control cabinets, large transformers, structures housing switchgear, bus work, steel support structures, lightning suppression lines, outdoor lighting, and a perimeter chain link fence. The tallest structures would be the steel support structures, which would be on the order of 60 feet high. The bus work would be in the range of 40 to 45 feet high. The transformers, switchgear structures, and control building would be no more than 15 to 20 feet in height. Although the substation control cabinets would be painted an earth-tone color using low-reflectivity paints, the substation equipment would have a standard low reflectivity neutral gray finish. Both step-up substations are located north of Whiskey Dick Mountain which shields them from visibility from main public roadways including Vantage Highway and I-90.

<u>Light and Glare</u>

Turbine Lighting:
To respond to the Federal Aviation Administration's (FAA) aircraft safety lighting requirements, the Project will be marked according to guidelines established by the FAA. At present, FAA guidelines for lighting of wind turbines call for lights that flash white during the day (at 20,000 candela) and red (at 2,000 candela) at night. These lights are designed to concentrate the beam in the horizontal plane, thus minimizing light diffusion down toward the ground and up toward the sky. The exact number of turbines that will require lighting will be specified by the FAA after it has reviewed final Project plans; however, typically, FAA has required that warning lights be mounted on the first and last turbines of each string, and every 1000 to 1400 feet on the turbines in between. Aside from any required aircraft warning lights, the turbines will not be illuminated at night.

The FAA is now in the process of reviewing its safety lighting standards for wind energy facilities and is in the process of developing revised requirements. The research that the FAA has undertaken as a part of this review suggests that the revised requirements are likely to go in the direction of requiring fewer lights that could be located further apart (Patterson 2003)

Based on experience at the operating Stateline and Nine Canyon wind power projects in Washington, it appears that the white flashing lights that will be mounted on the turbines and flash during daylight hours as required by the FAA for daytime aircraft safety will be visible, but not particularly intrusive to viewers in the areas surrounding the Project and are thus unlikely to create a moderate or high level of visual impact. The flashing red lights (2,000 candela) that the FAA requires be operated at nighttime will introduce a new element into the Project area's nighttime environment. At present, the Project site and immediately surrounding area are dark at night except for the lighting present at the set of communications towers on Cribb Peak near the eastern end of Whiskey Dick Mountain's ridgeline. Because the nighttime aircraft safety lights will be limited in number, red, and highly directional, their potential to create skyglow or backscatter will be minimal.

Exhibit 18-D is a nighttime photo taken at the Nine Canyon Wind Power Project in Benton County, Washington to illustrate the night lighting conditions that are typical at existing large wind power projects in the region. This photo was taken at a distance of about one mile from the closest turbine string at the location indicated on the map in Exhibit 18-D. The cluster of lights on top of the ridgeline at the right side of the photo is the night lighting at a radio tower complex that is not a part of the wind energy project. The remaining lights visible are the red aircraft safety lights associated with the project's turbine strings. These lights are visible as small blinking points of light. As this photo suggests, these lights do not light up the sky or the surrounding landscape. The flashing red lights associated with the Wild Horse Project will be most noticeable in the areas within a mile or so of the Project, but because there are no residences or public roads in these areas, the impacts on potential viewers will be negligible

Facility Lightning:
At the O&M facility and substation(s), outdoor night lighting will be required for safety and security. This lighting will be restricted to the levels required to meet safety and security needs. Sensors and switches will be used to keep lights turned off when not required. All lights will be hooded and directed to minimize backscatter and illumination of areas outside the O&M and substation sites.

The Project's O&M facility and substation(s) will create sources of light in areas where there are currently no nighttime sources of light. However, the impacts of the lighting associated with these facilities will not be substantial. Because of their location to the north of Whiskey Dick Mountain's ridgeline, where they will be screened in most views toward the Project site, the minimal night lighting associated with them will have no effect on most views. The one exception is the view into the plateau area from the area to the north of the site along upper Parke Creek Road. However, because of the viewing distance toward these facilities from this area (four miles or more) and the minimal amount of lighting involved, the degree of impact will be minor.

Mitigation measures will be implemented to restrict the substation and O&M facility lighting to the minimum required and to attenuate its effects. High illumination areas not occupied on a regular basis will be provided with switches or motion detectors to light these areas only when occupied. At times when lights are turned on, the lighting will not be highly visible offsite and will not produce offsite glare effects because lighting will be restricted by specification of non-glare, hooded fixtures, and placement of lights to direct illumination into only those areas where it is needed. With these measures to restrict lighting at the O&M facility and substation(s) to the minimal required, and to assure that it is appropriately hooded and directed downward into the areas where it is needed, the potential for it to create skyglow[1] or backscatter[2] will be limited.

Shadow Flicker
Shadow flicker, or strobe impacts, can occur only if the turbine is located in close proximity to a receptor and is in a position where the blades interfere with very low-angle sunlight. The Project is not expected to result in any shadow flicker effects to any sensitive receptors, such as residences, due to the distance of more than 9,000 feet to the nearest residence which is well beyond the distance at which shadow flicker can cause impacts. A detailed discussion and analysis of the Project's potential to create shadow flicker and any potential health effects in included in Exhibit 9, 'Shadow Flicker Briefing'

[1] Skyglow is a brightening of the night skies caused by light that is projected upward and then reflected back toward the ground by the atmosphere.
[2] Backscatter is related to skyglow - the term refers to the reflection of light back toward the ground by moisture or dust in the atmosphere.

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
1 – Vantage Highway Corridor South of Project Site				
Simulation View 1 (Exhibits 18-B, Figure 1b) View looking west from Vantage Highway 0.4 mile east of Project site access Road	Moderately High	Moderate	A total of 43 turbines will be visible along the ridgeline and southern slopes of Whiskey Dick Mountain, at distances ranging from 1.9 to 4.1 miles. All of the turbines will be either partially or fully silhouetted against the sky; however because of their distance from the viewer and because of their light color, the degree of visual contrast and visual salience will be moderate. The presence of the turbines will reduce the scene's degree of intactness by introducing highly engineered vertical elements in an otherwise natural appearing landscape, and will have a minor effect on the visual unity of the scene's composition. However, the presence of the string of turbines that accentuates the ridgeline could be thought of as enhancing the vividness of this view. The roadways that will be constructed to provide access to several of the strings located on the south face of the mountain will be visible as thin lines of gravel that contrast with the surrounding vegetated slope. The O&M facility, which will be located on a flat area at the top of the ridge near turbine E1 will be detectable. However, because of the 2.7 mile viewing distance and the fact that the O & M structure will be relatively small and will be located on the north side of the ridge's crest, it will not be a major element in the view. The treatment of the structure's surfaces with low-reflectivity colors that blend with the surroundings will further reduce the facility's noticeability. Although the new transmission line that will travel down the slope of the ridge will be visible, it will, in general, be a recessive element in the view because the wood-pole H-	Moderate

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
			frame towers will to a large degree be visually absorbed by the hillside backdrop. The visitor kiosk, which will consist of a parking area and kiosk in the area along the Project access road in the vicinity of Vantage Highway. Because this structure will be very small and will be painted with colors that are non-reflective and compatible with the surrounding landscape, it will not be a highly visible element in the scene. The Project will result in a highly noticeable change in this view, adding a large number of tall turbines and several smaller project elements as well to a scene that is now generally rural in character. Although the appearance and character of this view will be changed, the overall level of visual impact will be less than significant in that the view's level of visual sensitivity is moderate at most, and although the view's moderately high level of visual quality may be decreased to some extent, the decrease will not be substantial because the landscape's topography and vegetative cover will remain essentially intact, and because the vividness of the view will be increased. The overall level of visual impact will be moderate.	
2 – Valley Lands at Eastern Edge of Kittitas Valley				
Simulation View 2 (Exhibits 18-B, Figure 2) View looking east from Vantage Highway at Parke Creek Road	Moderately High	Moderate	From this viewpoint, a total of up to 43 turbines will be visible running along the top of and on the upper slopes of the ridgeline of Whiskey Dick Mountain. The closest of these turbines will be 4.5 miles away, and the furthest will be 7.6 miles, placing all of the turbines in the far middleground and background zones of the landscape. Exhibit 18-B, Figure 2b is a simulation of the Project as it would	Moderate

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
			appear with the 213 foot high (to hub height) turbine towers that are most likely to be used for this project. Exhibit 18-B, Figure 2c is a simulation of this view as it would appear under a scenario in which 262 foot high towers would be used, and Exhibit 18-B, Figure 2d is a simulation of the project's appearance assuming towers 197 feet in height. As comparison of these three simulation images suggest, the turbines with the 262 foot high towers appear to be somewhat taller and a little bit more noticeable than the turbines with the 213 foot towers, and the turbines with the 197 foot high towers appear to be slightly smaller than the turbines with the 213 foot high towers. Another difference among the three scenarios is that there are fewer of the taller turbines and they are spread farther apart, while there are more of the shorter turbines, and they are spaced more closely together. At this viewing distance and in this context, the overall visual effects of the three scenarios are about the same. Because of their increased numbers and the density of their configuration, the smaller turbines have a level of visual impact that is about the same or maybe even slightly greater than that of the taller turbines that are smaller in number and more widely spaced. Although the turbines will be silhouetted against the sky because of their location along the ridgeline, because of their distance from the viewer and because of their light color, the degree of visual contrast and visual salience will be moderate. The presence of the turbines will reduce the scene's degree of intactness extent by introducing highly engineered vertical elements into a landscape that now has a rural and natural appearance. Because the line of turbines extending	

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
			along the ridgeline will have an orderly appearance, the overall effect on the visual unity of the scene's composition will not be substantial. In addition, the presence of the string of turbines that accentuates the ridgeline could be thought of enhancing the vividness of this view. The overall level of visual impact on this view will be moderate, and the level of impact will be less than significant.	
3 – Lands to the West, North and East of the Project Site				
Simulation View 3 (Exhibits 18-B, Figure 3) View looking south from rangeland north of the Project site in Section 32, Township 19 North, Range 21 East	High	Moderate (views from wildlife lands) Low to Moderately High (views from seasonal residences)	From this viewpoint, over 100 turbines will be visible on the high elevation plateau that extends southward to the ridgeline of Whiskey Dick Mountain at distances that range from 2.8 to 7.8 miles. Most of the turbines will be seen entirely against the ground plane or distant ridgelines, and the contrast between the lighter color of the turbines and the darker color of their backdrops will create a moderate level of visual contrast, increasing the visibility of these turbines. A small number of the turbines visible in this view will be seen as fully or partially silhouetted against the sky, and for these turbines, their neutral gray color will reduce their contrast with the sky backdrop. Portions of the roads along the strings closest to this viewpoint may also be visible. The gravel of these roadways have the potential to create thin, linear bands that contrast with the color of the surrounding ground plane. The overhead collection line, O&M facility, step-up substation(s) and a portion of the project transmission line will be visible from this viewpoint. Because of the viewing distance (4.5 miles or more) and because they will be backdropped, these Project elements will not be highly detectable, and will have relatively little effect on the view. The large number of	Moderate

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
			turbines visible spread across the landscape in this view will have an adverse effect on the landscape's degree of unity and intactness, decreasing its overall level of landscape quality. However, because of the relatively small numbers of viewers, particularly of the most sensitive viewers, the users of the seasonal residences, the overall visual impact will be moderate. Nineteen of the turbines will be located on two sections that encompass ridgelines along upper Whiskey Dick Creek that are a part of the Whiskey Dick Wildlife Area. To the extent that hunters or other users of the wildlife area are on or near these sections, the landscape that they experience will be substantially altered, with turbines and other Project-related facilities visible in the immediate foreground. Although the character of the landscape in these areas will be transformed, and the existing visual quality reduced to some degree, the level of impact will be less than significant because of the moderate visual sensitivity of these lands, which are being managed primarily for their wildlife values rather than their scenic qualities.	
4 – Kittitas and Surrounding Valley Areas				
Simulation View 4 (Exhibits 18-B, Figure 4) View looking east from intersection	Moderate to Moderately High	Low	From this viewpoint at the edge of Kittitas, approximately 30 turbines will be visible running in a line along the distant ridgeline of Whiskey Dick Mountain. The closest of these turbines will be 8.3 miles away, and the furthest will be over 11 miles away, placing all of the turbines well into the background landscape distance zone.	Low

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
of Patrick Avenue and No. 81 and Clerf Roads at the edge of the City of Kittitas			Exhibit 18-B, Figure 4b is a simulation of the Project as it would appear with the 213 foot high (to hub height) turbine towers that are most likely to be used for this Project. Exhibit 18-B, Figure 4c is a simulation of this view as it would appear under a scenario in which 262 foot high towers would be used, and Exhibit 18-B, Figure 4d is a simulation of the Project's appearance assuming towers 197 feet in height. As comparison of these three simulation images suggest, the turbines with the 262 foot high towers appear to be slightly taller and a little bit more noticeable than the turbines with the 213 foot towers, and the turbines with the 197 foot high towers appear to be slightly smaller and less noticeable than the turbines with the 213 foot high towers. Another difference among the three scenarios is that there are fewer of the taller turbines and they are spread farther apart, while there are more of the shorter turbines, and they are spaced more closely together. At this viewing distance and in this context, the overall visual effects of the three scenarios are not significantly different. In all three scenarios, the turbines that are visible will all be silhouetted against the sky, but, because of their great distance and because of their light color, the degree of visual contrast will be low. However because of their scale and form, they will have a moderate degree of visual salience in all three cases. The presence of the turbines will reduce the scene's degree of intactness to some extent by introducing vertical elements along a distant ridgeline that now has a natural profile, but the degree of change will be limited by the	

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
			fact that the turbines be so far away and will be secondary elements in the overall view. The effect on the scene's visual unity will also be attenuated by the fact that the turbines will be so far away; in addition, the effect on the scene's degree of visual unity will be minimized because the line of turbines extending along the ridgeline will have an orderly appearance. The presence of the string of turbines that accentuates the ridgeline could be thought of enhancing the vividness of this view. The overall level of visual impact on this view will be low.	
5 – Lands East of the Columbia River				
(Exhibits 18-B, Figure 5) View looking west from I-90 west of Silica Road exit	Moderate to Moderately High	Low	From this viewpoint, over 100 turbines will be seen spread across the upper slopes of the ridgeline in the far distance of the view. All of the turbines will be in the range of 9 to 13 miles in the distance, placing all of them well into the landscape's background zone. Some of the turbines will be seen entirely against the slopes of the ridge, and the contrast between the lighter color of the turbines and the darker color of their backdrop will create a moderate level of visual contrast, increasing the visibility of these turbines. Many of the turbines will be seen as fully or partially silhouetted against the sky, and for these turbines, their neutral gray color will help them to blend into the sky backdrop. The effect of the turbines on this view will be greatly attenuated by the fact that they are located so far in the distance. Under hazy atmospheric conditions, their degree of noticeability is likely to be particularly low. The presence of the turbines will reduce the scene's degree of intactness to small degree by introducing vertical elements along a distant ridgeline that now has a natural	Low

Table 3.11.3-1: Analysis of Impacts to Visual Resources During Project Operation				
Landscape Areas/ Simulation Views	**Existing Level of Visual Quality**	**Level of Visual Sensitivity**	**Assessment of Visual Change**	**Potential Level of Visual Impact**
			profile. The turbines will also have a small effect on the view's level of unity and intactness. The overall level of visual impact on this view will be low.	
6- I-90 in the Vicinity of the PSE Interconnect				
(Exhibits 18-B, Figure 6) View looking west from I-90 east of the freeway's overcrossing of Stevens Road	Moderately Low	High	Exhibit 18-B, Figure 6b is a simulation of the view from the westbound lanes of I-90 looking toward the proposed PSE transmission feeder line and the substation that would connect this line with the PSE transmission system. In this view, the PSE interconnect substation will be visible at the base of the communications tower located at the top of the knoll in the center of the view. The substation's takeoff structures and the H-frame transmission towers, which will be seen against the sky backdrop will be the Project's most visible features. Although the Project facilities will be readily visible in this view, they will be relatively minor features in the overall landscape composition and will be consistent with the other infrastructure facilities that now dominate the landscape in this area. As a consequence, the impact of the proposed PSE interconnect substation and the PSE transmission feeder line on the visual character and quality of views in this area will be low.	Low

3.11.3.4 Aesthetic and Scenic Resources

There are no recreational wilderness areas in close proximity to the Project area. Surrounding wildlife and recreation areas have been indicated on the Zone of Visual Influence Map included in Exhibit 18-C. This ZVI analysis indicates that the Project will not be visible from the Wanapum Recreation Area nor the recreational trails in the Ginkgo Petrified Forest State Park.

The simulation from Simulation Viewpoint 5 is generally representative of views from the east side of the Columbia, including views from the Gorge Amphitheater and the I-90 Wildhorse Viewpoint.

The only designated recreational trail in the project vicinity from which the Project might be visible is the Iron Horse Trail. Views from this trail are discussed in the existing conditions and project impact analyses for Landscape Area 4. The impacts on the quality and character of the landscape experienced by users of this trail will be minor.

3.11.4 Comparison of Impacts of Proposed Alternatives

Simulation views 2 and 4 were both modeled using the Most Likely (70.5 meter rotor diameter), Small WTG (60 meter rotor diameter) and Large WTG (90 meter rotor diameter) wind turbine scenarios. Results of those analyses are presented in table 3.11.3-1 above. At most public viewing points, the overall visual effects of the three scenarios are not significantly different. The visual impact will remain quite low for all design options under consideration.

3.11.5 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.11.6 Mitigation Measures

Mitigation measures that have been made an integral part of the Project's design include:

- During the construction period, active dust suppression will be implemented to minimize the creation of dust clouds;
- When construction is complete, areas disturbed during the construction process will be reseeded to facilitate their return to natural appearing conditions;
- The wind turbine towers, nacelles, and rotors used will be uniform and will conform to the highest standards of industrial design to present a trim, uncluttered, aesthetically attractive appearance;
- The turbines will have neutral gray finish to minimize contrast with the sky backdrop.
- A low-reflectivity finish will be used for all surfaces of the turbines to minimize the reflections that can call attention to structures in a landscape setting;
- Because of the wind conditions at the site and the high level of reliability of the equipment being used, the rotors will be turning approximately 80-85% of the time, minimizing the amount of time that turbines will appear to be non-operational, a condition that the public often finds to be unattractive;
- The small cabinets containing pad-mounted equipment that will be located at the base of each turbine will have an earth-tone finish to help them blend into the surrounding ground plane;
- The only exterior lighting on the turbines will be the aviation warning lighting required by the FAA. It will be kept to the minimum required intensity to meet FAA standards. It is anticipated that the FAA will soon be issuing new standards for marking of wind turbines that will entail lighting far fewer turbines in a large wind farm than is now required, and having all the lights be synchronized. These potential regulatory changes are being closely monitored, and if, as is likely, they are made before Project construction begins, the aviation safety marking lighting will be designed to meet these standards;
- Nearly all of the Project's electrical collection system will be located underground, eliminating visual impacts;
- To the extent feasible, existing road alignments will be used to provide access to the turbines, minimizing the amount of additional surface disturbance required. Where possible, access road widths will be restricted to 20 feet (approximately half of all access road miles.) The access roads will have a gravel surface and will have grades of no more than 15%, minimizing erosion and its visual effects;

- The O&M facility building will have a low-reflectivity earth-tone finish to maximize its visual integration into the surrounding landscape;
- The parking areas at the O&M facility will be covered with gravel, rather than asphalt, to minimize contrast with the site's soil colors;
- Outdoor night lighting at the O&M facility and the substation(s) will be kept to the minimum required for safety and security, sensors and switches will be used to keep lighting turned off when not required, and all lights will be hooded and directed to minimize backscatter and off-site light trespass;
- At the substation(s), all equipment will have a low reflectivity neutral gray finish to minimize visual salience;
- All insulators in the substations and on takeoff towers will be non-reflective and non-refractive;
- The control buildings located at each substation would have a low-reflectivity earth-tone finish;
- The chain link fences surrounding the substations will have a dulled, darkened finish to reduce their contrast with the surroundings;

3.11.7 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts will take place during the 12 month construction period.

Although the Project would create substantial changes to the character, and to a lesser extent the quality of a number of views toward the Project site during the 20 year period of project operation, these changes would not constitute significant impacts because of their low to moderate levels of sensitivity.

3.12 POPULATION, HOUSING, AND ECONOMICS

The study area for evaluation of impacts to employment, income, property values, and local government revenues is defined as Kittitas County. In addition to the government and other sources cited, this analysis draws upon a study titled "Economic Impacts of Wind Power in Kittitas County", prepared for the Phoenix Economic Development Group by ECONorthwest in November 2002 (Exhibit 20). That report addressed two other prospective wind energy projects in Kittitas County similar in size to the Wild Horse Project; thus, the results from that study were adjusted to apply to this Project only. Throughout this section that study is referred to as the "Phoenix Study".

3.12.1 Existing Conditions

The following sections are intended to present relevant information regarding the existing population, housing, employment, income, and fiscal and tax conditions and trends in Kittitas County, Washington where the Project will be located. This is the area that is anticipated to be impacted by the Project.

3.12.1.1 Population

Population estimates for Kittitas County and Washington State are presented in Table 3.12.1-1. In 2002, the population of Kittitas County was 34,800. Since 1990, the County population has increased at an annual rate of 2.2 percent. During the same period, the State's population increased at an annual rate of 1.8 percent.

The State of Washington's Office of Financial Management (OFM) currently projects that County population will continue to grow through the year 2020; however, the rate of growth is projected to slow to approximately 1.0 percent annually. During the same period, the State's population is forecast to grow at an annual rate of about 1.2 percent.

Table 3.12.1-1: Kittitas County and Washington State Population

Area	1990	2002	Average Annual Growth, 1990-2002	2020 Forecast	Forecast Average Annual Growth, 2002-2020
Kittitas County	26,725	34,800	2.22%	41,776	1.02%
Washington State	4,866,663	6,041,700	1.82%	7,545,269	1.24%

Source: Washington State Office of Financial Management. 2003.

As shown in Table 3.12.1-2, nearly 92 percent of the County's population is Caucasian. The State's population is 82 percent Caucasian. The study area's population has a lower percentage of persons of Hispanic origin than that of the State. Approximately 5.0

percent of the County's residents are of Hispanic origin, compared to approximately 7.5 percent for the State.

Table 3.12.1-2: Kittitas County Demographic Breakdown of Population by Race						
Area	**White Persons**	**African-American**	**American Indian, Eskimo, or Aleutian**	**Asian or Pacific Islander**	**Other Race**	**Two or More Races**
Kittitas County	91.8%	0.7%	0.9%	2.3%	2.3%	2.0%
Washington State	81.8%	3.2%	1.6%	5.9%	3.9%	3.6%

Source: U.S. Bureau of the Census. 2002.

3.12.1.2 Housing

Table 3.12.1-3 displays the estimated number of housing units for Kittitas County and for the State of Washington. From 1990 to 2000, housing in the County grew at an average annual rate that was slightly greater than that of the State. Kittitas County's average annual growth rate was 2.2 percent, and the number of housing units increased from 13,215 in 1990 to an estimated 16,475 in 2000.

*Table 3.12.1-3: **Housing Units in Kittitas County and Washington State***					
	Housing Units		**% Average Annual Growth**	**Number of Vacant Units, 2000**	
Location	1990	2000	1990-2000	Total Vacant Units	Seasonal, Recreational, or Occasional Use
Kittitas County	13,215	16,475	2.2%	3,093	1,791
State of Washington	2,032,378	2,451,075	1.9%	179,677	55,832

Source: U.S. Census Bureau, 2002.

According to the 2000 Census, Kittitas County has 3,093 vacant housing units. Of the total vacant units, 1,791 were classified as seasonal, recreational, or occasional use. The occasional use units represent approximately 10.9 percent of the total units in Kittitas County. These units are generally lake or hunting cabins, quarters for seasonal workers, or time-share units. Nearly 56,000 of the state's total housing units, or 2.7 percent, were designated as seasonal, recreational, or occasional use units. The higher percentage of occasional use units in Kittitas County is attributed to the recreational areas located in the Cascades and other areas of the county. The median home value for a 3 bedroom home in Ellensburg is $135,000 and for the surrounding area is $175,000 (Ellensburg Chamber of Commerce, 2003.)

Of the total units available for rent in Kittitas County, the U.S. Census reported a vacancy rate of 6.8 percent. This vacancy rate is consistent with the vacancy rate reported by the Washington Center for Real Estate Research, which reported an apartment vacancy rate range of as high as 7.0 percent in September 2001 to a low of 3.9 percent in March of 2002. The higher vacancy rate experienced in September could possibly be explained by the fact that Central Washington University's academic year generally begins at the end of September. By comparison, the U.S. Census Bureau reported that the state had a rental vacancy rate of 5.8 percent. The median gross monthly rent for a 3 bedroom home in Ellensburg is $950 (Ellensburg Chamber of Commerce, 2003.)

The estimated number of persons per household in Kittitas County was 2.3 in 2000, which is less than the state's average of approximately 2.5 persons per household.

3.12.1.3 Employment

The top 5 major or key employers in Kittitas County include Central Washington University with a labor force of 1,330 employees, Ellensburg School District with 364 employees, Kittitas Valley Community Hospital with 276 employees, Kittitas County with 250 employees, and Fred Meyer with 200 employees (Phoenix Economic Development Group, 2003.)

Table 3.12.1-4 displays average employment by industry for Kittitas County and the state. In 2001, an estimated 11,903 people were employed in Kittitas County. Employment in Kittitas County is concentrated in the government, trade, and service sectors. The government sector (including local, state and federal employees) accounts for approximately 31 percent of total employment in the study area, while trade (including wholesale and retail) and services account for 29 and 18 percent, respectively.

Approximately two percent of employees in Kittitas County are not placed in a particular industry. The "not elsewhere classified" designation is used for confidentiality reasons if fewer than three firms are displayed in a particular sector, or any one firm has 80 percent or more of the employment at any level of detail in a sector.

Table 3.12.1-4: Kittitas County and Washington State Employment by Industry, 2001

	Kittitas County		**State of Washington**	
Industry	**Employment**	**Percent of Total**	**Employment**	**Percent of Total**
Agricultural, Forestry and Fishing	722	6.1%	90,373	3.4%
Construction and Mining	444	3.7%	147,008	5.5%
Manufacturing	676	5.7%	333,317	12.4%
TCU	425	3.6%	140,291	5.2%
Trade	3,472	2902%	616,986	22.9%
FIRES	2,126	17.9%	881,092	32.8%
Government	3,717	31.2%	480,276	17.9%

Not Elsewhere Classified	321	2.7%	23	0.0%
Total	**11,903**	**100.0%**	**2,689,366**	**100.0%**

Source: State of Washington Employment Security Department. 2003.
Notes:
TCU = Transportation, communication, and utilities
Trade = wholesale and retail
FIRES = Finance, insurance, real estate, and services

Recent unemployment rate trends for Kittitas County and Washington State are shown in Table 3.12.1-5. In 1997, the average unemployment rate for Kittitas County exceeded the state's rate by over one percentage point, 6.0 percent versus 4.8 percent. By 1999, strong economic growth had resulted in decreases in the unemployment rates for both the county and state to 5.6 percent and 4.7 percent, respectively. With the recent recession, unemployment has risen in both the county and state. The 2002 unemployment rate was 6.1 percent in Kittitas County and 7.1 percent in Washington State.

Table 3.12.1-5: Unemployment Rate Trends in Kittitas County and Washington State, 1996-2001

Area	1997	1998	1999	2000	2001	2002
Kittitas County	6.0%	6.0%	5.6%	5.8%	6.5%	6.1%
Washington State	4.8%	4.8%	4.7%	5.2%	6.4%	7.1%

Source: State of Washington Employment Security Department. 2003. Note: 2002 data are averages for year-to-date as of November, 2002.

3.12.1.4 Income and Local Government Revenues

<u>*Income*</u>
In 2001, the per capita income of Kittitas County residents of $21,728 was about 68 percent of the state average of $31,976 (Table 3.12.1-6). From 1998-2001, the county's per capita income grew at an annual rate of 2.4 percent. Over the same time period, the state's per capita income grew at an annual rate of 3.1 percent.

According to the 2000 U.S. Census, the poverty rate for Kittitas County in 1999 was approximately 19.6 percent, which exceeded the state average of 10.6 percent.

Table 3.12.1-6: Kittitas County Per Capita Income (1998-2001)

Area	1998	1999	2000	2001	% Average Annual increase (1998-2001)	% of State Total (2001)
Kittitas County	19,738	20,164	21,196	21,728	2.4%	68.0%

Table 3.12.1-6: Kittitas County Per Capita Income (1998-2001)						
Area	**1998**	**1999**	**2000**	**2001**	**% Average Annual increase (1998-2001)**	**% of State Total (2001)**
State of Washington	28,285	29,819	31,230	31,976	3.1%	

Source: Bureau of Economic Analysis. 2003.

According to the Washington State Office of Financial Management, the median household income in 2002 was $35,278 and is projected to be $35,924 in 2003.

<u>*Sales and Other Tax Revenue*</u>

According to the Washington State Department of Revenue, Kittitas County had an assessed value of approximately $2.4 billion in 2002. The 2002 average consolidated tax per thousand dollars of assessed value for the County was about $10.75. Revenues from property taxes are used to fund Kittitas County government, local school districts, local fire departments, libraries, and emergency medical services. These property tax revenues are also a major source of revenue for the local governments. Incorporated into the consolidated tax levy are local levies collected by the County Assessor and returned to the local jurisdictions as general fund revenues.

Recent trends in taxable retail sales in Kittitas County and Washington State are compared in Table 3.12.1-8. In 2002, retail sales in Kittitas County totaled approximately $412 million. From 1999 to 2002, retail sales in Kittitas County increased at an average annual rate of 2.9 percent. Over the same period, sales statewide increased at an annual rate of 1.6 percent. Both Kittitas County and the state experienced a decline in taxable retail sales from 2001, then an increase in 2002. The brief decline in retail sales probably resulted from the overall slowdown in the regional and national economies.

Table 3.12.1-8: Kittitas County and Washington State Taxable Retail Sales ($000s)					
Area	**1999**	**2000**	**2001**	**2002**	**Avg. Annual % Change 1999-2002**
Kittitas County	367,900	392,536	387,724	411,775	2.9%
Washington State	79,683,553	84,747,510	84,356,940	84,894,588	1.6%

Source: Washington State Department of Revenue. 2003.

<u>*General Fund Revenues*</u>

In 2003, the Kittitas County general fund had revenues of about $15.5 million. As shown in Table 3.12.1-9, approximately 38 percent of the revenue is expected to come from taxes. Other sources of revenue include licenses and permits, fines and forfeits, and intergovernmental transfers. Real and personal property taxes are forecast to be the largest contributors to revenues. Property taxes, which account for about 22 percent of total revenues, generated about $3.4 million in revenues. Sales and use taxes are expected to total approximately $2 million in 2003, providing approximately 13 percent of total revenues for the general fund (Kittitas County Auditor, 2003 General Fund Budget).

Table 3.12.1-9: Kittitas County General Fund, Total Resources (2003 Budget)		
Resources	**2003**	**Percent of Total Resources**
Real and Personal Property Taxes	$3,359,482	21.6%
Sales and Use Tax	$2,046,000	13.2%
Timber Harvest Tax	$150,000	1.0%
Excise Tax	$38,000	0.2%
Penalties on Taxes	$351,600	2.3%
Reserves and Carryover	$2,788,249	17.9%
Interfund Revenues	$233,909	1.5%
Misc. Revenue	$819,807	5.3%
Fines & Forfeitures	$1,483,350	9.5%
Charges for Services	$1,459,335	9.4%
Intergovernmental Revenues	$2,120,479	13.6%
Licenses and Permits	$699,200	4.5%
Total Resources	$15,549,411	100.0%

Source: Kittitas County Auditor, 2003 General Fund Budget

3.12.2 Impacts of the Proposed Action

3.12.2.1 Construction

Population and Housing

During major construction projects, there is always a chance that an influx of temporary workers requiring overnight accommodations will outstrip the supply of temporary housing. During construction, the Project would require up to 160 workers during a four-month period when construction activity is at its peak, and up to 90 workers for a couple of months on each end of the peak. A more detailed discussion of the anticipated construction workforce is provided in Section 2.2.6, 'Project Construction Schedule and Workforce.' Based upon the Applicant's experience with building wind power projects in other regions and recent examples from other wind power projects in the region (e.g. Stateline Wind Energy Center in Walla Walla County), up to half the construction workforce is expected to be from the local area. Due to the relatively short length of the construction period for any individual trade, most construction workers from outside the area are expected to commute daily to the site from the Yakima or Seattle areas, and those that do not are expected to reside locally only on a temporary basis and not to relocate their families. Therefore, many of these workers would not require overnight lodging.

For those workers that would require overnight lodging, the results of a telephone survey conducted by the Applicant of hotel, motel, RV Park, and campgrounds in Kittitas County indicates that there are 1,150 rooms or sites available in the county. The results indicate further that during the peak summer season, there are typically about 240 rooms or sites vacant at any one time. During the non-summer months, vacancy rates are much higher and it is estimated that there are usually around 760 rooms or sites vacant at any one time. As discussed above, there are also more than 1,000 vacant, non-seasonal housing units in Kittitas County. There are also many overnight lodging opportunities in the greater Yakima area, which had a population of 224,500 in 2000, and are within a one-hour drive of the Project. Thus, there appears to be an adequate supply of temporary housing available to accommodate non-local workers.

Employment and Income

Construction of the Project would result in increased employment and spending in Kittitas County. As mentioned above, the estimate of the extent of those impacts are based on the analysis included in the Phoenix Study, adjusted to apply to this Project. The extent of the impacts was estimated in the Phoenix Study using an input-output (I-O) model of Kittitas County. Input-output analysis is a commonly used technique that examines the relationships within a local economy between businesses and between businesses and their customers. I-O analysis includes a model of transactions in the local economy that allows an analyst to track how a change in final demand ripples through the economy in the form of direct, indirect, and induced spending.

In the I-O framework, a project or action that results in new spending for final demand, or a reduction in existing spending, is called a direct effect. The businesses that make the final sales must in turn purchase goods and services from other businesses. These indirect purchases are called indirect effects, which continue until leakages from the region in the form of imports, wages, or profits to persons outside the region end the cycle. Finally, workers at the producing businesses spend their wages in the local economy and purchase additional goods and services. These purchases are referred to as induced effects. The total economic impact of an action is the sum of the direct, indirect, and induced effects. I-O models generate multipliers that can be applied to direct purchases to represent the total direct, indirect, and induced effect of an action to different sectors of the economy.

During the construction phase, the economic impacts are estimated based on the following assumptions about Project construction:

- 250 total full and part time construction jobs over the entire construction period, with a peak of 160 workers for a four month period;
- 37 full and part time local construction jobs (for workers from Kittitas County) including construction management;
- A total Project cost of approximately $200 million. The largest single cost for construction is the purchase of the wind turbine generators and towers, which would be purchased either from GE Wind Energy (Tehachapi, CA) or from a European wind turbine manufacturer.
- $2,462,000 in local spending on construction materials such as gravel and concrete;
- $341,000 in spending on food and lodging by non-local labor in Kittitas County.

The construction impacts are expected to occur over approximately a one-year period. The direct, indirect, and induced economic impacts during construction are shown in Table 3.12.2-1 for total income and jobs. Total income consists of personal income in the form of wages, profits and other income received by workers and business owners, plus income from other sources such as payments to land owners who lease land for Project facilities. Jobs are the number of full and part time jobs expected to result from the Project and from the increase in spending in other sectors of the economy. As shown, the construction phase of the Project is projected to result in $4.8 million in total income and 71 jobs in Kittitas County.

Table 3.12.2-1: Economic Impacts in Kittitas County During Project Construction (2002$)

Impact Type	Total Income	Jobs
Direct	$3,783,000	37
Indirect	$428,000	12
Induced	$580,000	23
Total	$4,791,000	71

Source: ECONorthwest, Economic Impacts of Wind Power in Kittitas County. For the Phoenix Economic Development Group. October 2002. Modified for the Wild Horse Wind Power Project by CH2M HILL, June 2003.

The precise levels of construction wages vis-à-vis existing wage levels in the area are not known, as these will be determined by the construction contractor and their subcontractors, based on prevailing labor market conditions at the time of construction. It is therefore reasonable to assume that Project construction wage levels will be consistent with existing wage levels in the area. Finally, due to the short term of the construction period (12 months or less), even if wages paid by the construction contractor for the Project were higher than existing wage levels in the area, it is very unlikely that this would have any impact on other local employers beyond the short duration of the peak Project construction period (i.e. 4 months).

Fiscal Impacts

Sales Tax:
By statute, an exemption from state sales tax exists under RCW 82.08.2567 for renewable energy generating facilities. The Applicant has received confirmation from the Washington Department of Revenue that purchases of wind turbine generators, foundations, substations, control buildings, and power lines will be exempt from state sales tax. However, all other construction-related purchases would be subject to sales tax, as would indirect purchases such as construction workers' food, lodging, and fuel expenditures. There would also be other fiscal benefits that Kittitas County would receive from the Project, such as increased license and permit fees, use taxes, and charges for services.

Property Tax:
The Project would result in a substantial increase in the property tax base of the County and local taxing districts where the Project is located. These taxing districts include Kittitas School District #403, Hospital District #1, and County Road District #1. The effects of this increase in tax base are discussed under Operations below, as property tax payments would not be due until after Project construction is completed.

3.12.2.2 Operation and Maintenance

Population and Housing
There will not be a significant increase in population or housing demands due to the small number of workers required for operations. The Project is expected to require 14 to 18 total workers during operations, and some of them (up to half) are expected to be hired among persons already residing in Kittitas County. It is anticipated that roughly half of the operations workforce would be experienced wind power technicians and professionals that would relocate to Kittitas County to operate the Project.

Employment and Income
During operations, it is estimated that 14-18 workers would be employed to operate and manage the Project. It is assumed that all of these operations workers would reside in Kittitas County, with roughly half of them relocating to the county from other areas. There would also be spending on materials and services that would be necessary to operate and maintain the Project (e.g. fuel, maintenance supplies, road maintenance services, weed control services, etc.) The estimated annual direct, indirect, and induced income and jobs created by the Project during operations are shown in Table 3.12.2-2. As shown, the Project is projected to result in an estimated $1.4 million per year in added income and 26-30 additional jobs in Kittitas County.

Table 3.12.2-2: Annual Economic Impacts in Kittitas County During Operations (2002$)

Impact Type	Total Income	Jobs[a]
Direct	$1,000,000	14-18
Indirect	$45,000	1
Induced	$360,000	11
Total	$1,405,000	26-30

[a]Total may not add because of rounding.
Source: ECONorthwest, Economic Impacts of Wind Power in Kittitas County. For the Phoenix Economic Development Group. October 2002. Modified for the Wild Horse Wind Power Project by CH2M HILL, June, 2003.

Fiscal Impacts
As described in Section 3.13, ‘Public Services and Utilities/Recreation’, the Project is not expected to result in any significant increases in demand for public services or public expenditures. The Project will, however, result in a substantial increase in the local property tax base and will be the largest taxpayer in Kittitas County.

Based on an estimated total Project cost of $200 million, the Applicant estimates that the Project will increase the total valuation of real property in Kittitas County by approximately 8%, from $2.5 billion to $2.7 billion. To put this figure in perspective, the 2003 total assessed value of the ten largest taxpayers in Kittitas County combined is approximately $140 million and the largest single taxpayer in Kittitas County is Puget Sound Energy, with an assessed value in 2003 of $32,343,143 (Kittitas County Assessor, Feb. 2003). Therefore, it is anticipated that the Project would be the largest single taxpayer in Kittitas County by a factor of six and would have an assessed value greater than that of all ten of the current largest taxpayers in the county combined. It is expected that the Project will result in both increased revenues for state schools and local public services in the area as well as reduced property tax levy rates for local taxpayers.

It is anticipated that Project valuation for tax assessment purposes will be conducted by the Kittitas County Assessor's office. There is little established precedent regarding valuation of wind farms for tax purposes in Washington. Because the Stateline Wind Energy Center, which is located in Walla Walla County, Washington and Umatilla County, Oregon, is an interstate project, it was assessed centrally by the state Department of Revenue. In that case, the entire value of the Project was treated as new construction and therefore was exempt from the limits of I-747 (described below), and resulted in substantial increases in tax revenues to local districts.

Applicant cannot project with certainty the precise amounts of increased revenues vs. decreased levy rates resulting from the Project because it depends on what portion of the Project is considered real vs. personal property by the Kittitas County Assessor and how much, if any, of the Project the Assessor defines as "new construction." The Kittitas County Assessor has not yet provided a firm indication of the expected allocation between real property and personal property for the Project.

Voters in Washington approved Initiative 747 in 2001. I-747 limits a taxing authority's total property tax revenue increases to one percent per year. There are exemptions for new construction and excess levies approved by the voters. If the assessed value in a district increases dramatically, levy rates would likely have to be decreased in order to meet the requirements of I-747. It is anticipated that this would be the case with the addition of the Project to the local property tax base, because the Project would represent an increase of much more than 1% in total assessed value for the local districts. Assuming the property tax levies were reduced, it would result in lower property taxes for other taxpayers in the County.

Benefits to taxpayers in Kittitas County are derived from the additional services provided by tax dollars generated by the Project, as well as by the reduction in levy rates that would likely be required by Initiative I-747. The largest beneficiaries of the added revenue from the Project would be local and state schools, county government, county roads, and other local services.

In addition, development of this Project would result in increasing the value of other properties because of the increase in wages and overall economic activity in Kittitas

County. The Phoenix Study estimated that this secondary effect would result in an additional $78,000 in property taxes annually in the county.

Income to Landowners

The Applicant plans to purchase the privately owned land needed for the Project itself. The Applicant has entered into long term (i.e. 30 year) leases with the Washington Department of Natural Resources (WDNR) for approximately 34 wind turbine sites. Applicant intends to enter into a similar long term lease with the Washington Department of Fish and Wildlife (WDFW) for approximately 9 wind turbine sites. The amount of rental income paid to WDNR and WDFW would depend on the total number and nameplate capacity of wind turbines installed, the actual energy production, and the actual energy sales price. The estimates provided here are based on the best available information and assumptions regarding energy production and energy sales price.

Rental payments for the 34 WDNR turbine sites are expected to generate an annual average of approximately $200,000. Based on current WDNR policy, approximately 75 percent of the rental income will be allocated to the Common School fund, while the remaining 25 percent will go to the WDNR management fund. Rental payments are subject to an additional 12.48% leasehold tax, which contributes money to local taxing districts as well as the general fund. Rental payments for the 9 WDFW turbine sites are expected to generate an annual average of approximately $56,000. The Applicant is not familiar with the details of WDFW's policy for allocation of rental or lease income, but it is assumed the fund would be used to support the protection and enhancement of wildlife habitat.

The PSE and/or BPA transmission feeder line(s) and the PSE interconnect substation would be installed on private land under easements from the property owners. Payments to property owners that lease the land for the PSE transmission feeder would generate approximately $120,000 over the life of the Project.

Property Values

Some individuals have expressed concerns that wind energy projects could have a negative effect on property values by detracting from the views experienced by other property owners. The Project is located in a very sparsely populated area that is zoned Forest and Range and Commercial Agriculture, and the primary land uses in the immediate area are grazing and publicly-owned lands. There are less than 20 residential structures within 3 miles of the Project boundaries, and many of these are seasonally occupied cabins. Thus the potential for property value impacts related to viewshed impacts appears to be quite limited. The potential impacts of the Project on views in the area are discussed in detail in Section 3.11, 'Visual Resources/Light and Glare'.

The 2002 Phoenix Study includes the results of interviews with tax assessors in counties throughout the U.S. that have wind energy projects in place, and includes the results of a literature review of academic journals into this matter. For comparison purposes, the study also reported on studies that have been done about the impacts of electric transmission lines on property values.

The assessor's survey covered 22 projects in 13 counties. Of those 13 counties, six had residential properties with views of a wind farm, six had no residential properties with views of a wind farm, and one reported that the wind project was too new to assess any property value impact. All six of the counties with residential views of wind projects reported that the turbines have not altered the value of those properties. Of the six counties with no residential views, five reported that there was no impact on property values, while a sixth (Kern County, California) reported that land parcels with turbines on them have increased in value in response to changing the land from a grazing zone to a "wind-energy" zone.

The results of the literature review found only one study that specifically addressed the impact of wind turbines on property values. The study investigated impacts to residential properties in Denmark. The results were based on a small sample of homes, and were not significant statistically.

Because of the paucity of available literature on potential property value impacts of wind energy projects, the Phoenix Study also reported on the published literature about the impact of transmission lines on property values. Unlike wind farms, which some people find attractive, transmission lines are almost universally perceived as unattractive. Thus, the impacts of transmission lines may give an indication of the maximum possible impact that could be experienced by a wind energy project if such a negative impact exists. The results of the literature about the impact of transmission lines on property values can be summarized that their effect on property values is at most about a 10 percent reduction in value, and those impacts are short-lived i.e., the effects diminish over time.

Recently, another study, funded by the US Department of Energy and conducted by the Renewable Energy Policy Project (REPP) entitled "The Effect of Wind Development on Local Property Values" (May 2003, Exhibit 19) investigated the impacts wind turbines have on property values. The REPP study represents the most comprehensive analysis of the issue of wind farms and property values conducted to date. This study focused on wind development projects that were completed after 1998 with installed capacity of over 10 MW. Of the 27 projects identified, 10 projects had sufficient data to be reviewed. A comparative analysis was conducted of sales data of properties within a five-mile radius ("view shed") of a wind turbine versus a larger comparable region prior to and after the development of the wind farm. The statistical analysis in the REPP study does not support the claim that wind development projects have an adverse impact on property values on properties within the view shed of a wind farm.

These findings and the nature of surrounding land uses indicate that the Project is very unlikely to result in a negative impact to property values.

3.12.2.3 Comparison of Impacts of Proposed Scenarios

It is estimated that the number of construction and operations employment opportunities associated with all the scenarios being considered will be approximately the same. The only substantial difference in terms of fiscal and economic impacts among the proposed scenarios is the difference in total Project cost and the resulting impact on local property tax revenues. The difference in total Project costs among the proposed scenarios is largely a function of the difference in the total cost of the wind turbine generators, which is essentially linear with respect to total nameplate capacity (expressed in MW).

The analysis presented in the preceding sections is based on a total Project nameplate capacity of 204 MW. For the 312 MW scenario, the total Project cost would be roughly 65% higher. For the 158 MW scenario, it would be roughly 22% lower. It is assumed that these differences in total Project costs would translate into roughly linear increases or decreases in property tax revenues compared to the base case of a Project size of 204 MW.

3.12.3 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.12.4 Mitigation Measures

See Section 3.12.2, 'Impacts of the Proposed Action' for housing needs during construction. There appears to be an adequate supply of temporary housing available to accommodate non-local workers, therefore, no mitigation measures are proposed. The overall socioeconomic impact of the Project will be strongly positive for Kittitas County in terms of increased property tax base and employment opportunities, thus no mitigation measures are planned for population, housing, and economics.

3.12.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are expected.

3.13 PUBLIC SERVICES AND UTILITIES/RECREATION

This section presents an analysis of existing public services and utilities in Kittitas County including Kittitas, Ellensburg, and Vantage (the communities closest to the Project site) and potential impacts associated with construction and operation of the Wild Horse Wind Power Project ('Project'). The evaluation includes fire protection, police, medical services, schools, communications, sewer, solid waste, and water supply services. In addition, recreational facilities within approximately 25 miles from the center of the Project, and in some cases, recreational facilities that are beyond the 25 mile radius were included in this section.

Potential impacts to roads are fully described in Section 3.15, 'Transportation'. Operations and Maintenance (O&M) impacts, activities, and schedules are fully described in Section 2.2.7, 'Operations and Maintenance'.

3.13.1 Existing Conditions

3.13.1.1 Fire Protection

There are two fire districts to the southwest and southeast of the Project area, Fire District No. 2 (Rural Ellensburg) and Fire District No. 4 (Vantage). The proposed wind turbines will be located outside of any existing fire district, as this area is almost totally uninhabited (see Exhibit 21, 'Project Area Fire Districts'). The City of Ellensburg also has its own fire department. The Applicant is in the process of determining which Fire District will be responsible for fire protection services for the Project and will submit this information to EFSEC prior to construction as part of the Fire Protection and Prevention Plan.

Fire districts are staffed primarily by volunteers. Fire District No. 2 currently has five full-time paid personnel and approximately 95 volunteers. Fire District No. 4 is staffed entirely by volunteers. Both Fire Districts Nos. 2 and 4 have emergency medical equipment and extraction equipment for auto accidents, as well as Basic Life Support (BLS) services. Most of the rural fire districts have minimal services (equipment and personnel) for search and rescue. All districts have bimonthly or monthly training meetings. All districts have mutual aid agreements with neighboring districts and with the City of Ellensburg's fire department.

Fires that occur most frequently in the area near the Project are wild land fires (grass, brush, and timber), vehicle fires, and structural fires. District fire departments also receive calls for boating (District No. 2 responds to fires on the Columbia River, near Vantage) and hunting accidents; emergency medical situations such as heart attacks; recreational mishaps; propane spills and fires, and assistance to the State Patrol for HAZMAT. Most fires are man-made or caused by arson, with only a few naturally occurring fires, i.e., lightning.

3.13.1.2 Police

The Kittitas County Sheriff's Department and the Washington State Patrol provide law enforcement services for the entire county, except for some cities that provide their own law enforcement—Cle Elum, Roslyn (covered by Cle Elum), Kittitas, and Ellensburg. All state highway routes (SR-97, SR-970, SR-10, SR-821, I-90, and I-82) are patrolled by the Washington State Patrol. The Project is north of Vantage Highway, between the towns of Kittitas and Vantage. The County Sheriff's Department serves the unincorporated areas of Kittitas County.

The law enforcement services provided by the County Sheriff's Departments include traffic control, drug enforcement, search and rescue, and civil calls. The Sheriff's office has implemented a traffic safety program and is in the final stages of developing a proposal for a criminal justice facility in the area. Other county services include a K9 unit, SWAT team, marine patrol, and search and rescue (pers. comm., Carolyn Hayes). The Washington State Patrol provides traffic enforcement on state highways and drug enforcement, Hazardous Materials Team (HAZMAT) oversight, and incident response. The Washington State Department of Ecology in Yakima (approximately 35 miles south of Ellensburg) also provides a HAZMAT response team.

Sheriff Gene Dana heads the Kittitas County Sheriff's Department. He has 25 deputies on patrol, three detectives, a criminal chief, and an undersheriff. All officers are state-certified, and many have additional training for drugs, search and rescue, traffic control, and accidents. The Sheriff's Department is state and federal accredited. No additional personnel, holding facilities, vehicles, equipment, or other needs are anticipated during construction or operation of the Project

3.13.1.3 Schools

The Project is located in School District 403 (Kittitas). District 403 includes Kittitas Elementary School (grades K-5) and Kittitas Secondary School (grades 6-12). Table 3.13.1-1 lists the total number of students at each school, as well as by grade. The existing capacity of the Elementary School is 225 students and the existing capacity of the Secondary School is 350 students.

Table 3.13.1-1: Total Number of Students by School and Grade– Kittitas School District			
Kittitas Elementary School (grades K-5)		**Kittitas Secondary School (grades 6-12)**	
Grade	# of Students	Grade	# of Students
K	40	6	53
1	30	7	51
2	47	8	49
3	37	9	37
4	41	10	48
5	45	11	44
		12	38
Total:	240	Total:	320
Source: Kittitas School District #403, 2003.			

School bus routes use federal, state, and county roads near the Project area for student transportation. Further details on schools and their services are not provided as there will be no significant impact to local schools from the Project. Based upon the Applicant's experience with building other wind projects and recent experience at other wind projects in the region, up to half the construction workforce is expected to be from the local area. Due to the relatively short length of the construction period for any individual trade, most construction workers from outside the area are expected to commute to the site from the Yakima or Seattle areas, and those that do not are expected to reside locally only on a temporary basis and not to relocate their families. No demands for additional teachers or other personnel are anticipated during the construction period. Of the total 14 to 18 workers anticipated during Project operations, up to half are expected to be from the local area, based on the Applicant's experience with operating other wind projects and recent experience at other wind projects in the region. No enrollment impacts on schools are anticipated, therefore, no mitigation measures are being proposed. (See Section 2.2.6, 'Project Construction Schedule and Workforce' for more details.)

3.13.1.4 Parks or Other Recreational Facilities

Table 3.13.1-2 provides a list of recreational facilities and activities available within a 25-mile radius of the Project site or beyond; the radius is centered on the approximate middle point of the Project. Exhibit 22, 'Recreational Areas Surrounding Project Site' illustrates the area. This study area covers forests and wilderness areas, wildlife areas and refuges, boat launches, beaches and other water use sites, State parks, municipal parks, campsites, and museums. Ski areas are available beyond the 25-mile radius, at Snoqualmie Pass and Mission Ridge.

Washington State campgrounds are operated on a first-come, first-served basis, and state regulations limit overnight stays to 10 days. The U.S. Forest Service campgrounds exceed their capacity almost every weekend during the summer, often turning people away (Lucy Schmidt, U.S. Forest Service). National forests have a 14-day limit on camping. After that, campers must leave the campground for at least 24 hours before returning.

Summer recreational activities include water sports, such as fly fishing, swimming, boating, river rafting, and water skiing; as well as camping, biking, hiking, horseback riding, hunting, picnicking, bird watching, rock hounding, softball, and other team sports. During the winter, recreational activities include cross-country skiing, inner tubing, snowshoeing, skiing, sledding, snowboarding, and snowmobiling. There are no fishing sites within the Project area.

Table 3.13.1-2: Parks, Recreational Facilities, and Activities within 25 Miles of the Wild Horse Wind Power Project Facility

TOWNS	Distance in Miles
Kittitas	9.0
Vantage	10.0
Ellensburg	14.5
George	15.0
Cle Elum	17.0
Quincy	19.5
Wenatchee	23.5
STATE	
Colockum Wildlife Area	11.0
Quilomene (Schaake State) Wildlife Area	1.0
Whiskey Dick Wildlife Area	1.0
Ginkgo State Park	7.0
North Columbia Basin (Colockum) State Wildlife Area	8.0
Olmstead Place State Park	11.0
Crescent Bar Recreation Area	13.0
Squilchuck State Park	18.0
South Columbia Basin State Wildlife Area	20.0
Rock Island State Park	21.0
Priest Rapids State Wildlife Area	21.5
Wenatchee Confluence State Park	23.5
NATIONAL	
Yakima Firing Center	9.0
Wenatchee National Forest	12.0
U.S. Military Reservation Yakima Training Center	15.0
Columbia National Wildlife Refuge	18.5
Wenas Wildlife Recreation Area	20.0
OTHER	
Columbia River	7.4
Stan Coffin Lake	C

Evergreen Reservoir	C
Quincy Seeps Lakes Public Fishing Area	C
Burke Lake	C
Ellensburg Golf and Country Club, Racquet and Recreation Center, and Swimming Pool/Fitness Center	E**
Yakima River-Thrall Access	E
Fiorito Ponds	E
Matton Lake	E
ELLENSBURG CITY/COMMUNITY PARKS/CAMPGROUNDS	
Burlington Northern Square	E
Catherine Park	E
Irene Rinehart Riverfront Park	E
Kiwanis Park	E
Lions/Mountain View Park	E
McElroy park	E
Memorial Park	E
Paul Rogers Wildlife Habitat Park	E
KOA Campground (private)	E
Reed Park	E
Rotary Pavilion	E
Sagebrush Trail	E
South Main Entry Park	E
West Ellensburg Park	E
Whitney Park	E
Wippel Park	E
Skate Park	E
ELLENSBURG MUSEUMS	
Children's Activity Museum	E
Clymer Museum and Gallery	E
Kittitas County Museum	E
Olmstead Place State Park Heritage Center	E
Thorp Mill (located in Thorp)	E

Notes:
Includes areas of interest within a 25 mile radius of the Project site.
All distances measured from the closest property boundary line.
***E   Located in Ellensburg or vicinity*

3.13.1.5 Medical Services

Kittitas Valley Community Hospital in Ellensburg serves the entire county. There are 50 licensed beds, but only 36 are set up to be used, and those beds are not used to capacity. The hospital has Level Four trauma service, with a limited number of specialists available. Patients with head injuries, severe burns, and/or trauma are transported to a different facility, usually Harbor View Medical Center in Seattle. Less severe accident victims are sometimes transported to Yakima for hospitalization and treatment. There is a heliport on the roof of the hospital, and a helicopter is available for emergency response (Eric Jensen, Kittitas Valley Community Hospital administrator, personal communication). MedStar, a critical care transport service located in Moses Lake, Washington, also provides air ambulance support services to Kittitas County.

The City of Ellensburg fire department provides emergency medical services (EMS) for the entire county, directly billing for services that include treating injuries, falls, burns, fractures, lacerations, and heart attacks. The Ellensburg fire department has 1 chief, 3 captains, 6 EMS providers, 11 paramedics and 18 Emergency Medical Technicians (paid and reserves). Ambulances are located in Ellensburg, and the towns of Kittitas and Cle Elum. Also, Cascade Search and Rescue is located in Ellensburg. Emergency calls are dispatched through the Sheriff's office to the fire districts that provide search and rescue support.

In the event of a medical emergency at the Project site, the Personal Medical Injury emergency plan described in Section 4.6.3 will be enacted.

3.13.1.6 Communications

Telephone services near the Project are currently supplied by Ellensburg Telephone. Cellular phone service is available from a variety of providers. The closest cell towers are located approximately 3 miles south of the Project and are provided by Voice Stream Wireless and Nextel West Corporation. Cell phone coverage in the Project area itself is highly variable, depending on the terrain. Charter Communications offers high speed cable internet service to Kittitas. Ellensburg Telephone offers DSL and dial-up service to Kittitas.

Newspapers published and/or distributed in the area include the *Daily Record* (Ellensburg daily newspaper), and *Northern Kittitas County Tribune* (Cle Elum weekly newspaper).

There is no cable television service in Vantage. Cable television services are provided by Charter Communications in Ellensburg and Kittitas, R&R in Roslyn, and TCI in Cle Elum. Broadcast television service in the Project area is available for Channels 25, 31, 39, 41, 51, 54, 63, and 69. All of these stations are UHF channels and are broadcast from transmitter antennas located south and east of Ellensburg. Reception quality varies greatly, based on local topography and distance from the transmitter antennas (see Exhibit 24, 'Telecommunications Obstruction Analysis'). Radio transmission reception quality also varies throughout Kittitas County.

3.13.1.7 Septic System

A description of existing community sewer systems within the county is not provided as no public utilities will be used for the Project. Sanitary wastes will be collected in "portable toilets" during construction, and an onsite septic system is proposed for the operations and maintenance facility.

3.13.1.8 Water Supplies

Groundwater has not yet been exploited for beneficial use via drilled wells within the Project area according to a search of well logs for the Project area (Washington State Department of Ecology, 2003). The groundwater wells mapped in the area are at least 2 miles from the Project site boundary, and at least 1,000 feet lower in elevation. No well drilling is anticipated for construction or operation of the Project, as water will be purchased from an off-site vendor and trucked to the Project site.

3.13.1.9 Solid Waste

Solid waste disposal services in the area are provided by a construction and demolition ("C&D") landfill and a transfer station in Ellensburg. The Kittitas County Solid Waste Department manages the Rye Grass landfill, located on Vantage Highway, about 2 miles south of the Project site. The Ellensburg transfer station is operated by Waste Management, and does not accept hazardous wastes. There are drop boxes for limited materials recycling at the transfer station, but mixed paper recycling is not offered. Garbage is transported from the transfer station in Ellensburg to the Greater Wenatchee Regional Landfill located in East Wenatchee. The Ryegrass construction and demolition debris landfill operated by Kittitas County accepts inert materials including asphalt, construction debris, fencing, roofing material, concrete, brick, etc., as noted in Exhibit 23, 'List of Accepted Waste Materials'. All of these are licensed facilities.

3.13.1.10 Public Utilities

Puget Sound Energy (PSE) and Kittitas PUD No. 1 provide electric services within the county, except for the City of Ellensburg which has its own municipal electrical service. The Project will connect either to the Bonneville Power Administration or PSE high voltage transmission system. Currently, Kittitas PUD No. 1 has a single phase power line which runs parallel and adjacent to the north side of Vantage Highway. Power from this line is also fed up a branch line which feeds communications towers located on land owned by DNR in Section 34 at the east end of Whiskey Dick Mountain.

3.13.2 Impacts of Proposed Action

3.13.2.1 Fire Protection

Construction
Because of the number of workers and that the construction activities will be occurring in an area susceptible to wild land fires, there is increased potential for calls for emergency fire services. There is little or no potential for nacelles to catch on fire during construction, as they will not be operating yet. Given the fact that there are only three

residences within 2 miles of the Project site, fire risk to people and property is considered minimal. The Applicant has initiated discussions with Rural Ellensburg Fire District #2 for providing fire protection service under contract during the construction period.

Operations
Impacts from fire, either from a turbine or wild land fire in the Project area, could increase or be more difficult to control unless provisions are made for fire fighters to have easy access to the Project site. Mitigation measures including facilitating access to the Project will be made as described under Section 3.13.4 below to address these concerns.

Fires caused by lightning are rare in the area compared to man-made fires, and they usually occur on timbered ground. A lightning-caused fire at the turbines is highly unlikely because all turbines and towers will be built with engineered lightning protection systems, (see Section 2.2.4, 'Design Criteria for Protection from Natural Hazards'). Fires in modern turbine nacelles due to mechanical failures are also extremely rare. In the event of a nacelle fire, Project operations staff and fire personnel will not attempt to put it out, but only prevent the fire from spreading to any adjacent land. This will be achieved either by use of fire suppressant material or a small controlled burn around the base of the tower.

All operations personnel working on the turbines will work in pairs. In the unlikely event that an injury occurs while working in the nacelle, all staff will be trained in lowering injured colleagues from the nacelle. A rescue basket, specially designed for this purpose, will be kept at the operations and maintenance facility and will be available for use by local emergency medical services personnel. Training in its use will also be provided to local EMS personnel by the Applicant.

3.13.2.2 Police

Construction
Construction activities associated with the Project (commuting construction workers and the transportation of materials) will increase traffic volume on roadways surrounding the Project area. This increased volume will occur between the spring and fall seasons, depending on the construction schedule, but is not expected to significantly impact roadways (see Section 3.15, 'Traffic and Transportation'). It is possible that the number of accidents and calls for service along major roadways (Vantage Highway and I-90) could increase slightly for about six months, when most of the onsite work will be done. Enforcement activities may peak when employees peak, at about 160 construction workers during a period of approximately one to two months. Since the time period for construction is short, the existing police force should be able to provide adequate enforcement services. The Applicant will consult with the County regarding the impact on county law enforcement staffing. If additional staffing is required, the Applicant proposes to mitigate by prepaying a sufficient amount of taxes to provide adequate staffing levels during construction.

Out-of-area workers are not expected to move their families into the Project area as each craft will typically be completed within four months or less. They will either commute (from the Seattle or Yakima area, a one- to two-hour drive) or stay in temporary housing (RV parks, hotels, motels, or campgrounds) for the period of time needed to complete their tasks. Also, of the total work force, approximately 90 specialists will erect the turbine towers within about four months. These workers, required for this type of work, are expected to stay in temporary housing.

Assuming that most workers will not change their family residences, traffic violations are expected to be the largest concern for police enforcement. There should be minimal need to increase civil law enforcement, or for additional jail space. Traffic enforcement should be manageable with existing or temporary part-time Washington State Patrol and Sheriff's Department staff. Since the construction time period will be short, existing staff should be able to cover any additional law enforcement requirements.

Operations
Because the number of employees during operations will range from 14-18 workers, about half of whom are expected to be hired locally, there will be no significant impacts to law enforcement.

3.13.2.3 Schools

Construction
It is unlikely that construction workers will relocate their families to the study area during construction due to the expected short duration (maximum of three to four months) of employment for each craft. Therefore, no impacts are expected to local school districts.

Operations

There will be an insignificant impact on schools during operations because the number of employees who might have families moving to the area is small. Up to half of the 14 to 18 employees are expected to be hired locally.

3.13.2.4 Medical Services

Because the Kittitas Valley Community Hospital has capacity for additional patients and there are several ambulances available to service the Project area, there will be no significant impacts to medical services in the Project area during construction and operation. The Applicant will make arrangements with the Kittitas Valley Community Hospital for helicopter transportation service in the unlikely event that any operations personnel are seriously injured and require evacuation from a remote location within the Project area.

3.13.2.5 Parks or Other Recreational Facilities

Construction

Some workers may decide to stay at parks and campgrounds that allow overnight camping. These workers may displace existing recreational users. However, recreational demands are much higher on weekends, and workers more likely will use such facilities on weekdays.

In addition, it is possible that some construction workers will take advantage of the recreational opportunities within the county and throughout the region. This may include boat launches, parks, wildlife areas and refuges, and forest and wilderness areas, thereby increasing the number of users and again possibly displacing existing recreational users. Truck deliveries during construction will not significantly affect roads leading to Gingko State Park. See Section 3.15, 'Traffic and Transportation' for a detailed analysis of potential traffic impacts.

During construction, no public access to the Project site (including transmission feeder line corridors) will be allowed, in order to prevent any potential conflicts between recreational users and construction equipment and activities.

Operations

Some parks and recreational facilities currently exceed capacity during certain periods. However, there will be an insignificant impact on parks and recreation during operations because the number of employees who might have families moving to the area is small, and these families are unlikely to all be using the same recreational facility at the same time.

Some amount of tourism to the Project site is expected once the wind turbines are in operation. It is difficult to estimate the number of visitors the Project will receive. The Stateline Wind Energy Center near Walla Walla has attracted thousands of visitors since it was built in 2001, while other projects are visited far less frequently. However, given the Wild Horse Project site's remote location, it is not anticipated that large numbers of tourists will visit the Project, particularly given that one or two other large wind projects will likely be built in more accessible areas of Kittitas County closer to population centers.

The Applicant proposes to construct a visitor information kiosk and parking area off of Vantage Highway, just west of the main Project access road, as indicated in Exhibit 1b, 'Project Site Layout'. This kiosk will be equipped with interpretive information explaining the Project, as well as educational material regarding wind energy in general. Organized tours of the site will be facilitated from the onsite operations and maintenance facility. No public access will be allowed to any Project facilities which could pose a potential threat to the safety of visitors (e.g. substations.) Tourists visiting the site will contribute to the economy of the community by their purchase of local services (e.g., gas, food, and lodging).

During operations, access to the Project site will be controlled but permitted to the extent that it does not cause conflicts with the safe and efficient operation of the Project.

Controlled hunting will be allowed during Project operations, as described in Section 3.6.2.3, ‘Potential Wildlife Impacts - Big Game’. The potential impacts to habitat and wildlife of Project operations is also discussed in Section 3.6, ‘Wildlife’ and potential impacts to recreation are also discussed in Section 3.11, ‘Visual Resources/ Light and Glare’.

The transmission feeder line corridors will be located on easements across privately owned land. No changes in land use along these corridors are anticipated during Project operations. Access to these areas will continue to be at the discretion of the landowner.

Termination, Abandonment or Cessation of Operation
Public access in the event of Project termination, abandonment, or cessation of operation will be determined by the respective public and private landowners at the appropriate time. In the event of such termination, abandonment, or cessation of operation, Project facilities will be removed in accordance with the Project decommissioning plan as agreed.

3.13.2.6 Communications

There will be no impacts to telephone, newspapers, or cable and satellite television services in the Project area during construction or operations. The Applicant commissioned a detailed analysis of the potential for turbines to obstruct telecommunications facilities, such as line-of-sight microwave communications paths, in the Project area (Exhibit 24-A, ‘Microwave and Fresnel Zone Obstruction Analysis’). Locations of all proposed turbines and other infrastructure have been chosen so as to avoid any impacts on existing communications paths in the Project area. As described in Exhibit 24-A, the proposed turbines will not obstruct or interfere with any existing microwave telecommunications facilities, including those used by cellular telephone providers.

Wind turbines do not interfere with cellular telephone reception. In fact, in some European countries, including Germany, cell phone antennas are located on wind turbine towers. In the US, wind project operations personnel regularly use both cell phones and walkie-talkies to communicate with each other within and around large wind farms. There are no reported incidents of wind turbines interfering with cell phone reception. Therefore, there will be no obstruction to cell phone service or the ability of cell phone users to contact emergency service providers in the area.

The Applicant commissioned a detailed analysis of the potential for the Project to interfere with off-air television reception in the surrounding area. The results of this analysis are presented in Exhibit 24-B, ‘Off-Air TV Reception Analysis’. The conclusion of this analysis is that the Project will result in minimal to no degradation of television reception and that the number of potentially affected residences is extremely small.

3.13.2.7 Public Water Supplies and Domestic Wells

Domestic Wells
There will be no impacts to local wells near the Project site during construction and operations. The groundwater wells mapped in the area are at least 2 miles from the Project site boundary, and at least 1,000 feet lower in elevation. A more detailed discussion of potential impacts of the Project to local groundwater is presented in Section 3.3.2, 'Impacts of the Proposed Action - Groundwater'.

Public Water Supplies

Construction:
Water for construction will be purchased by the construction contractor from a source with a valid water right and trucked to the Project site in tanker trucks. Water use for Construction is estimated to be approximately 11 million gallons, as described in Section 3.3.2.3, 'Water Use During Construction'. The source for this water has not yet been definitively identified, however, the City of Kittitas has expressed interest in providing water for construction of the Project. Refer to Exhibit 13, 'Letter of Interest from City of Kittitas for Project Water Supply'.

Operation:
Water use for Project operations is expected to be minimal, and is limited to domestic uses (supplying the lunchroom and bathroom in the operations and maintenance facility and incidental maintenance uses.) Operations phase water use is expected to be substantially less than 1,000 gallons per day. This water will be purchased from a local vendor and trucked to the Project site and stored in an on-site water storage tank at the operations and maintenance facility. The Project does not anticipate using substantial quantities of water from public systems and thus no impacts are expected.

3.13.2.8 Sewage/Solid Waste

Construction
There will be no significant impacts to community sewer systems. The Project will not be connected to a sewer system during construction or operations. Sanitary wastes will be collected in portable toilets during construction. Therefore, no discussion of local sewage treatment facilities is necessary.

During construction, the primary wastes generated will be solid construction debris such as scrap metal, cable, wire, wood pallets, plastic packaging materials and cardboard. The total volume of construction wastes is expected to be approximately 30 drop boxes weighing about three tons each on average, for a total of less than one hundred (100) tons. By comparison, this is considerably less solid waste than is generated by a single large apartment building over the course of a year.

The waste will be accumulated on site in dumpsters and/or drop boxes until hauled away, either to the Ellensburg transfer station or the Ryegrass landfill, by either the Applicant, site contractor or a local solid waste collection service provider, such as Waste Management. Much of the construction waste will be recyclable. Specific recycling program details will be developed by the construction contractor. Please refer to Exhibit 23, 'Accepted Waste Materials', for a list of materials that are accepted at the Ryegrass landfill. The only materials expected to be produced by the construction of the Project that are not accepted at the Ryegrass landfill are cardboard and food-related wastes. There will be no significant impacts to solid waste disposal sites or services.

Operations:
For operations, an on-site septic system will be installed, in accordance with County and State regulations. Collection of solid wastes at the operations and maintenance facility during operations either will be contracted or employees of the Project will haul the solid wastes to the local licensed transfer station and/or landfill. Solid waste generation during operations will be minimal (on the order of one dumpster per week) and thus there will be no impact to local solid waste facilities.

3.13.2.9 Public Utilities

Local Electrical Service Provider
Kittitas PUD No. 1 provides local electrical service to the areas and very few residences near the Project. It is not anticipated that the Project will draw power from Kittitas PUD No. 1 for purposes of construction or operations. During construction, power will be provided by portable generators and trailer mounted generator/light stand fixtures. During operations, the Project will run on station power taken directly from the on-site step-up substation(s). The Project will generate power output approximately 80% of the time and will consume a small amount of electricity during periods of low wind. The Project is estimated to consume less than 1% of Project energy generation. There will be no impact to adjacent or other nearby electrical service facilities.

Feeder Lines and Interconnection to the Grid
Power from the turbines will be collected through an extensive underground and overhead collection system and fed to the BPA and/or PSE step-up substations on the Project site as illustrated on the Site Layout in Exhibit 1. From the step up substations, power will be fed through high voltage feeder lines which run to the utility systems as described more fully in Section 2.2.3 'Project Facilities'. Both BPA and PSE have performed system impact studies for the Project which indicate that their transmission systems have adequate available transmission capacity to accept power from the Project at the proposed points of interconnection (POI) without significant changes to their operations or the requirement of additional dedicated staffing. A full description of the types of facilities to be constructed to allow for interconnection is contained in Section 2.2.3 'Project Facilities'.

3.13.2.10 Fiscal Impacts

As described in the preceding sections, impacts of the Project in terms of additional demands on public services are expected to be minimal. The Project will result in a substantial increase in the local property tax base and additional revenues to local jurisdictions through both direct and indirect effects of increased employment and spending as well as increased property and sales taxes. A more detailed discussion of these impacts is provided in Section 3.12.2, ‘Population, Housing, and Economics - Impacts of Proposed Action’. The net fiscal impact of the Project is expected to be strongly positive, thus no additional mitigation measures are proposed.

3.13.2.11 Comparison of Impacts of Proposed Scenarios

Potential impacts to public services, schools, utilities and recreation are expected to be equivalent for all scenarios under consideration. The number of construction and operations employees for all scenarios is expected to be the same. Avoidance of communication pathways have been taken into account in all three scenario designs.

3.13.3 Impacts of No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or “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.) See Section 2.3, ‘Alternatives’.

3.13.4 Mitigation Measures

Potential impacts to public services and utilities will be mitigated by the tax revenues generated by the Project. Fiscal impacts of the Project are addressed in Section 3.12, ‘Population, Housing and Economics.’ No further mitigation is necessary or proposed.

3.13.4.1 Construction

Because construction activities at the Project are not expected to result in significant impacts to medical services, schools, public utilities, communications, water supplies, sewage/solid waste disposal, or stormwater systems, no mitigation measures will be necessary for those services or utilities.

The following mitigation measures will be implemented to reduce impacts to public services resulting from construction and operations of the Project:

- The Applicant will provide all police, fire, and emergency medical personnel with emergency response details for the Project including detailed maps of the Project site access roads, Applicant contact information, procedures for rescue operations to the nacelles, and location of the rescue basket.

Potential impacts to fire services will be mitigated by the following:

- The Applicant has initiated discussions with local fire district(s) regarding a contract for fire protection services during construction and ongoing fire protection services during operations;
- Provisions for special training of fire district personnel for fires related to wind turbines;
- Training for EMS personnel in the use of a rescue basket that will be kept at the operations and maintenance facility for the purpose of removing injured employees from the WTGs;
- Providing detailed maps to fire districts that show all access roads to the Project;
- Providing keys to a master lock system to fire districts that will enable emergency personnel to unlock gates that would otherwise limit access to the Project;
- Use of spark arresters on all power equipment (e.g., cutting torches and cutting tools), when necessary due to extreme fire danger conditions;
- Informing workers at the Project of emergency contact phone numbers and training them in emergency response procedures;
- Carrying fire extinguishers in all maintenance vehicles.

3.13.4.2 Operations

During operation of the Project, impacts to local services and utilities are expected to be insignificant. However, emergency preparedness planning will be implemented as mentioned above, to reduce potential impacts in the event of an emergency. No additional mitigation will be required.

3.13.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are anticipated for public services, utilities, or recreation.

3.14 CULTURAL RESOURCES

3.14.1 Introduction

A cultural resources evaluation was performed to identify and assess any potential impact on cultural resources located within the Project area. These resources may include previously documented or undocumented historic, cultural and archaeological resources as well as traditional cultural properties (TCPs). To determine if the Project area contains any significant cultural deposits, Lithic Analysts was contacted to conduct an extensive and systematic on-ground cultural resource survey of the proposed Project area. The survey areas (areas effected by actual as well as potential ground-altering activities) included locations of all turbine strings, on-site step-up substations, off-site interconnect substations, new roads, existing two track roads, gravel roads, proposed PSE and BPA feeder lines, and existing power line rights-of-way as indicated on the site survey map included in Exhibit 1-B. The pedestrian survey for the Project area was conducted in April, May and October 2003. The weather, for most of the survey, was clear, and access to all areas was unobstructed.

3.14.1.1 Regulatory Framework

Federal
Section 106 of the National Historic Preservation Act (NHPA) requires that any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking, or issuing licenses or permits, must consider the effect of the proposed undertaking on historic properties. No federal action is anticipated in relation to the proposed Project. If the Project ultimately interconnects with the BPA transmission system, BPA would be responsible for implementation of the NHPA.

State
RCW 27.53.060 further provides protection of cultural resources on private and public lands in the State of Washington.

3.14.2 Existing Conditions

3.14.2.1 Regional Context

The Project area is located approximately 11 miles east of Kittitas, Washington, and 10 miles west of the Columbia River near Vantage, Washington, on a series of ridge tops that separate the Kittitas Valley from the Columbia River and mark the beginning of the Cascade foothills. The Wenatchee National Forest is northwest of the Project area, the Quilomene Wildlife Area is northeast and the Whiskey Dick Wildlife Area is southeast of the Project area.

The Project area receives an annual effective precipitation rate of less than nine inches. The area lies within the *Artemisia tridentata/Agropyron spicatum* association of the shrub-steppe vegetation environmental zone. This zone occupies the center of the Columbia Basin Province and extends west to the foothills of the Cascade Range. Most of the Project area, particularly the higher elevations are situated within lithosols or regoliths, thus the sediments are extremely rocky.

The Columbia River Basalt formation dominates the underlying geology of this Project area. This formation was the result of an outpouring of a long sequence of Miocene lava flows covering an area of over 500,000 square miles. Individual lava flows were approximately 27 feet to 100 feet thick, with a total thickness of 2,000 feet to 5,000 feet. (Franklin and Dyrness 1988:29). Interspersed between layers of basalt are interbeds of sedimentary deposits called the Ellensburg Formation. It is within these layers that opal, chalcedony, jasper, and chert are found. Prehistoric knappers utilized these lithic materials for flaked stone tool manufacture. Glaciers, 2,000,000 to 10,000 years ago, further carved the Project area, helping to create the narrow, rocky ridges upon which the proposed Wind Turbine Generator Strings will be erected. Section 3.1.1, 'Earth' contains a detailed discussion concerning the geology of the Project area.

3.14.2.2 Prehistory

Culturally, the area is referred to as the Southern Plateau, which stretches from the Okanogan Highlands in the north to the Bitterroots in the east, the southern edges of the Deschutes and John Day Rivers (in Oregon) in the south, and the crest of the Cascade Mountains in the west. Within the Southern Plateau, the Kittitas or Upper Yakima and others occupied the subregion called the South-central Plateau (Ames, et.al. 1998). During ethnographic times, the predominant language of the Southern Plateau was Sahaptin, of which the Kittitas spoke the NW dialect along with the Yakima, the Klickitat, the Upper Cowlitz or Taitnapam and the Upper Nisqually. But, nearly half the languages of the Plateau cultural area belong to the Salishan family group. Salishan is also spoken on the Northwest coast. There are seven languages of the Interior branch spoken on the Plateau. The southeastern group of these seven includes the Columbian spoken by the Sinkayuse, the Wenatchee and the Chelan (Kincade, et.al. 1998).

There are numerous chronological sequences or phases that have been proposed for the archaeological record on the Columbia Plateau. These assigned phases generally are an effort to place documented cultural material remains within a certain framework. Chronologies usually rely heavily on projectile point characteristics or morphology—instead of technology—to place an archaeological site with a particular prescribed phase. No attempt has been made here to discuss Plateau cultural history within such a context. Rather, the many archaeological studies for the area have been synthesized to arrange Plateau cultural history into three general periods ranging from about 11,500 years ago to A.D. 1720 (Adapted from Ames, et. al. 1998, unless otherwise noted). Following is a brief summary of these time frames. They are strictly academic and do not reflect tribal viewpoints.

Period I. 11,500 years ago to 5000/4400 B.C. Period IA dates from 11,500 to 11,000 years ago. The Richey-Roberts Clovis Cache is the only known site on the Southern Plateau containing intact deposits of this age. Other evidence of these earliest occupations consists entirely of surface finds. There is little available evidence of cultural continuity from Clovis to later-dating periods, though a strong connection with other regions to the south and east is implied. Period IA sites have not been identified in the South-central Plateau.

Period IB dates from 11,000 years ago to 5000/4400 B.C. Post Clovis cultures practiced a broad-spectrum hunter-gatherer subsistence strategy consisting of high seasonal and annual mobility, low population densities, and a technology suited for maximum flexibility. In that economy, wide ranges of foods were exploited. People moved frequently and left no evidence of dwellings or structures.

The great majority of Period IB sites, particularly those dating prior to 7000 B.C., are concentrated in the central and eastern portions of the region. Most major sites are located along the Columbia and Snake Rivers and tributaries; sites are also documented in the surrounding plateaus and mountainous uplands, indicating that all regional environments were used. A documented Period IB archaeological site is located at Ryegrass Coulee near Vantage, east of the Project area on the Columbia River.

Period II. 5000/4400 to 1900 B.C. Semi subterranean pit houses appear in the archaeological record for the first time along with evidence of increased exploitation of certain nutritious roots and salmon. Less investment is made in the manufacture of stone tools as judged by their decline in quality. Semi subterranean pit houses are seven to eight meters across, circular to rectangular in plan view, and one to two meters deep. The houses generally lack evidence of superstructures and their contents include clusters of large hopper mortar bases and anvils resting on their floors. The presence of semi subterranean pit houses likely represents a region-wide shift in settlement patterns to some form of semisedentism. However, there are few dated dwellings in the region 2000 to 1800 B.C.

Period III. 1900 B.C. to A.D. 1700. The beginning of this period is marked by the widespread reappearance of pit houses, increasing heavy reliance on fishing and storage of salmon, intensive exploitation of camas, and evidence of land use patterns that persisted into the 19th century. These land use patterns include seasonal (usually winter-early spring) villages in the canyons and exploitation of uplands and mountains from special use camps during the summer and fall.

By 500 B.C., pit houses were common and highly variable in size with evidence of superstructures. Large pit houses (diameters greater than 12 meters) became more common after A.D. 1000. Large concentrations of houses – towns and villages – also appeared in the record by A.D. 500; longhouses entered the archaeological record after A.D. 500. Like pit house, net weights became quite common suggesting greater use of fishing nets. While there is very little evidence of food storage pits in Periods I and II, storage pits with salmon remains are seen at the beginning of Period III. Period III is the only period in Plateau prehistory that is also represented by fiber and wood artifacts and other perishables.

Pit house sites are found along the Columbia and its tributaries and clusters of house pits have been located on terraces of very small streams that flow into larger rivers; and in totally unexpected places.

Sub period IIIA. 1900 B.C. to A.D. 1 This sub period in the west-central Plateau reveals: increased population and sedentism, changes in subsistence patterns, large riverine villages and the appearance of communal villages, larger and more functional artifact assemblages, and an increase in trading of non-local items utilizing pre-existing trade networks. A greater diversity in the physical styles of housing and the larger numbers of dwellings documented during this period likely reflect an expanding regional population base.

Artifact assemblages are dominated by expedient tools, and salmon are a dominant component of faunal assemblages. Large mammals are also a principal source of food. Seasonal root and vegetable food gathering and raw material extraction were among the prominent activities pursued from upland camps.

Sub period IIIB. A.D. 1 to 1720. This subperiod marks the appearance of the ethnograhically defined winter village pattern. By A.D. 1, pithouses are found among most salmon-bearing rivers and streams, and upland camps and use areas occur in expanded numbers. Hunting and hunting-related activities, plant gathering and processing and lithic quarries and collection areas are among the most common of site occurrences in these areas. The first documented examples of longhouses appear during Sub period IIIB.

The longhouse at Avy's Orchard (East Wenatchee), dated to A.D. 889, was a semi subterranean structure, implying an evolution to a surface structure found later. This change was most likely linked to the adoption of an equestrian lifeway over most of the region after A.D. 1720. Even though there were some changes in housing during sub period IIIB, the circular, semi subterranean pit house or mat lodge remained the dominant form of housing. These were easily adapted to a surface structure with the introduction of the horse and increase in settlement mobility. The number and diversity of nondwelling structures, such as sweatlodges, also increased during this period.

Hunn (1990) states that the Plateau way of life remained "fundamentally the same" throughout prehistory until the rapid changes brought about by European American influences during the 1700s and later. Any changes noted represent subtle shifts of emphasis rather than profound redesign of Plateau economic and social patterns. As stated by Kirk and Daugherty (1978), culture change proceeded at a modest pace through the ages into the historic period. Events that drastically altered the subsistence patterns in Plateau life included the introduction of the horse, the spread of diseases, the fur trade and European American emigration onto native land (Hunn 1990).

3.14.2.3 Ethnography/Ethnohistory

The Project area is situated within the Yakama Nation ceded territory. The Kittitas Indians are one of five closely related, but independent, bands that today make up the Yakama Nation—the Yakima, the Kittitas, the Klickitat, the Taitnapam and the Wanapum. The Kittitas lived, generally, in the Yakima River valley drainage from Selah Creek south of Ellensburg, north to the area near Keechelus Lake at Snoquamie Pass (Schuster 1998). This area is often referred to as the Kittitas Valley.

The Confederated Tribes of the Colville Reservation (CTCR) also have an interest in the Project area. CTCR ceded territory includes Northwestern Washington. The tribes of the CTCR are the Sinkayuse or Moses-Columbia, Wenatchee, Entiat, Chelan, Methow, Okanogan, Nespelem, Lakes, Colville, Palus, Sanpoil and the Chief Joseph Nez Perce.

Chief Moses claimed the area which includes the Project as part of Columbia traditional territory when negotiating with the U.S. Government for a reservation in 1872 (Ruby and Brown (1965). The Columbias utilized lands east and south of the Big Bend in the Columbia River. There was a distinct subgroup at Quilomene Bar on the Columbia east of the Project area (Miller 1989). Early trails led up the Quilomene from the Columbia River to cross over to the Kittitas Valley. The Moses Columbia utilized the area in what is now eastern Kittitas County, and often participated with the Kittitas in local root gathering (Anastasio 1972, Ruby and Brown 1965), thus accounting for some overlapping between Yakama and Colville traditional territory. Columbia territory was centrally located and villages were often located along the borders of their territory, providing them with continued contact with other Salishan as well as Sahaptin speakers. The Columbias had an extensive network and were known to travel east to the bison grounds. They also traded with formal partnerships involving the Kittitas and Snoqualmie (Miller 1989) and other coast tribes.

As part of the Plateau cultural group, the Kittitas and the Moses Columbia utilized a riverine settlement pattern, based upon sharing of diverse resources among bands of related and extended family groups. Beginning in April with root gathering—before the spring Chinook run at the Dalles—they followed a subsistence cycle referred to as the seasonal round, traveling to and from resource procurement grounds (Hunn 1990). Regional trading centers were located at Che-lo-han near Kittitas, Soap Lake, Waterville, Kettle Falls and the mouths of the Wenatchee and Okanogan Rivers and Icicle Creek (Miller 1989). Through spring, summer and fall, they gathered and processed various foods contained within the surrounding areas, including camas, bitterroot, lomatium and other roots, berries, fish, deer, elk, medicinal herbs and other plants and animals (Hunn 1990).

Celilo Falls and The Dalles, great fishing and trading centers, were located down river on the Columbia. Celilo Falls was the principal fishing area for the entire region. There were many other Columbia River fisheries up and down the river—one at Priest Rapids, for example. Trading and fishing at The Dalles attracted not only Plateau groups, but people from as far away as the Northwest Coast, with trade items available from the Great Plains and Northern California. The Kittitas, the Moses Columbia and others followed the trails from the Upper Yakima River through Union Gap and on south to Celilo. Other fisheries utilized by the Kittitas during the summer and early fall were located to the northwest at the outlets of Lakes Cle Elum, Keechelus, and Kachess—Lake Cle Elum being the largest (Schuster 1990). In addition, fishing sites are found along the entire length of the Yakima River, and it is likely that campsites along many stretches in the Kittitas Valley were used for plant gathering and processing as well (DePuydt 1990).

During ethnographic times, the Kittitas maintained close ties to both Sahaptin and Salish-speaking tribes (Ray 1936, Prater 1981, Miller and Lentz 2002), particularly the Moses Columbia, the Wenatchee and the Snoqualmie. They were expert traders and maintained particularly strong trade relations with the Snoqualmie, and were known to winter with them at their village below Snoqualmie Falls (Prater 1981).

The Kittitas resided along the upper Yakima River from Cle Elum Lake to the Yakima Canyon. There were at least eleven known Kittitas villages located in this portion of the Yakima River valley. Most were near the Yakima River, and the others were near creeks flowing into the Yakima River (Schuster 1998; Ray 1936).

Nearest to the Project area, Ray (1936) noted the village of Na'nam, with about 400 people located on present-day Naneum Creek, which is about ten miles to the west. Two villages were also located at the present site of the town of Kittitas. These villages were close to the near-by root gathering grounds, and contained the highest concentration of people in May and June. Both villages had Salish names, which translate to "grasshopper creek" and "standing by the side of your arm" (Ray 1936). The Sinkayuse or Moses Columbia Indians spoke Salish (Miller 1998), and this is part of the traditional use area claimed by Chief Moses (Ruby and Brown 1965). The famed horse racing area was located just to the north, where Caribou Creek enters the Kittitas Valley (Kittitas County Centennial Committee [KCCC] 1989). Visited by Alexander Ross in 1814, it was used regularly in the spring and fall by native people until as late as 1912 (Paul 1996). This area of the Kittitas Valley with tall bunch grass and plentiful water supported vast herds of horses (KCCC 1989).

Many trails once dotted the local landscape, connecting the villages located at the head of Yakima Canyon with the area west of the Cascades and the Columbia Plateau to the east. Ray (1936) reported several Indian trails in the Kittitas Valley. One followed the southern bank of the Upper Yakima River west to the upper reaches of the Cle Elum River. Trails extended north from the Yakima River trail into the mountains and to Wenatchee. Another crossed from the mouth of Naneum Creek to Reecer Canyon and then to Swauk Creek. Portions of present-day Interstate 90 (Prater 1981) west of Thorp were literally constructed over the ancient Indian trail leading westward across the mountains through Snoqualmie Pass. Schnebly Coulee, which became Highway, Vantage Highway, and Ryegrass Coulee, which became Interstate 90 in Eastern Kittitas County, both were originally trail access from the Columbia River. In addition, the Kittitas and other Yakima used Naches Pass to reach Puget Sound to trade at Fort Nisqually (Glauert and Kunz 1976). The trail up Naneum Creek over Colockum Pass to the Columbia River and the Wenatchee area was steep and dangerous. Residents of Wenatchee and Ellensburg upgraded it to a rough road in 1883. It was used as a stagecoach road until the advent of railroads and later the automobile. The Colockum Pass road is still in use today as a dirt road (KCCC 1986). It was inventoried by the OAHP as historical site #19-132.

The horse arrived in the Kittitas Valley around 1740, after being traded by the Shoshone to other Plateau Indians, and then to the Kittitas. With the resulting increase in mobility, they could then travel greater distances, often to the Great Plains in pursuit of buffalo, or to inter-tribal trade centers and social gatherings.

Indians have always enjoyed competition in horsemanship. Skill in handling became a source of prestige. Status measurements changed and wealth was counted in horses, which thrived on upland grasses on the Plateau. Plateau people were thus influenced by the plains culture and adopted many of their practices, such as dress, dancing style, housing style, decorative beaded horse garments, European trade goods, and changes in inheritance patterns (Meinig 1995, Schuster 1990). Even so, riverine environments remained important and most groups retained their previous subsistence customs. Although horses and European trade items were acquired in the early part of the 18th Century, consistent Euro-American contact began with the Lewis and Clark Expedition in fall 1805, well south of the Project area.

3.14.2.4 Historic Setting

Euro-American influence in the Kittitas Valley began with early explorers. British fur traders for the North West Company, such as David Thompson and Alexander Henry the Younger, descended the Columbia past the junction of the Yakima River in the summer of 1811 and fall of 1813, respectively. David Thompson, of the Montreal based Northwest Company, traveled the length of the Columbia River from Kettle Falls to the mouth in his efforts to map a route from the Interior to the Pacific Ocean (Meinig 1995), and claim the land for Great Britain. Along the way, he established fur trade contacts among the native peoples of the valley. He and his crew of French Canadians and Indians camped the night of July 8th at the mouth of Crab Creek, where they were ravaged by mosquitoes and high winds. Thompson arrived at the mouth of the Columbia only to discover the Americans constructing a fur trade post under John Jacob Astor's Pacific Fur Company. His return trip up the Columbia was partially shared with a team from the Pacific Fur company, lead by David Stuart. Among Stuart's crew was a clerk by the name of Alexander Ross. Once he reached the mouth of the Snake, Thompson traveled from there to the mouth of the Palouse, then left his water route to return overland (Anglin 1995). Stuart and his men, lagging behind, kept to the water route.

Alexander Ross, who kept excellent notes, was the first known Euro-American to enter the Kittitas Valley near the Project area later in 1814. He came to the valley to purchase much needed horses at the Che-lo-han encampment, otherwise known as the Council Gathering Grounds, located near the present-day town of Kittitas. Ross estimated that Che-lo-han stretched for more than six miles. It was here that he counted over 3,000

Indians, not including women and children, and a vast herd of horses. Ross likely exaggerated his population count to intrigue Eastern audiences:

> *It was a grand and imposing sight in the wilderness, covering more than six miles in every direction. Councils, root-gathering, hunting, horse-racing, foot-racing, gambling, singing, dancing, drumming, yelling and a thousand other things, which I cannot mention, were going on around us* (Glauert and Kunz 1976).

Fur traders, trappers and explorers—both American and British—soon followed though fur trading did not have the early impact on the Kittitas Valley that it did elsewhere. Generally though, construction of Fort Vancouver by the Hudson's Bay Company in 1825 greatly increased contact with fur traders. Trading was also brisk with Fort Nisqually on Puget Sound. Rather than furs, the Yakima used their best asset, the horse, as a trading commodity to acquire all nature of trade items, such as guns, ammunition, beads, blankets, axes, knives and projectile points. Beef gradually became a staple in Indian diet. Some time after 1840, the Kittitas under Ow-hi and later Kamiakin began grazing their own herds in the valley (Schuster 1990). They imported Black Spanish or Sandwich Island cattle from the Hudson's Bay Company at Fort Vancouver (Glauert and Kunz 1976). As with fur trading, initial European American settlement did not influence the Kittitas Valley as much as elsewhere because the land was not considered good for farming (Schuster 1990).

In May 1841, Leiutenant Charles Wilkes of the United States Exploring Expedition sent Robert Johnson from Puget Sound overland to assess the navigability of the Columbia River and explore the interior of the Columbia (Anglin 1995). On his way, Lt. Johnson stopped in the Kittitas Valley to purchase fresh horses. His negotiations were not without difficulty because the Kittitas chief, Te-i-was, was reluctant to part with his best mounts. While there, Johnson learned that game was scarce and the beaver had all but disappeared. Johnson observed and recorded camas and other roots being dug by the women, as well as the method of preparation by drying, pounding them into a mass between two stones and then baking them in an oven. Johnson also observed a patch of potatoes being cultivated near the Columbia River within a small square of land surrounded by turf walls (Wilkes 1845).

The Kittitas Valley, as part of the Oregon Territory, was governed under joint occupancy between the British and Americans until 1846. After that time Euro-American settlements increased throughout the region. Catholic missions were established in the Yakima River Valley in 1847 (Schuster 1982) at the invitation of Ow-hi (Ricard 1976). Most missions were located a distance away from the Project area at Ahtanum and on Manastash Creek (Glauert and Kunz 1976). There was possibly one, however, at the mouth of the Taneum on the Yakima River (Olmstead-Smith in Miller and Lentz 2002). Few, if any, adult Indians were baptized or attended mass on a regular basis (Ricard 1976). However, the Catholic fathers had good relationship with the Indians, particularly Kamiakin, Ow-hi, and Te-i-as. Father Pandosy often served as an interpreter and trusted counsel for them during negotiations with the U.S. Government (Glauert and Kunz 1976). Tensions and fears were high throughout the region after the deadly attack on the Whitman Mission near Walla Walla. In addition, the Protestant settlers did not trust the Catholic priests. Once hostilities actually occurred in 1855, the Catholic mission at Ahtanum was sacked and burned by vigilantes (Hunn 1990, Schuster 1982).

The relative isolation of the Yakima Valley began to disintegrate in the 1850s as events proceeded rapidly. The Donation Land Act was passed, and Indian lands in the Northwest were opened for settlement. Euro-American settlers began moving into areas on both sides of the mountains. Washington Territory was formed in 1853, and Isaac Stevens was appointed governor and Indian agent. Besides surveying a railroad route across the territory, Stevens's primary motivation was to gain legal and undisputed title to Indian land so settlement could proceed unobstructed (Hunn 1990). At Stevens's direction, Captain George B. McClellan conducted a preliminary survey to construct a military wagon trail over Naches Pass and surveyed the Kittitas Valley. Even though he mapped much of the interior Cascade Range, he was unsuccessful in his efforts to get his men over Snoqualmie Pass because of heavy snow. This was left to army engineer Tinkham, who succeeded in 1854 (Glauert and Kunz 1976).

It was McClellan who first introduced the word "Kittitas" into the geographic lexicon, though it was later misspelled by Stevens's staff when they drew the maps. McClellan reported that his base camp was at Kittitas, the name of a nearby Indian encampment. In addition, the priest, Father Pandosy had baptized his first convert at that location and spelled it in his records as "Ki-tatash." Many meanings have been ascribed to the name, but the early frontiersman, Charles Splawn said that *kittit* means white chalk and *tash* means place of existence. There are many places in the area where white chalk can be found. One, in particular is located on the Yakima River just south of Ellensburg. Chalk was used by the Indians to paint their faces and their horses (Glauert and Kunz 1976).

In 1853, James Longmire brought the first wagon train of settlers through the territory and across Naches Pass to the Puget Sound region (Glauert and Kunz 1976, Schuster 1982). McClellan discovered gold in the Kittitas Valley in 1853, but attention was not paid until larger mines were discovered in the Colville area in 1855. Tensions increased as miners crossed through the Upper Yakima Valley to reach the Colville, precipitating a closure of the area by military order. Despite that, soldiers continued to look for gold, eventually discovering several nuggets on Peshastin Creek (Glauert and Kunz 1976).

As a result of these events, Plateau bands began moving toward unification and confederation though they did not succeed. Yakima tribal leadership began to emerge through Ow-hi and Te-i-was of the Upper Yakima and their nephews Kamiakin, Showaway, and Skloom of the Lower Yakima (Schuster 1982). In the fall of 1854, Kamiakin called a council of all tribal groups on middle Plateau to meet at the Grand Ronde in Eastern Oregon. The purpose was to form a confederacy and organize resistance, but an agreement could not be reached (Meinig 1995).

Once the treaty negotiation process started, Governor Stevens was relentless in pursuit of his goals. He organized a series of grand treaty councils to be held at various locations around the territory. In June 1855, approximately 1,000 Yakimas led by Kamiakin, Ow-hi, and Skloom along with other Plateau groups, attended negotiations at the Walla Walla treaty grounds, at a place where they had often gathered in the past to trade. In return for ceding their territories, Indians were promised payment in goods, cash, and other compensation and exclusive rights to bounded areas called reservations. In reality, their traditional ties were severed, and they were denied access to hunting territories and resource procurement areas (Hunn 1990, Schuster 1982).

After lengthy discussions and negotiations in which most Indians just gave up so they could go home (Schuster 1990), the treaty was signed at Walla Walla on June 9, 1855. It established a formal relationship between the U.S. government and the Yakima people. The treaty created the Consolidated Tribes and Bands of the Yakima Nation, now the Yakama Nation. Inadvertently, this formal relationship served to bind together formerly politically autonomous local bands—the Kittitas, Wanapum, Yakama, Taitnapam, and Klickitat—into a nation with a formal sense of tribal unity (Schuster 1982). Together they ceded almost 11 million acres (29,000 square miles) more than one fourth of the State of Washington, and were moved to the reservation at present-day Toppenish (Schuster 1998). In lieu of those lands, they retained approximately 1,200,000 acres (2,000 square miles) of land for their "exclusive use and benefit." Euro-Americans were not permitted to reside on the reservation without permission of the tribe (Hunn 1990). This proved not to be the case.

Within months after the signing of the treaties, Stevens announced that the Washington Territory was once again open for settlement. A veritable land rush began. The discovery of gold on the Colville River further increased tensions as miners swarmed across the landscape. In September of 1855, some Yakamas attacked a group of trespassing miners who had molested Yakama women (Schuster 1990). When the Indian agent came from The Dalles to investigate, he was attacked and killed by Showaway's son. Soldiers sent to avenge the agent's death were attacked and routed at Toppenish Creek by Kamiakin. Full-scale warfare resulted. In November of 1855, the Oregon Mounted Volunteers, in pursuit of the Yakama out of Union Gap, looted and burned the Catholic mission at Ahtanum (Glauert and Kunz 1976, Schuster 1982).

Colonel George Wright constructed a fort on the Naches and a base camp in the Kittitas Valley as a show of force, believing that the Indians would be persuaded to negotiate for peace. Even though he met with Ow-hi, a settlement was not reached. Wright then rounded up about 400 Kittitas and Wenatchee and transported them to Fort Simcoe to keep them away from other, more hostile bands. Hostilities continued throughout the Washington Territory until about September 1856. But in 1858, gold was again discovered, this time in British Columbia. Yet another group of miners was attacked while trespassing in Yakama lands. Lt. Jesse Allen retaliated and attacked a village at dawn in the Teanaway-Swauk area, killing three Indians. Lt. Allen also lost his life by friendly fire (Glauert and Kunz 1976). The war in 1858 continued until a final surrender in September. Ow-hi turned himself in. His son, Qualchon was hanged in the mistaken belief that he was responsible for the earlier death of the Indian agent. Ow-hi was killed while trying to escape. Skloom did not regain his lost prestige. Kamiakin fled to Canada where he lived to be 73 (Schuster 1990). But, the will of the Indians was finally broken, and they were gradually moved onto their reservations.

Congress ratified the treaty on March 8, 1859, and settlement of the Kittitas Valley continued. By the 1860s, cattle were being driven from the Yakima Valley to the mines in Canada, and open range became the norm for the Columbia Plateau. Ranchers in the Kittitas Valley followed the example set earlier by Ow-hi and Kamiakin, and took advantage of the abundant grass for feed. The area around Thorp was the most active ranching locale in the Kittitas Valley by the end of the decade, and homesteading as well as ranching began to increase. After the Snoqualmie Wagon Road was completed in 1867, ranchers in the Kittitas Valley began to use it to drive cattle to Puget Sound (Prater 1981).

Salishan tribes along the Big Bend of the Columbia River also ceded their lands as part of the treaty signed on June 9, 1855, in Walla Walla. The original plan was for them to live on the Yakima Reservation. The Upper River Colville Reservation was set aside by Executive Order in 1872. Boundaries were redrawn within one month, resulting in the loss of the Colville Valley. Chief Moses did not want to live among the Yakama, and remained free while petitioning the U.S. government for his own reservation. Tensions in the area remained high between settlers and Indians, particularly after the murder of the Perkins family near White Bluffs. Many erroneously held Moses responsible or felt that he was protecting the murderers. In fact, Moses was instrumental in calming the fears of restless natives. Moses was arrested in 1878 at Crab Creek on orders from the Indian agent and held at Fort Simcoe for a time, in an effort to force him to live on the Yakama Reservation. Through the efforts of General Howard, Moses was granted permission to travel to Washington, DC. He was again arrested in an attempt to incarcerate him so that he could not make the trip. However, Indian Agent Wilbur posted bond. Moses finally departed for Washington, DC, in 1879 with his nephew Chilllileetsah, Chief Homily of the Walla Wallas and Chief Hiachenie of the Cayuses. Moses effectively pleaded his case and was granted the Columbia Reservation by a Memorandum of an Agreement signed by President Rutherford B. Hayes (Ruby and Brown 1965). This reservation was expanded in 1880 to include Lake Chelan. But in 1881, the reservation was reduced in size when the U.S. Government claimed a 15-mile strip along the Canadian border, which contained silver mines.

However, Moses and others subsequently relinquished this reservation to move to the Colville in 1883. Some were allowed allotments on the former Moses Reservation, but the Chelans were moved to the Colville Reservation at gunpoint. Some were able to return to Lake Chelan allotments. Many others were given allotments, but those were often lost through treachery. The balance of the allotment remained part of the reservation. Chief Joseph of the Nez Perce moved to the Colville Reservation not long after in 1885. After gold was discovered on reservation land in 1890, the northern half of the reservation was relinquished and returned to public domain. The size of the reservation was further reduced after another allotment in 1905. The twelve tribes of the

Colville Reservation unified in 1938 and became the Confederated Tribes of the Colville Reservation (Miller 1998, Ruby and Brown 1965).

Frederick Ludi and John Goller were the first permanent Euro-American settlers in the Kittitas Valley. They came from Montana Territory in 1867 after the area was opened up for homesteading. Tillman Houser was the first settler to come into the Kittitas Valley from Puget Sound. He built a cabin for his family and planted wheat in 1868 north of present-day Ellensburg, then returned to Puget Sound to get his wife and children via the new Snoqualmie Wagon road. Fielding Mortimer Thorp and his father-in-law Charles Splawn soon followed from east of Yakima (Prater 1981). They raised a herd of Durhams (Glauert and Kunz 1976). They homesteaded at the mouth of Taneum Creek, near present-day Interstate 90 and the ancient Kittitas village site. Thorp and Splawn opened a small trading post, and started the first mail route over Snoqualmie Pass, paying an Indian named Washington $10 per round-trip delivery. The first school in the Kittitas Valley was started by Charles Splawn. The first students were local Kittitas Indians (Prater 1981).

Robbers Roost, the well-known trading post, was established in 1870 by Charles Splawn's brother Andrew Jackson Splawn and Ben Burch, who Splawn later bought out (Prater 1981). They got their supplies from The Dalles, and traded mostly with the local Indians and drovers on their way over Snoqualmie Pass because there were not many Euro-American families yet in the area. John Shoudy purchased Robbers Roost one year later and platted the town of Ellensburg (Kirk and Alexander 1990).

Specifically concerning the Project area, the U.S. Department of Interior, General Land Office (GLO) surveyed Township 17 North, Range 20 East (GLO 1884a); Township 17 North, Range 21 East (GLO 1884b); Township 18 North, Range 20 East (GLO 1884c); and Township 18 North, Range 21 East (GLO 1884d) in 1869 and certified in 1884. The surveyors noted many trails throughout the current proposed Project area.

The surveyor recorded Township 17 North, Range 20 East (GLO 1884a) as generally rolling, 2nd and 3rd rate, with occasional good grass. A trail extends from the northwest to the southeast, crossing very near the corner of Sections 14, 15, 22, and 23, approximately where Interstate 90 now is located and outside the proposed Project area.

Township 17 North, Range 21 East (GLO 1884b) contains land generally rolling, 2nd rate with good grass, bunch grass and some sagebrush. Trails were not noted during the current pedestrian survey in Sections 4, 9, 17, or 18, which is the location of the proposed PSE 230 kV interconnect.

The land in Township 18 North, Range 20 East (GLO 1884c) was recorded as usually rolling, with 2nd class soil and good bunch grass. Many trails crossed Sections 22, 23, and 24. However, trails were not noted during the present pedestrian survey. By now, with over 130 years of grazing and other uses, any sign of old trails has been obliterated. The GLO surveyors also observed "four Indian houses and a scattering of timber" in Section 22. The houses appeared to the surveyors to be the "winter quarters of a large number of

Indians." These houses were located outside the proposed Project area on private land, to which we did not have access, except through the public right-of-way near Parke Creek. These houses were at one time located in what is now an aspen grove near the confluence of Parke Creek and Whiskey Jim Creek. The land, especially near the confluence, has been altered over the years. The location of the Indian houses has never been recorded as an archaeological site at the Washington State Office of Archaeology and Historic Preservation (OAHP).

For Township 18 North, Range 21 East (GLO 1884d), the surveyors generally noted that the land was rolling or hilly and broken, the soil was first rate with some second rate, and the grass was good to rich. Land was noted as level at the corner of Sections 15, 16, 21, and 22. On the line between Sections 14 and 15, they noted a creek (present-day Skookumchuck Creek) flowing northeast. Between Sections 22 and 27, they observed a "spring of good water" flowing south in a dry creek bed, sinking a short distance below this point. Today, this is named Reynolds Spring. Pine trees were noted on the line between Sections 27 and 28. They also noted a trail bearing east-west in Sections 15, 16, and 17 just north and outside of the proposed Project area.

According to OAHP files, segments of old trails or historic roads in the vicinity of the Project have not been recorded or evaluated for national register significance. Even though remaining segments of the GLO-mapped trail were not noted by the current pedestrian survey, it is evident that native peoples utilized areas surrounding the proposed Project turbine strings, access roads, and power lines in the past. These trails were used to gain access from the Columbia River to root gathering places, such as Che-Lo-Lan, or to travel from the Kittitas Valley to the mountains in the north and west.

In 1887, the Northern Pacific Railroad was completed from the Kittitas Valley through Stampede Pass and onto Tacoma, a definite advantage for Ellensburg as the headquarters for the Cascade Division. This provided an opportunity to exploit the timber and coal resources along the route. Ellensburg became a hub for transportation of goods to Wenatchee and the surrounding areas and could then provide supplies to markets in Puget Sound (Meinig 1995). Hundreds of men were employed to cut and lay timber for railroad ties (Prater 1981) and later bridges across the Columbia River. The population of Ellensburg doubled from 600 to 1,200 in two years after completion of the railroad (Kirk and Alexander 1990, Oliphant 1976).

The Chicago, Milwaukee and St. Paul (C.M.&St.P) railroad opened for service in 1909, with service connecting the Midwest from the Missouri River in South Dakota to Seattle. It followed a direct route to the Pacific Northwest and cut across the Palouse to Lower Crab Creek, then directly west to Ellensburg, over Snoqualmie pass and finally ending in Tacoma-Seattle. Freight service was opened in August 1909, and passenger service in 1911 (Luttrell 1999). The primary service was "across rather than within the region" (Meinig 1995) and profits were derived from "transcontinental movement of freight". Thus, only limited industrial development occurred in Kittitas County. However, agriculture benefited greatly. Hay, cattle, butter, potatoes, wool and later lamb were shipped by rail (Luttrell 1999, KCCC 1989). The C.M.&St.P Coast Division between

Othello and Tacoma-Seattle operated from 1909 until the 1970s. The abandoned railroad grade is now the John Wayne Pioneer Trail, operated by the Washington State Parks and Recreation Commission (Luttrell 1999). A portion of the trail passes immediately south of the proposed Project PSE Interconnect Substation, but the Project will have no impact on the trail.

Cattle grazing became increasingly important in the Kittitas Valley as settlement opened and ranchers took advantage of the open range. Known as “Cattleman’s Paradise” (KCCC 1989), the Kittitas Valley became a gathering place for cattle drives and summer grazing. Along with plentiful grass and water, the Kittitas Valley was centrally located. Snoqualmie Pass and Colockum Pass provided quick access to markets west of the mountains and the minefields in the north. By 1870, more and more stockmen were filing homesteads. The Daverin, Cooke, and Olmstead families settled in the eastern portion of the county (Glauert and Kunz 1976). In particular to the Project area, David Dorse Schnebly moved to the area in 1871. David became the publisher of the “Localizer” newspaper in Ellensburg, the forerunner to “The Daily Record.” His son, Philip Henry, became one of the “most prominent stockmen in the state.” Philip ran over 2,000 head of cattle with his six sons on over 40,000 acres of land. (Ellensburg Public Library, n.d.). Much of the present-day Project area lies within land once owned by the Schnebly Brothers Livestock Company (Metsker Map Company 1956). Cattle wintered on the ranches in the valley then were driven to spring pastures around Whiskey Dick Mountain in April. Their summer range was near Colockum Pass, which is higher than Snoqualmie. Once the new calves were branded, the cattle were then driven to Colockum Pass. The whole drive took two days, with an over night stop at the corral located at The Pines (Squire 1956). The Schnebly Bar Baloon livestock brand is the oldest in the state, dating from the 1840s. The Schnebly family brought it from Missouri to the Oregon Territory and then on to Ellensburg by 1862 (Ellensburg Public Library, n.d).

David Dorse Schnebly was elected Sheriff of Kittitas County in 1878, for two terms. He served at the time of the murder of the Perkins family by hostile Indians. Schnebly’s daughter-in-law, Eliza, recalled that during that time people “lived in dread, but there was no real attack”. Chief Moses camped near her home during that time, and took his meals at the “officers’ camp” (Ellensburg Public Library n.d.). David Schnebly was part of five men who rode out from the Kittitas to Crab Creek to help the posse find the murderers, and was likely present when A.J. Splawn arrested Moses the first time. Later as Sheriff, Schnebly’s posse captured an unarmed Moses the second time prior to his Washington DC trip, despite promising Indian Agent Wilbur that he would do no such thing (Ruby and Brown 1965).

Sheepherding is another industry with its roots in Kittitas County in the late 1800s. By the 1870s, there were large herds of Rambouillets whose wool was shipped elsewhere. Lambs were not shipped until the arrival of the railroad. After that, lambs were shipped to the coast, and east to Chicago or St. Paul. Sheep wintered in pastures near the Columbia River and summered in the Cascade Range near Colockum Pass. Shearing stations were located along the Old Vantage Highway and Caribou Canyon as well as many other places in eastern Kittitas County. Sheep herding still exists in the county, but on a much smaller scale, and the bands of sheep do not migrate as in the old days (KCCC 1989).

Lumber was also provided for the ever-increasing number of settlers' homes in the Kittitas Valley. Sawmills were established in the Kittitas Valley as early as the 1870's and the annual spring log drives continued until 1915, transporting logs from upland sources to the mills in Ellensburg and Yakima. The drive was a site to see. Schools and even businesses closed during this spectacular event, so that everyone could go to the river and watch. Once the dams were completed at the lake outlets near Snoqualmie Pass, restricting spring run-off, the logs could no longer be floated in the Yakima River. Also, more bridges and more irrigation canals were constructed along the way, further inhibiting access. Once railroad lines were connected from high mountain logging areas to the Northern Pacific Railroad, floating was no longer necessary (Henderson 1990). Logging today is still an economic resource for upland areas and mills in the Northwest.

However, once the railroad was complete, the Snoqualmie Wagon Road was used less and less as a conduit for cattle. The construction of the railroad stimulated settlement of the Kittitas Valley and other areas of eastern Washington. Small towns sprang up in many places along the lines, including Kittitas, which was platted by the Chicago, Milwaukee and St. Paul Railroad in 1908. Farming was on the increase and cattle were no longer king. However, improvements continued on the Snoqualmie Wagon Road until the arrival of the automobile. Through continuous use over the years, the road has evolved into what it is today, a major east-west thoroughfare connecting Kittitas Valley with Puget Sound and all parts east of Kittitas Valley.

Once the automobile was introduced, large-scale changes began to occur in the transportation system. Supported by federal highway legislation and funding, state road construction increased dramatically. Portions of old trails and wagon roads were gradually superceded. The Snoqualmie Wagon Road is now Interstate 90, and the wagon road from Ellensburg to Yakima through the Yakima River canyon is now Canyon Road, Highway 821.

The proposed PSE 230 kV feeder line will run south from the Project site and will cross the Vantage Highway and a remnant of the vacated Old Vantage Highway in Section 9, T17N, R21E, as the feeder line travels from the Project area to the proposed PSE interconnect substation. The Vantage Highway originally connected Ellensburg to the Vantage Ferry at the Columbia River. It was formerly part of the Sunset Highway and established as a primary state highway in 1913. The Sunset Highway was to travel across Washington from the Pacific Highway in Renton, over Snoqualmie Pass, southeasterly through Ellensburg, by the most feasible route to the Columbia River near Vantage, then to Wenatchee, through Waterville and then to end in Spokane. Before 1913, the highway was State Route No. 7. By April 1917, the entire route was passable and much, but not all, of it was graded with gravel or crushed rock surfacing (Washington State Department of Highways 1918). Once the Blewett Pass highway to Wenatchee was completed in 1920, the section of the Sunset Highway from the connection at Ellensburg to Vantage and beyond to Davenport in Lincoln County became known as the North Central

Highway, State Road No. 7. The Sunset Highway was then State Road No. 2 (Washington State Department of Highways 1922; 1928).

The Vantage ferry was in operation until the Vantage Bridge was constructed in 1927 (Paul 1996). The bridge was relocated to the south after Wanapum Dam was constructed. The new bridge opened in November 1962 (KCCC 1989). The North Central Highway is now Vantage Highway. As upgrading occurred on the Vantage Highway, various portions were paved and corners straightened. Unneeded sections of the road were then vacated, and turned over to private ownership. This remnant of the Old Vantage Highway extends west and northwest from the intersect with the PSE 230 kV feeder line for about four miles on private property. It then becomes the Sunset Road for another mile as a county road to access private dwellings. The Sunset Road connects with the Vantage Highway near Parke Creek Road in Section 3, Township 17 North, Range 20 East. Vantage Highway was transferred to Kittitas County on December 19, 1968, when Interstate 90 was completed. The Project's PSE 230 kV feeder line will span over the top of the old vacated road and the Vantage Highway right-of-way. Pole spans will be constructed so that poles will not impact either highway.

Irrigation began in the region in the early 1800s with Dr. Marcus Whitman at Walla Walla. By 1852, the Oblate Fathers were irrigating their garden at Ahtanum Creek. Chief Kamiakin irrigated his gardens nearby in the same manner about the same time. Small-scale, privately owned and operated irrigation canals and ditches soon sprang up throughout the Yakima Valley. One such canal, the Town Canal, was completed in 1890 by the Ellensburg Water Company to carry water to over 2,000 acres of land east of town. Eventually demand for water outstripped the capacity of these small projects and often disputes arose. In response, the territorial government passed the Water Act in 1882 regulating water rights in Yakima and Kittitas Counties (Pfaff 2001).

Interest in large-scale irrigation began in the early 1890s in the Kittitas Valley. Finally, the U.S. Reclamation Act was passed in 1902, and the U.S. Reclamation Service completed preliminary water surveys in 1905 for the Yakima Project. Today, irrigation canals of the Yakima Project are located at Sunnyside, Tieton, Kittitas, Roze and Kennewick, with storage facilities at Bumping Lake Dam, Kachess Dam, Keechelus Dam, Clear Creek Dam, Tieton Dam and Cle Elum Dam. The first of these projects, however, were constructed in the lower Yakima River Valley. Actual construction didn't begin in the Kittitas Valley until about 20 years later. The Kittitas Reclamation District organized in 1911 under state law so that landowners could try to secure financing. Water was to come from the Yakima River and be supplemented by storage facilities or reservoirs at Kachess and Keechelus Lakes. World War I, coupled with lack of money, delayed plans until the federal government provided assistance beginning in 1925. Canal construction finally began in early 1926 and was completed in 1929. Final completion of the Kittitas District occured in 1932, with the construction of the Wippel Pumping Plant (Pfaff 2001, Soderberg 1985).

Irrigation water is diverted to the main canal at the Easton Diversion Dam. The main canal divides into two near Thorp. The North Branch (now the Highline) is the larger of the two branches, at 36 miles. It flows in a general southeast direction and eventually swings south to the Wippel Pumping Plant, where three laterals branch around Badger Pocket. The canal returns to the Yakima River about eight miles southeast of Ellensburg (Pfaff 2001). Water from this canal irrigates approximately 70,000 acres in the Kittitas Valley. The Washington State OAHP inventoried this irrigation system in 1985 (Soderberg 1985). Once the irrigation system was completed, population increased more rapidly in the Kittitas Valley than anywhere in the Yakima Project (Pfaff 2002). Cattleman Philip Schnebly and his son, Fred, were among the local citizens involved in developing the reclamation district. Fred served on the board from 1922-1927 (Ellensburg Public Library, n.d.).

Hydroelectric dams on the Columbia River were constructed in the 1940s and 1950s. These dams transformed the once raging river into a series of slack-water lakes and monumental power plants to provide irrigation and electricity to the homes and business of the Northwest. In spite of the great benefits, there have been many losses, particularly to native fisheries. Irrigation ended open stock ranges, though farming became progressively more important. The command center at Wanapum Dam, the nearest to the Project area, is connected by computer to all other dams on the Columbia River, and tracks by the day how much water is released and held behind each dam. An average of 6.5 million gallons of water per minute pass through its turbines to manufacture electricity to be used as far away as Los Angeles. Bonneville Power Administration transmission lines bisect the whole of the Kittitas Valley, delivering power from dams on the Columbia River (Rocky Reach, Wanapum, and Grand Coulee) to Western Washington.

3.14.3 Cultural Resource Assessment

3.14.3.1 Previous Work and Background Research

A literature search of the recorded archaeological sites and archaeological information was conducted at OAHP in Olympia, Washington. All pertinent files concerning investigations of historic and prehistoric resources were reviewed for archaeological information regarding the immediate Project area and the surrounding area.

Cultural resource surveys have not been conducted within the Project area prior to this investigation. However, four archaeological surveys were identified as peripheral to the Project area. In 1985, a small archaeological survey, with negative results, was conducted for the microwave towers located on top of Cribb Butte in Township 18 N, Range 21 East, Section 34 (Galm 1985). In 1996, a large cultural resource survey was conducted for the Olympic Pipeline Company (Historical Research Associates 1996). This survey paralleled Johnson Canyon at the southern end of the proposed PSE feeder line, but archaeological sites were not located within the Project area. In 1999, an archaeological survey was conducted for the John Wayne Trail that also passes through Johnson Canyon near the termination of the proposed PSE feeder line. Again, archaeological sites were not recorded within the Project area (Luttrell et al. 1999). In 2002, an archaeological survey was conduced for the Schultz-Wautoma transmission line right-of-way, which passes through the central portion of the proposed PSE feeder line. The proposed BPA feeder line will intersect with the right of way for the existing BPA 500 kV transmission lines (Schultz to Vantage and Schultz to Wautoma). Prehistoric and historic sites were not located within the Project area or the paths of the proposed transmission feeder lines (BPA and PSE) during this survey (Griffin and Churchill 2002).

Previously Recorded Archaeological Sites
During the OAHP literature search, six 17 previously recorded sites were located within ½ mile (0.8 kilometer) from the Project area (Table 3.14.3-1). All sites are outside the area of potential effect (APE), and will not be impacted by any aspect of this Project.

Table 3.14.3-1. Summary of Recorded Archaeological Sites within ½ Mile (0.8 Km) of Project Area

Site Number	Site Type	Setting
45KT0353	Prehistoric	Near spring
45KT0354	Prehistoric	Near spring
45KT0355	Prehistoric	Near spring
45KT0356	Prehistoric	Near spring
45KT0357	Prehistoric	Near spring
45KT0358	Prehistoric	Spring-fed drainage
45KT0409	Prehistoric	Near spring
45KT0359	Prehistoric	Base of hillside, along creek
45KT0360	Prehistoric	Base of hillside, along creek
45KT0831	Prehistoric	Slope of hillside
45KT1081	Prehistoric	Slope of hillside
45KT1082	Prehistoric	Slope of hillside
45KT1514	Prehistoric	Slope of ridge
45KT1515	Prehistoric	Top of ridge
45KT2037	Prehistoric	Ridge bench terrace
45KT2126	Historic	Slope

The 17 sites previously recorded within ½ mile (0.8 kilometer) from the Project area included 16 prehistoric sites and one historic site. Site 45KT353 exhibited flakes, bifacial tools, as well as fire cracked rocks on the surface. Site 45KT354, at the time of recording, had debitage, bifacial tool fragments, and metate fragments on the surface. Mussel shell fragments, debitage, and bifacial tool fragments were noted on the surface of the 45KT355. Debitage was the main artifact class noted on the surface of 45KT356, a large prehistoric site located on a ridge overlooking several springs. The large site, 45KT357/45KT409, provided debitage, bifacial tools fragments, and river cobbles as a surface assemblage. Site 45KT358 consists of a basalt projectile point and one flake. Site 45KY359, located downstream from 45KT358, is somewhat larger consisting of mussel shell debitage, faunal remains, and pits/cairns in local talus slopes. Site 45KT360 contains talus pits and debitage. Site 45KT2037 is a series of small rock piles. Sites 45KT831, 45KT1081, and 45KT1082 are recorded localities near the proposed PSE interconnect substation situated at the southern end of the PSE feeder line. Sites 45KT1514 and 45KT1515, both small scatters of debitage, 45KT2033, a single flake, and 45KT2126, a historic can dump, are well outside the southern leg of the PSE feeder line. All of these recorded areas are all well outside the Project APE, and are in no danger of disturbance by this Project.

Prehistoric archaeological sites 45KT357 and 45 KT409 together are on the National Register of Historic Places (NRHP) as Government Springs and The Pines (OAHP 1975). The sites are situated in two parallel gullies that gradually curve and join as Whiskey Dick Canyon. Government Springs is located at the head of one of the gullies. These sites are significant because early people used the area to travel between the Columbia River and the Kittitas Valley. Three valleys, the Quilomene, the Skookumchuck and Whiskey Dick Canyon, served as trails between the two. It is a ten-mile climb from the Columbia River to the crest (2800 feet) and then another seven-mile hike to descend to the Kittitas Valley below (1500 feet). It appears that the sites were heavily used as a campsite for travelers and hunters, and "that the area was home to the Yakima and Columbia Indians" (OAHP 1975).

There has not been a request for an OAHP Determination of Eligibility for other sites located near the Project area. The prehistoric sites are generally associated with creeks or springs. The historic site is possibly associated with historic construction such as railroad or irrigation systems. Within the Project area, historic sites were expected in a wide variety of locales, while prehistoric sites were expected to be found associated with springs.

In addition, the proposed PSE interconnect substation will be situated above the Highline Canal. This canal is the main branch of the Kittitas Reclamation District Main Canal irrigation system, constructed between 1926 and 1932. The water from this canal irrigates approximately 70,000 acres in the Kittitas Valley.

The OAHP inventoried this irrigation system in 1985 (Soderberg 1985). The Highline Canal has not been determined eligible for inclusion in NRHP, nor has there been a request made for an OAHP Determination of Eligibility. There are several canals, storage dams, and ditches in Kittitas County that have been determined eligible, but are not listed on NRHP. In 1999, Chapman and Fagan (1999) surveyed the irrigation features in Kittitas and Yakima Counties for the Proposed Level 3 Fiber Optic Line Project. A total of 19 large, named irrigation canals were included. Chapman and Fagan (1999) recommended the major canal crossings, smaller ditches, and their associated irrigation features were potentially eligible to be included in NRHP, though formal determination has not been made. It was recommended the features be avoided, or repaired and replaced in-kind during construction of the fiber optic line.

The proposed PSE interconnect substation is situated on high ground above the Highline Canal in the southwest ¼ of Section 14 (T 17N, R 20E) as shown in Ehxibit 1-B, "Project

Site Layout'. The Project will not be using roads or bridges crossing over the open waterway of the Canal during construction or operations. Access to the PSE interconnect substation will be achieved either through an existing driveway off of Stevens Road to the east or along a new access driveway from Stevens Road to the north. The existing driveway runs west from Stevens Road uphill toward the Canal and parallels the Canal for approximately 600 feet. Near the existing Canal spillway and siphon, a new section of roadway will be constructed which will run up the hill and provide access to the PSE interconnection substation. The driveway from the north that accesses the PSE interconnection substation would run parallel to the Section lines between Sections 14 and 15 (T 17N, R 20E) as shown in Ehxibit 1-B. Project access and road upgrades will be constructed so that they do not impact the Highline Canal.

Traditional Cultural Properties
Traditional Cultural Properties (TCPs) are a historic property type recognized under the National Historic Preservation Act. Two criteria for TCPs include:

- a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world; and,

- a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice (National Register Bulletin 38).

The literature search revealed that recorded TCPs are not located within the Project area or vicinity (Clark 1953, Relander 1956, Smith 1983). Plants found in the Project area (Taylor 1992) indicate that the land could have been used in prehistory for plant resource procurement, but the Project area has not been specifically documented as such.

3.14.3.2`Field Survey and Results

Most portions of the Project area that would be affected by ground-altering activities are linear in nature, not large surface parcels. All affected areas were walked in meandering transects by two or three surface investigators. Ground visibility was excellent in all areas of this Project.

All turbine strings were covered by three meandering transects each at 30 meter (100 feet) intervals. All existing access roads, new access roads, and underground electrical lines were covered by three surface investigators employing 10 meter (35 feet) meandering transects. The areas proposed for the Project substations were also surveyed by 10 meter (35 feet) meandering transects. In addition, the two transmission feeder lines, one BPA feeder line (230/287 kV) leaving the northwestern end of the Project area at the BPA step-up substation and the PSE feeder line (230 kV) leaving the southern end of the Project area at the PSE step-up substation, were surveyed by two surface investigators using 10 meter (35 feet) meandering transects.

This area of Washington is interesting in that the Gingko State Park, located just east of the Project area and immediately west of the Columbia River, is the home of the petrified forest, where flakeable stone, to manufacture projectile points and other stone tools, can be found in abundance. While the Gingko State Park area has abundant toolstone materials, the Project area, 10 miles to the west, was literally devoid of flakeable stone of useable size and quality.

However, checked and/or small pieces of poor quality opal were located at two different locations during this survey. Poor quality opal was noted while surveying the BPA feeder line. This material was found in some quantity especially where the feeder line intersects with the right of way of the main BPA Schultz-Wautoma 500 kV line in Section 22, Township 18 North, Range 20 East. While surveying the PSE feeder line, opal was also noted downslope from the PSE step-up substation. Artifacts were not identified at either of these two locations.

Four "isolated finds" of prehistoric artifacts, eight prehistoric archaeological sites and one historic site were located and recorded during this archaeological survey. The archaeological sites are in good condition, but provided only minimal cultural information.

Archaeological Historical Sites

Eight archaeological sites, seven non-natural (culturally modified) rock piles, and one open site, were located during this survey.

WHWPP Site #1 is located near where a wind turbine will be placed. This site measures approximately 100 meters (350 feet) northwest/southeast by 50 meters (175 feet) northeast/ southwest, and contained 31 surface artifacts of chalcedony (n=17) and chert (n=14). Fifteen technologically diagnostic flakes were identified. Based upon this meager flaked stone assemblage identified at this site, prehistoric knappers selected chalcedony and chert toolstones to reduce into bifacial tools. WHWPP Site #1 is defined as a diffuse segregated reduction location. This site is situated on extremely rocky sediments. Subsurface cultural deposits are not likely to exist at this location.

WHWPP #2 was located in small saddle. This feature measured 1.2 meters (east/west) wide by 2.4 meters (north/south) long (4 x 8 feet), and was constructed by placing small to medium size, angular boulders in a rectangular pile approximately .6 meters (2 feet) high. The feature is obviously human-constructed.

WHWPP #3 was located on the flat top ridge (elevation 982 m/3220 feet) between two drainages. This feature measured 1.2 meters (northeast/southwest) wide by 2.4 meters (northwest/southeast) long (4 x 8 feet), and was also constructed by placing small to medium size, angular boulders in a rectangular pile approximately 6 meters (2 feet) high. The rocks in this feature had settled somewhat, but the feature is obviously human-constructed.

WHWPP #4 consists of two rock features located near each other, one on a small flat basalt outcrop and the other just below the outcrop. One is a probable hunting blind that contains angular basalt cobbles and medium size boulders arranged in a U-shaped pile approximately .6 meter (2 feet) high. The other, a rock feature, consists of angular basalt cobbles and pebbles arranged in an oval pile about .3 meter (1 feet) high. The rock feature is located on the flat above the hunting blind.

WHWPP #5 is a series of three hunting blinds 22 meters apart and made of angular basalt cobbles and medium size boulders arranged in U-shaped piles approximately .6 meter (2 feet) high. The blinds are located on the edge of a steep hillside above an unnamed spring and situated generally in a southwesterly line, approximately 22 meters apart. Hunting Blind #1 is 2.5 meters long (northeast/southwest) and 3.0 meters wide (northwest/southeast) and faces northwest. Hunting Blind #2 is 3.0 meters long (northeast/southwest) and 4.0 meters wide (northwest/southeast) and overlooks the valley below. Hunting Blind #3 is 2.5 meters long (northeast/southwest) and 2.5 meters wide (northwest/southeast) and is on the edge of steep hillside.

WHWPP #6 is a rock feature located on a northwest/southeast ridge high above Whiskey Dick Creek on the southwest side of the creek. This rock feature contains angular basalt cobbles and medium size boulders arranged in a circular-shaped pile approximately .6 meter (2 feet) high. It is 3.0 meters long (north/south) and 3.0 meter wide (east/west).

WHWPP # 7 consists of two rock features located near each other on a high ridge running northwest/southeast. These rock features are 1.3 meters apart and contain angular basalt cobbles and medium size boulders arranged in round piles approximately .6 meter (2 feet) high. Both features are 1.6 meters in diameter, each and are located 1.3 meters apart

WHWPP #8 is rock feature located on a high northwest/southeast ridge. This rock feature contains angular basalt cobbles and medium size boulders arranged in circular-shaped pile, 1 meter in diameter, and approximately .65 meter tall.

In addition, one historical period site, a remnant of the Old Vantage Highway, formerly known as North Central Highway, was located during the current pedestrian survey. This remnant of the Old Vantage Highway extends west and northwest from the intersection with the PSE 230 kV feeder line for about four miles on private property. It then becomes the Sunset Road for another mile as a county road to access private dwellings. The Sunset Road connects with the Vantage Highway near the Parke Creek Road. The road is in very poor condition. There are many potholes and vegetation is gradually reclaiming the right of way.

Regarding the rock features, particularly those found in mounds or heaps, a local resident (Henry Schnebly, personal communication 2003) stated that a man named Scammon spent lots of time as a kid hunting the Project area and surrounding environs for petrified wood. During the 1950s, Scammon constructed a series of cribs for fence lines for the Schnebly family. According to Schnebly, Scammon was a “real ambitious kid, but didn’t get the cribs in the right place". There are residues of Scammon's cribs remaining today. Nevertheless, the nature of the features recorded by the present archaeological survey remains unknown. Some could be have been constructed by Native Americans, or they could have been constructed by methods discussed by Schnebly. Nevertheless, these sites will be avoided during construction.

3.14.4 Impacts of the Proposed Action

The archaeological survey covered the entire areas within the Project where ground-altering activities are proposed. Eight previously unrecorded prehistoric archaeological sites and one previously unrecorded historical site were identified during this survey.

In addition, the proposed PSE interconnect substation will be situated above the Highline Canal. Project access roads and road upgrades will be made so that they do not impact the Highline Canal.

According to OAHP files, segments of old trails or historic roads in the vicinity of the Project area have not been recorded or evaluated for national register significance. Government Land Office (GLO 1884a, 1884b, 1884c, 1994d) surveyors noted trails in the Project area during their 1869 reconnaissance. Even though remaining segments of the GLO-mapped trail were not noted by the current pedestrian survey, it is evident that native peoples utilized areas surrounding the Project area in the past. Trails were used to gain access from the Columbia River to root gathering places, such as Che-Lo-Lan, or to travel from the Kittitas Valley to the mountains in the north and west. Three valleys, the Quilomene, the Skookumchuck and Whiskey Dick Canyon, served as trails between the Columbia River and the Kittitas Valley (OAHP 1975). Government Springs and The Pines are listed on the National Register of Historic Places. They were heavily used as a campsite for travelers and hunters, and "that the area was home to the Yakima and Columbia Indians" (OAHP 1975). It is evident that the area was used for travel in the past. The presence of edible plants in some portions of the Project area is important. Though plants alone do not constitute an archaeological site, the metate recorded at 45KT354, Wild Horse Spring, indicates the site was used as plant procurement area. TCPs have not been identified or recorded in the Project area.

In addition, a remnant of the Old Vantage Highway was also identified. The proposed PSE 230 kV feeder line will run south from the Project site and cross the Vantage Highway and a remnant of the vacated Old Vantage Highway in Section 9, T17N, R21E, as the feeder line travels from the Project area to the proposed PSE interconnect substation. The Project's PSE 230 kV feeder line will span over the top of the old vacated road and the Vantage Highway right-of-way. Pole spans will be constructed so that poles will not impact either highway.

RCW 27.53.060 provides for the protection of cultural resources on private and public lands in the state of Washington. In addition, Section 106 of the National Historic Preservation Act (NHPA) requires that any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking, or issuing licenses or permits, must consider the effect of the proposed undertaking on historic properties. However, no federal agency action is anticipated as part of the proposed Project. An historic site or property may include a prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, NRHP maintained by the U.S. Secretary of the Interior. When evaluating resources, NRHP criteria for evaluation of significance of cultural resources properties must be applied. According to the National Register Criteria for Evaluation:

> "The quality of significance in American history, architecture, archeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
> B. That are associated with the lives of significant persons in our past; or
> C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> D. That have yielded or may be likely to yield, information important in history or prehistory.

The archaeological and historical sites identified during this current cultural resource survey likely do not meet the standard qualifications for NRHP. Nevertheless, it has been recommended that the newly recorded archaeological sites be avoided to prevent any damage. The Assistant Archaeologist at the Washington State Office of Archaeology and Historic Preservation has informed the Applicant that there is no set standard for set-backs, but recommended that a 100 feet would be adequate for avoidance. Applicant intends to maintain 100 foot setbacks from these sites.

If prehistoric or historic artifacts are encountered during ground-altering activities, work associated with those ground-altering activities should be halted immediately and a professional archaeologist should be notified immediately to inspect the artifacts and their subsurface context(s). A copy of the Cultural Resource Report has been forwarded to the Washington State Office of Archaeology and Historic Preservation in Olympia.

3.14.4.1 Construction

As recommended by the Assistant Archaeologist at the Washington State Office of Archaeology and Historic Preservation, 100 foot design and construction buffers will be maintained around the archaeological and historical sites identified during this current cultural resource survey, even though they do not meet the standard qualifications for NRHP.

Additionally, a qualified archaeological monitor will be present when earth-disturbing activities are conducted during construction near known archaeological sites to prevent destruction of unanticipated buried cultural materials and/or human remains. The monitor will record and report cultural materials encountered during ground disturbing activities. If human remains are discovered, construction will stop in the immediate area. EFSEC, the Washington State Office of Archaeology and Historic Preservation and appropriate Native American Tribes will be notified immediately. At that time, appropriate treatment and mitigation measures will be developed and implemented.

If a tribe requests to have one of their representatives present during earth-disturbing construction activities, the Applicant will comply with their wishes.

3.14.4.2 Operation

Operation of the Project will not impact any of the archaeological or historical sites identified during this current cultural resource survey.

3.14.5 Comparison of Impacts of Proposed Scenarios

The cultural resource study area includes impacted areas for all design scenarios under consideration. Project design will implement the recommended 100 foot setback around culturally sensitive areas for all design scenarios. It is anticipated that by following this guideline, no impacts to culturally sensitive areas will occur under any of the proposed scenarios.

3.14.6 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or “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.) See Section 2.3, ‘Alternatives’.

3.14.7 Significant Unavoidable Adverse Impacts

There are no anticipated significant unavoidable adverse impacts to cultural resources as a result of the construction and operation of the Project.

3.15 TRAFFIC AND TRANSPORTATION

3.15.1 Existing Conditions

3.15.1.1 Road Network

Two kinds of roads are involved in constructing the Project: transporter routes and turbine site access roads. Transporter routes are roads used to bring in equipment, materials and manpower from outside of the Project study area to the Project site. Transporter routes include state, county, and city roads within the study area. Site access roads are newly constructed or improved gravel surfaced roads that run from the site access location on Vantage Highway to and between the individual turbines. These are described in Section 2.2.3 'Project Facilities'. There are currently two main transporter routes that will provide access to the site. Transporter routes were determined based on the most logical and direct routes to the site. Transporter Route 1 passes through the City of Kittitas. As described below, roads maintained by the City of Kittitas accommodate lower speed vehicles and are usually used for local residential or agricultural traffic. Therefore, Transporter Route 1 will likely be used for light duty traffic such as passenger vehicles, delivery trucks, and single-unit construction materials and equipment trucks. Transporter Route 2 extends further east and passes through Vantage. This route utilizes interstate and County highways and is better suited for larger vehicles because it does not pass through residential areas. Therefore, oversize and over length delivery vehicles will use Transporter Route 2. Exhibit 26, 'Project Site Surrounding Roadway Network,' depicts the Project Transporter Routes.

Transporter Route 1 begins at the Port of Seattle and continues east along I-90, an interstate highway, to the City of Kittitas (Exit 115). The route then continues north on Main Street through the city, east on Patrick Avenue, north on No. 81 Road, and east on Vantage Highway to the Project site access location. I-90 varies between two- and five-lanes with 4- to 10-foot-wide paved shoulders and is classified as a rural-interstate with rolling terrain, according to the WSDOT road classification system, in the vicinity of the Project. I-90 has posted speed limits of 60 miles per hour (mph) in urban areas and 70 mph in rural areas. The 70 mph designation begins east of Issaquah.

From I-90, Main Street is the next leg on the transporter route. Main Street is maintained by the City of Kittitas and has a posted speed limit of 35 mph immediately north of the I-90 ramps. This speed limit is reduced to 25 mph as the roadway enters the industrial and commercial areas of the town. Main Street is a level two-lane, north-south, undivided roadway with 2- to 5-foot-wide unpaved/dirt shoulders for most of the length. There is also a designated bicycle lane on either side of the road through the industrial section of Kittitas. There is no parking along Main Street through this industrial section, but there is angled pull-in parking along the next section of the roadway through the city's retail area. Access to Main Street is unrestricted as there are many driveways and minor cross streets through the city. Main Street terminates at a T-intersection with Patrick Avenue, which is the next leg of the transporter route. Patrick Avenue is maintained by the City of Kittitas and has a posted speed limit of 25 mph. This is a level two-lane, east-west, undivided roadway with designated paved bicycle lanes that are approximately 6 feet wide along either side of the road. There is no parking along Patrick Avenue, but access is fairly unrestricted as there are many driveways.

The next leg of this transporter route is No. 81 Road, which is classified as a rural major collector by Kittitas County and has a posted speed limit of 35 mph. This is a level two-lane, north-south, undivided roadway with unpaved, gravel shoulders approximately 1-2 feet wide. There is no designated parking along No. 81 Road and access to the roadway is unrestricted as there are many residential driveways. The intersections of Main Street and Patrick Avenue, and Patrick Avenue and Road No. 81 have very tight turning radii, which may prove difficult for large or lengthy vehicles. These roadways are mostly used by local or residential traffic. Vantage Highway is the final leg of this transporter route. Vantage Highway was once a state highway but has since become classified as a rural minor collector and is maintained by Kittitas County. This road has a posted speed limit of 50 mph and is a two-lane, east-west, undivided roadway with paved shoulders approximately 2 feet wide. There is no designated parking along Vantage Highway and there is minimal access to the roadway.

Transporter Route 2 begins at the Port of Seattle and continues east along I-90, an interstate highway, to Vantage (Exit 136). The route then continues on Vantage Highway, which first heads north and then curves to the west to the Project site access location. The I-90 segment of this transporter route has the same characteristics as mentioned above. Vantage Highway is classified as a rural minor collector and is maintained by Kittitas County. This road has a posted speed limit of 35 mph within Vantage, but 50 mph outside of Vantage. This road is a two-lane, east-west, undivided roadway with paved shoulders less than 2' wide. There is no designated parking along Vantage Highway and there is minimal access to the roadway.

3.15.1.2 Traffic Patterns and Volumes

Table 3.15.1-1 shows the average daily traffic (ADT) volumes on major roadways along each transporter route in the study area. These volumes are based on the most current available traffic data from WSDOT (2002 Annual Traffic Report), Kittitas County, and the City of Kittitas.

Kittitas County does not have historical traffic data for the roadways along the transporter routes, nor do they collect estimated truck percentages. Similarly, the City of Kittitas also does not collect historical data or estimated truck percentages.

Table 3.15.1-1: Average Daily Traffic (ADT) Volumes and Estimated Percent Trucks						
	1998 ADT	1999 ADT	2000 ADT	2001 ADT	2002 ADT	Est. Truck %
Transporter Route 1						
I-90 (West of Kittitas)	11,000	11,000	11,000	14,000	15,000	21
Main Street*	N/A	N/A	N/A	N/A	2,000	N/A
No 81 Road	N/A	N/A	N/A	N/A	1,300	N/A
Vantage Highway (West of site access)	N/A	N/A	N/A	N/A	1,146	N/A
Transporter Route 2						
I-90 (West of Vantage)	10,000	10,000	11,000	11,000	11,000	21
Vantage Highway (East of site access)	N/A	N/A	N/A	N/A	1,500	N/A

ADT = Average daily traffic.
N/A = Not available.
** ADT was collected in April 2003.*
Sources: Washington State Department of Transportation. Kittitas County Public Works. City of Kittitas Staff.

3.15.1.3 Truck Volumes and Routes, Weight and Load Limitations

The Kittitas County road network would comprise the primary public haul routes used in the construction of the Project. The regulatory framework for transportation in Kittitas County consists of program and project planning, design standards related to roadway geometry and paving materials, load limits for bridges, and weight limits or closures under defined circumstances. Kittitas County roads are designed to sets of standards with respect to paving materials and methods, and with respect to roadway geometry and design. Kittitas County Road Standards state the minimum requirements for public and private road construction in the County, as well as any exceptions to these standards. Where exceptions are noted, all new road and bridge construction must also be in accordance with the current edition of WSDOT's "Standard Specifications for Road, Bridge and Municipal Construction."

Kittitas County Code 10.28 "Seasonal Weight Restrictions" specifies load and weight restrictions on Kittitas County roads during load sensitive periods. These include any weather conditions that could affect traffic on County roads, such as ice, snow, fog, etc. It also authorizes the county engineer to issue emergency permits for the operation of vehicles exceeding the allowable gross load. Although the construction schedule may show tasks in the winter months, the majority of construction traffic is not anticipated to begin until seasonal conditions permit access to the higher elevations. These higher elevations are prevalent at the Project site, which will therefore limit the extent to which seasonal weather conditions affect construction traffic. It is not anticipated that seasonal traffic will have any effect on public use of the roadways utilized during Project construction because of the rural location of the Project site. However, if seasonal or holiday traffic or other special events (such as those that may occur at the Gorge) may possibly affect traffic, the issue will be addressed as necessary in the Traffic Management Plan, which will be prepared and submitted to EFSEC prior to Project construction.

The Revised Code of Washington (RCW) 46.44.090 "Special permits for oversize or overweight movements" allows special permits to be issued for vehicles exceeding the maximum size/weight/load limits, which are specified in the RCW sections listed below. The Applicant will implement special measures as specified within the permits.

- RCW 46.44.010 Outside width limit.
- RCW 46.44.020 Maximum height -- Impaired clearance signs.
- RCW 46.44.030 Maximum lengths.
- RCW 46.44.034 Maximum lengths -- Front and rear protrusions.
- RCW 46.44.041 Maximum gross weights -- Wheelbase and axle factors.
- RCW 46.44.042 Maximum gross weights -- Axle and tire factors.

From RCW 46.44.041, the maximum legal load is specified as 105,500 lbs. Because some construction transport vehicles related to the Wild Horse Project may exceed this weight limit, a special permit in accordance with RCW 46.44.090 will be obtained.

In addition, WSDOT requires permits for "superloads" (vehicles with a gross weight exceeding 200,000 lbs and/or a total width or height exceeding sixteen feet).

The expected weight of component delivery vehicles may be more than 200,000 lbs. A permit for these superloads must be submitted in writing, along with other requested information. Among the information requested are an explanation of why the move or transport is necessary, why the load cannot be divided into smaller loads, and a proposed route that is known to be adequate to accommodate this superload.

The transport of wind turbine components along state highways is necessary because there is no source for these highly-specialized components within close proximity to the Project site. The required materials and equipment must be shipped into the region from a larger metro area such as Seattle. The wind turbine blades and nacelles are manufactured as single units and cannot be divided. Many of the WTG vendors under consideration manufacture their components in Europe or Japan and would likely utilize the Port of Seattle (or another shipping port in Puget Sound) as an entry gateway. The proposed route for these superloads is along I-90, which is a state-maintained highway, and along Vantage Highway, which is a County-maintained road.

Along the segment of I-90 in which Transporter Route 1 and 2 overlap, there are two road restrictions in the westbound direction. There is a height restricted bridge on I-90 (Cle Elum River Bridge) and a height restricted snow shed west of Ellensburg. Because these are height restrictions in the westbound direction only, they are not anticipated to cause problems for loaded trucks carrying oversize equipment eastbound on I-90 to the Project site. In the eastbound direction there is a height restricted overpass at Exit 62 which is adequately signed. All loads over 14'0" are required to exit at the eastbound off-ramp and re-enter via the eastbound on-ramp. This is a standard diamond interchange and is not anticipated to cause any problems for trucks. Vehicles can easily exit and re-enter

I-90 to avoid the overpass. There are no other weight and load limits on any of the roads in the vicinity of the Project site.

The Kittitas School District surrounds the Project site. School bus stops along Vantage Highway are few in number and are adequately signed, so conflicts are not anticipated. In addition, stops along Vantage Highway can be made where adequate shoulders or private driveways are located, providing safety for children should construction traffic coincide with pick-up/drop-off times. School bus stops along No. 81 Road are also few in number and adequately signed. Buses making stops along this road are able to pull off the main roadway, providing children safety from traffic and allowing vehicles to pass. Because construction-related traffic is not anticipated to increase total truck volume along the highways by more than 15% over the current level and because this increase will be for a short period, it is not expected to cause problems for school bus service in the area.

Existing pavement conditions on Main Street, No. 81 Road and Vantage Highway will be videotaped as necessary prior to construction of the Project. This video log will be compared with the condition of the roadways after construction. If siginificant degradation in pavement condition is noted, the Applicant and Kittitas County or the City of Kittitas will attempt to determine responsible parties and will develop a plan for restoring the pavement to pre-Project conditions as recorded in the video log. The Applicant will be responsible for restorative work made necessary by the Project. The video log will be used to document pavement conditions in lieu of a pavement analysis.

3.15.1.4 Existing Roadway and Intersection Levels of Service

To analyze traffic conditions, average daily traffic data from WSDOT and Kittitas County were used to determine a level of service (LOS) for each of the roadways. LOS is a qualitative measure describing operational conditions in a traffic stream, and motorists' or passengers' perceptions of those conditions. A LOS definition generally describes these conditions in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. There are six LOS classifications, each given a letter designation from A to F.

LOS A represents the best operating conditions and LOS F represents the worst. An estimate of 10 percent of the ADT volume is used to determine the peak hour volumes for state highways. The city and County roads involved in the study area are rural, so a conservative estimate of 15 percent of the ADT volume is used to estimate the peak hour volumes for these roadways. Specific peak hour counts were estimated using this method, as opposed to collecting raw data, because of the low average daily volumes of the roadways in question. It is assumed that the low overall volumes would also mean low peak hour volumes, which would not adversely affect capacity.

LOS was determined on the basis of the most current Highway Capacity Manual (HCM) (Transportation Research Board, 2000). The ADT represents the estimated 2002 daily volumes in both directions of travel.

Existing Roadways LOS:

To determine the LOS for selected roadways in the study area, daily traffic capacity was determined by estimating capacities obtained from the HCM. Daily traffic volumes were compared with these capacities to determine volume-to-capacity ratios, which were used to calculate the existing LOS. Table 3.15.1-2 summarizes the existing roadway traffic conditions in the Project vicinity and includes existing roadway classification, number of lanes, daily volume, design capacity, peak-hour volume, and LOS.

Table 3.15.1-2: 2002 Conditions of Affected Roadways

Roadway	Classification	No. of Lanes	Average Daily Volume	Hourly Design Capacity[a]	PM Peak Hour Volume[b]	PM Peak Hour LOS
Transporter Route 1						
I-90 (West of Kittitas)	Rural-Interstate	4	15,000	6,020	1,500	A
Main Street	City road	2	2,000	2,800	300	B
No 81 Road	Rural major collector (County Road)	2	1,300	2,800	195	A
Vantage Highway (West of site access)	Rural minor collector (County Road)	2	1,146	2,800	172	C
Transporter Route 2						
I-90 (West of Vantage)	Rural-Interstate	4	11,000	6,020	1,100	A
Vantage Highway (East of site access)	Rural minor collector (County Road)	2	1,500	2,800	225	C

a) Maximum number of vehicles per hour in both directions for LOS E.
b) Peak hour volumes estimated at 10% (for Interstate roads) and 15% (for city and County roads) of ADT.
LOS = Level of service.

The LOS for the current roadways surrounding the proposed Project site are (LOS) C or better. This LOS represents generally smooth traffic operating conditions with occasional delays. With LOS C, individual users feel generally unrestricted by the presence of others in the traffic stream.

Existing Intersections LOS

Major existing intersections along Transporter Route 1 include I-90 ramp termini at Exit 115 (to Kittitas), Main Street and Patrick Avenue, and also No. 81 Road and Vantage Highway. The only existing intersection on Transporter Route 2 is the I-90 ramp termini at Exit 136 (to Vantage). These intersections are all unsignalized.

WSDOT does not conduct individual counts at the ramp termini intersections because of the low volume. Kittitas County has not analyzed individual intersections since June 1996 according to the current Kittitas County comprehensive plan. Because the Project area is rural and without traffic signals, these intersections are expected to operate at LOS C or better during construction due to the low existing traffic on these roadways.

A 60/40 directional split was assumed for level of service calculations for the existing traffic scenarios. A conservative truck percentage of 10% was assumed for roadways in which actual truck data was not available.

3.15.1.5 Accident Rates

Accidents are generally expressed in terms of accident rate, where accident occurrence is indexed to the amount of traffic using a given roadway. For roadway segments, accident rates are computed as the number of accidents per million vehicle-miles (MVM) of travel. Table 3.15.1-3 shows an estimated number of accidents for the selected roadways based on multi-year accident rates. The most recent accident rates provided by WSDOT are from 2001. These 2001 accident rates were used to predict the number of accidents in 2002 along the transporter routes.

Table 3.15.1-3: Accident Rates and Numbers, 2002

Roadway	Milepost	Length (miles)	(a) Accident Rate (acc/MVM)	2002	
				ADT	No. of Accidents
I-90 (West of Kittitas)	110.87	4.6	0.41	15,000	10
I-90 (West of Vantage)	115.47	20.96	0.84	11,000	71

a) 2001 Multi-year accident rate. Rate is in accidents per million vehicle-miles. Source: Washington State Department of Transportation, 2003 (Accident Report).
MVM = million vehicle-miles.

The 1996 Accident Data on State Highways Report (WSDOT, 1996) indicates an average statewide accident rate of 0.86 accidents per MVM for the type of roadway corresponding to I-90 (Rural – interstate). The average statewide accident rate is higher than both I-90 segments analyzed. Therefore because of the low average daily traffic along these routes, and the low accident rate, there are no anticipated safety issues. WSDOT multi-year data is from 1996 because WSDOT has experienced "delays in implementing a new collision records system in the state" (WSDOT website April 7, 2003) and therefore, only the multi-year accident rate for 1996 can be compared.

Accident data was collected by Kittitas County along Vantage Highway. The number of accidents was recorded, but types of accidents and accident rates were not calculated by the County. Twenty accidents occurred within the 11 miles of Vantage Highway between No. 81 Road and the Project site access location (Transporter Route 1) in 2002. Six accidents occurred within the 10.2 miles of Vantage Highway between the Project site access location and Vantage. Because of the low average daily traffic along these routes, there are no anticipated safety issues.

Sight distance could be of concern along a few stretches of Vantage Highway near milepost 25 on Transporter Route 2 due to the winding geography and steep side slopes. Construction vehicles traveling on either Transporter Route 1 or 2 may encounter these types of issues, but they are not anticipated to cause problems. These areas are adequately signed, and construction traffic is expected to reduce their speed as they approach these areas. Due to extremely low average daily traffic volumes and reduced speed at these locations, the above roadways are not considered to have safety issues.

Sight distance at the Project site entrance intersection on Vantage Highway is not anticipated to be of concern. Two alternative site entrance locations were evaluated near the Rye Grass Landfill. The east entrance location (approximately 10 miles east of the City of Kittitas), which is an existing private road entrance onto Vantage Highway, has limited sight distance to and from the east due to winding geography and steep side slopes. It also has limited sight distance to and from the west due to a crest in the roadway. The west entrance location, which is located directly across the Rye Grass Landfill entrance approximately 100 yards west of the previously mentioned entrance location, does not have sight distance safety issues. At that location there are no crests in the roadway, winding geography, or steep side slopes to obstruct vision to the site entrance intersection. This intersection also has adequately widened shoulders that may be beneficial to vehicles turning into and out of the site. The Applicant proposes to use this west entrance location for these reasons.

3.15.1.6 Future Plans and Projects

Kittitas County Department of Public Works staff has stated that there are currently no construction projects planned on County roads in the Project area.

WSDOT has also been contacted and the following projects that may affect the transport and/or operations of the proposed Project have been identified:

a) I-90: Gold Creek to Easton Hill paving project (MP 55.51 to MP 67.32). Scheduled for spring of 2004.
b) I-90: Cle Elum Weigh Station roadway preparation project (MP 78.46 to MP 78.81). Scheduled for spring of 2005.
c) I-90: Yakima River Bridge deck repair project (MP 78.81 to MP 78.85). Scheduled for 2006.

d) I-90: Eastbound Cle Elum ramp paving project (MP 85.48 to MP 86.18). Scheduled for spring of 2004.
e) I-90: Highline Canal to Elk Heights auxiliary lane project (MP 90.57 to MP 92.76). Scheduled for completion in July, 2004.
f) I-90: Rye Grass Summit to Vantage auxiliary lane project (MP 125.21 to MP 136.11). Scheduled for completion in late Fall of 2004.

The paving project on I-90 between MP 55 and MP 67 is within the four lane section of the Interstate. Traffic control for this paving project will include lane closures restricting traffic to single lane movements eastbound and westbound. The paving is expected to occur only during daylight hours. Project-related heavy vehicles could potentially use these routes while they are under construction. The roadway preparation project and deck repair project at MP 78, as well as the ramp paving project between MP 85 to MP 86 are not anticipated to affect Project-related traffic but are mentioned here as they are on the transporter routes. The auxiliary lane projects between MP 90 and MP 92, and between MP 125 and MP 136 will be conducted adjacent to the travel lanes. These travel lanes can still be utilized; therefore adverse effects to Project-related traffic are not anticipated. The Traffic Management Plan will include coordination between Project-related construction traffic and these planned WSDOT construction projects.

The I-90- Rye Grass Summit to Vantage auxiliary lane project is in an area covered by Transporter Route 2 of the Project. There may be potential conflicts for construction vehicles in this area due to lane closures and/or reduced lane and shoulder widths related to the WSDOT project, if WSDOT has not completed construction before the Project components are delivered. Any conflicts will be discussed specifically with WSDOT and a Traffic Management Plan (as noted in Section 3.15.5 Mitigation Measures) will be prepared. This Traffic Management Plan will address any other planned County or WSDOT road construction projects that affect Project construction and operations, and include the use of additional signage, flaggers, and/or alternate route designations.

3.15.1.7 Local Comprehensive Transportation Plans

There are currently no plans for major improvements to roadways in use for the Project, or to the transportation system in Kittitas County. A review of the Kittitas County Comprehensive Plan identified no transportation goals, policies, or objectives that directly relate to the types of transportation impacts that may be caused by the Project.

WSDOT requirements are referenced throughout this section, however, it is anticipated that the Project construction and operation will fully comply with relevant WSDOT plans and goals by developing a comprehensive Traffic Management Plan in consultation with appropriate experts and regulators, and by obtaining and complying with all provisions of necessary permits.

3.15.1.8 Public Transportation

Kittitas County is primarily a rural county where the need for public transportation in or near its towns is not a high priority. The City of Kittitas and the Vantage area, near the vicinity of the Project site, currently do not have public transit systems. However, there is an accessible/special needs transportation program provided by the Kittitas County Action Council (KCAC) for citizens. Besides this service, Greyhound bus service and taxi-cab services are the main form of transit between cities within the County.

3.15.1.9 Air Traffic

There are no regional or municipal airports in the vicinity of the Project site. The nearest airport is Kittitas County Airport (Bowers Field), approximately 1.5 miles north of the City of Ellensburg. The Kittitas County Airport (Bowers Field) does not have scheduled air service, but is limited to private and charter plane service. Small planes may use private runways at ranches or farms in the area, but none have been identified in the immediate vicinity of the Project and the frequency of this type of use is unknown. None of the equipment or materials necessary for the Project operations or construction will be transported by air to the Project site.

3.15.1.10 Rail Traffic

Burlington Northern operates an active main line between Auburn and Tri-Cities over Stampede Pass, passing through Ellensburg. Portions of the line had been inactive until 1996, when the pass portion reopened to freight traffic. Approximately 4-10 trains traverse the route daily. It is not anticipated that any of the equipment or materials necessary for the Project operations or construction will be transported by rail to the Project site and therefore there will be no rail traffic burden impacts.

3.15.1.11 Waterborne Traffic

Over 100 miles southeast of the Project site, the Ports of Pasco, Benton, and Kennewick operate on the Columbia River. Grain is the major commodity using barge transportation on this stretch of the river. It is not anticipated that any of the equipment or materials necessary for the Project operations or construction will be transported by barge or ship up the Columbia River; therefore, there will be no impact to barge or river vessel traffic.

Depending on the final WTG vendor selected, it is possible that Project equipment and components would be transported through the Port of Seattle, Tacoma, or other Puget Sound port authority. Project equipment would likely be containerized and Project components would likely be shipped as a project cargo. These arrangements will be finalized following WTG vendor negotiations.

3.15.2 Impacts of the Proposed Action

On the basis of historical ADT levels on I-90, a 1 percent growth factor is assumed in establishing impacts on future background levels of traffic. This growth factor is considered reasonable because of the area's rural nature, and because of the historical volume trends presented in Table 3.15.1-1.

Local policies are aimed at keeping the public road service at or above an accepted level of service determined by the County. Roadways that will experience heavy truck traffic can be assessed on an individual basis by the County during the Project. All of the roadways in the study boundaries currently provide LOS C or better.

Table 3.15.2-1 describes the existing and future daily peak-hour traffic volumes and LOS values without any construction traffic impacts. It is estimated that during the peak hour in 2004, all roadways in the Project vicinity will function at LOS C or better, without the Project. An estimate of 10 percent of the ADT volume is used to determine the peak hour volumes for state highways. The city and county roads involved in the study area are rural so a conservative estimate of 15 percent of the ADT volume is used to estimate the peak hour volumes for these roadways.

Table 3.15.2-1: Existing, Future Daily, and Peak-Hour Traffic Volumes and LOS without Project

Roadway	**No. of Lanes**	**Existing Daily**		**Estimated Peak Hour without Project**			
		2002	**2004**	**2002**	**LOS**	**2004**	**LOS**
Transporter Route 1							
I-90 (West of Kittitas)	4	15,000	15,300	1,500	A	1,530	A
Main Street	2	2,000	2,040	300	B	306	B
No 81 Road	2	1,300	1,326	195	A	199	A
Vantage Highway (West of site access)	2	1,146	1,169	172	C	175	C
Transporter Route 2							
I-90 (West of Vantage)	4	11,000	11,220	1,100	A	1,122	A
Vantage Highway (East of site access)	2	1,500	1,530	225	C	230	C

LOS = Level of service.
Source: Washington State Department of Transportation, 2002.

3.15.2.1 Construction

The Applicant will construct a road system on the Project site, with site access roads linking turbines along turbine strings and also linking turbines strings to the planned accessway from Vantage Highway. The accessway off of Vantage Highway will be constructed with the required slopes and culverts according to WSDOT and Washington State access management under Title 468 Washington Administrative Code (WAC) and Chapter 47.50 Revised Code of Washington (RCW).

Construction materials and equipment are assumed to be originating from the west of the Project (see Section 3.15.1.3 for an explanation of why this traffic is likely to travel from the west). Project construction traffic management will fully comply with applicable regulations and a comprehensive Traffic Management Plan will be developed in consultation with appropriate experts and regulators.

Consultation with County and State Transportation Agencies

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.

WSDOT:
The Applicant has consulted with Mr. Rick Holmstrom, Development Services Engineer for 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 impacts to I-90 are anticipated to be minimal.

Vehicular Traffic- Existing Roads, Estimated Volumes, Types, and Routes
The Project construction period requiring the transportation of major equipment and constituting the highest amount of construction traffic will span approximately 6 months. It is anticipated that approximately half of the construction workers will access the site from within 40 miles of the Project. These local workers will most likely be from Ellensburg, Yakima, or the surrounding area. It is anticipated that the other half of the construction workers will be non-local, originating from the Seattle area (approximately 125 miles to the west). See Section 3.12, 'Population, Housing, and Economics' for information on the construction workforce.

Vantage Highway will be most utilized as a primary roadway to and from the Project site. As the primary access route to the site, this roadway will likely have the greatest impact from the construction vehicles and workers. Workers from the Seattle area will most likely travel east on I-90, north, from exit 115, through the City of Kittitas, and continue east on Vantage Highway to access the Project site. Workers from the Yakima area will travel north on US 82 and east on I-90 to the Kittitas exit where they will continue on the access route previously mentioned. These are the shortest and most direct routes from the surrounding major urban areas.

Trucks will be used to deliver construction equipment and materials. Some of these trucks will have a gross vehicle weight above 105,500 pounds. Any oversize or overweight vehicles will comply with state requirements. Because the surface condition of the pavement near the Project site is built to WSDOT standards and is of good bituminous or asphalt quality, the delivery of construction materials and equipment is not expected to degrade existing conditions.

The wind turbines, towers, transformers and other large equipment will be transported to the site using semi-truck and lowboy trailers designed for heavy loads (i.e., multiple axles). The trucks will deliver the equipment to the Project site. Movement of the transporters will have short-term impacts on traffic along Vantage Highway and other roadways used along the transporter routes.

Construction is anticipated to commence during April, 2005. There will be an on-site workforce of about 160 workers during the peak month of construction as described in Section 2.2.6 ‘Project Construction Schedule and Workforce’. The average workforce for the remaining months of construction will be about 90 workers. During the peak construction period, construction workers will generate an estimated 214 daily trips (assuming one third of the workforce will carpool to the site), 107 of which will occur during the evening peak hour. These construction worker trips will consist of light duty vehicles, which will travel on Transporter Route 1 through the City of Kittitas.

Construction-related traffic increases will consist of deliveries of Project equipment and construction materials (such as water and steel) by truck. Truck deliveries are anticipated to occur between approximately 8 a.m. and 4:30 p.m. on work days. In total, 25,789 heavy duty truck deliveries are expected during the construction period. Approximately 1,340 of these truck deliveries are oversized or overlength and must travel on Transporter Route 2 through Vantage to access the site. The remaining trucks may travel on Transporter Route 1 through the City of Kittitas. Assuming 96 work days (4 busiest months at 24 workdays per month), this would result in approximately 255 trucks (or 510 truck trips) per day on Transporter Route 1. This equates to 128 truck trips during the peak hour on Transporter Route 1, assuming a very conservative estimate that 25% of the 510 total truck trips will actually occur within the peak. A conservative estimate was assumed in order to show the possible effects on capacity. Similarly on Transporter Route 2, there will be 14 trucks per day, which equates to 28 truck trips, or 7 trucks during the peak hour. The estimated maximum number of truck trips per day during this peak period is approximately 383 trucks, or 766 truck trips, using currently available construction estimates.

In addition to worker traffic and heavy duty construction vehicles, there will be an estimated 30 light duty delivery trucks daily for the peak of the construction period, resulting in 60 daily trips. These light duty vehicles will travel on Transporter Route 1 through the City of Kittitas. Similar to heavy construction deliveries, light duty delivery trips will not all occur within the peak hour. Assuming that 25% of all light duty delivery trips will occur within the peak hour, 15 truck trips will occur on Transporter Route 1.

Transporter Route 1 will experience an additional 250 peak hour trips during the peak of construction (107 worker trips, 128 heavy duty delivery trips, and 15 light duty delivery trucks). Transporter Route 2 will experience very little additional construction traffic at only 7 peak hour trips.

It is anticipated that truck deliveries will include:

- Major equipment (e.g. tower sections, nacelles, blades);
- Water trucks for road wetting during compaction and for dust control;
- Fuel trucks for replenishing diesel and gasoline storage tanks;
- Cement, sand and aggregate for use in concrete foundations and trench shading;
- Construction equipment delivery and pickup;
- Reinforcing steel;
- Mechanical equipment;
- Electrical equipment and material (transformers, cable, etc.);
- Miscellaneous steel, roofing, and siding;
- Construction consumables;
- Contractor mobilization and demobilization.

Table 3.15.2-2 provides a summary of PM peak hour traffic and LOS during the construction time period of the Project. The LOS during construction assumes that construction traffic is added to the heavier directional split of background traffic for conservative impacts.

The construction LOS during the PM peak hour with construction worker traffic and delivery traffic causes the transporter routes to operate at LOS C or better. It is anticipated that the LOS C on Main Street and the LOS B on I-90 west of the City of Kittitas will return to operating at existing conditions once the Project is complete.

Table 3.15.2-2: Total PM Peak Hour and LOS Construction Impacts to the Roadways

Roadway	No. of Lanes	2004 Base ADT	2004 PM Peak	Construction Worker Traffic	Construction Traffic	Total PM Peak	LOS
Transporter Route 1							
I-90 (West of Kittitas)	4	15,300	842*	107	150	1,099	B
Main Street	2	2,040	306	107	143	556	C
No 81 Road	2	1,326	199	107	143	449	A
Vantage Highway	2	1,169	175	107	143	425	C
Transporter Route 2							
I-90 (West of Vantage)	4	11,220	617*	0	7	624*	A
Vantage Highway	2	1,530	230	0	7	237	C

Table 3.15.2-2: Total PM Peak Hour and LOS Construction Impacts to the Roadways

** Freeway PM Peak volumes are directional.*
Source: Washington State Department of Transportation, 2002.

The LOS table 3.15.2-2 above was based on an upper-limit scenario in which all gravel needed for construction on-site would be transported to the Project location from off-site. Therefore, this is a conservative estimate of truck trips. The Applicant intends to utilize on-site gravel quarries at the Project location to supply construction gravel. These on-site gravel quarries would significantly reduce the number of heavy vehicles accessing the site, thereby improving traffic operations. Heavy duty truck deliveries are reduced by 15,092 vehicles over the construction period when on-site gravel quarries are utilized. Table 3.15.2-3 below shows that with on-site facilities (100% gravel on-site) vehicle trips are reduced by 79 vehicles in the peak hour on Transporter Route 1 as compared with gravel coming from off-site.

A 60/40 directional split was assumed for level of service calculations for the existing traffic scenarios. This split was updated accordingly in the HCS analysis, assuming that peak hour construction traffic would be added in the peak direction. Truck percentage was also updated in the HCS analysis.

With an on-site quarry, a total of 10,697 heavy duty truck deliveries are expected during the construction period. Approximately 1,340 of these truck deliveries are oversized or over length and must travel on Transporter Route 2 through Vantage to access the site. The remaining trucks may travel on Transporter Route 1 through the City of Kittitas. Assuming 96 work days (4 busiest months at 24 workdays per month), this would result in approximately 98 trucks (or 196 truck trips) per day on Transporter Route 1. This equates to 49 truck trips during the peak hour on Transporter Route 1, assuming 25% of the 196 total truck trips will actually occur within the peak. Similarly on Transporter Route 2, there will be 14 trucks per day, which equates to 28 truck trips, or 7 trucks during the peak hour.

Transporter Route 1 will experience an additional 171 peak hour trips during the peak of construction (107 worker trips, 49 heavy duty delivery trips, and 15 light duty delivery trucks). Transporter Route 2 will experience very little additional construction traffic at only 7 peak hour trips.

Table3.15.2-3: Effect of On-Site Gravel Quarry on Construction Impacts

		0% Gravel On-Site		**100% Gravel On-Site**	
Roadway	**2004 PM Peak**	**Worker and Truck Traffic**	**LOS**	**Worker and Truck Traffic**	**LOS**
Transporter Route 1					
I-90 (West of Kittitas)*	842	1,099	B	1,020	B
Main Street	306	556	C	477	C
No 81 Road	199	449	A	370	A

Table3.15.2-3: Effect of On-Site Gravel Quarry on Construction Impacts					
Vantage Highway (West of site access)	175	425	C	346	C
Transporter Route 2					
I-90 (West of Vantage)*	617	624*	A	624	A
Vantage Highway (East of site access)	230	237	C	237	C

** Freeway PM Peak volumes are directional.*
Source: Washington State Department of Transportation, 2002.

Later in the project development process, when a turbine type and construction contractors have been selected, the Applicant will work with a transport company to determine construction vehicle specifics. The largest type of transport vehicles used for the Project would carry the nacelles and the turbine blades. The nacelle transport truck would be approximately 110 feet in length and weigh approximately 280,000 pounds. The blade transport truck would be approximately 160 feet in length and weigh approximately 155,000 pounds. It is estimated that 5-10 nacelles and 5-10 sets of turbine blades would arrive each week at the site via truck.

Road Improvements and Maintenance
There are no anticipated improvements to existing roads, intersections, or roadway approaches that will be used for construction or operation of the facility. If potential improvements become necessary, Kittitas County Roadway Design Standards and WSDOT Design Standards will be implemented.

Construction and operation of the Project is not anticipated to require maintenance and repair beyond that which is regularly scheduled by the State or County. As discussed above in Section 3.15.1.3, 'Truck Volumes and Routes, Weight and Load Limitations', maintenance or repairs that are required will return roadways to pre-Project conditions as documented in the video log. Public roadways will continue to be maintained by the State or County. Roadways on the Project site will be maintained by the Applicant. Access trails for the transmission feeder line(s) will be maintained by the Applicant and/or the interconnecting utility (PSE and/or BPA).

Air Navigation Considerations
The Applicant intends to file a 'Notice of Construction or Alteration' with the regional FAA office in Renton, WA to initiate the "7460" review process. Applicant will provide a copy to EFSEC once a final determination is made.

After a determination by the FAA is made, Applicant intends to submit a revised 'Notice of Proposed Construction or Alteration' as necessary to the FAA based on the final, approved Project site layout and proposed turbine size and will comply with all requirements of the FAA. The FAA's aeronautical studies state that, for certain turbines, a 'Notice of Actual Construction or Alteration' (FAA form 7460-2) be submitted within 5 days after the construction reaches its greatest height. The Applicant will submit a

‘Notice of Actual Construction or Alteration’ (FAA form 7460-2) for all structures for which the FAA has required them in accordance with the required timeline, as necessary.

Parking during Construction

During construction, parking will be located at the site of the O&M facility and along the site access roads. The O&M facility site will also serve as a construction staging area. Dust control will be implemented as needed to minimize fugitive dust. Personnel working on turbine foundations, electrical infrastructure and turbine erection will park along turbine string roads. Because vehicles will park in areas that are already temporarily or permanently disturbed for other construction purposes, no additional ground disturbance is anticipated for parking needs. It is anticipated that roughly half of all construction worker vehicles will be parked at the O&M facility location and the other half will be dispersed across the various turbine strings. With a peak workforce of 160 people, the maximum number of worker vehicles anticipated at any one time is 107, assuming that efforts to encourage carpooling will result in about one third of construction workers carpooling to and from the Project site. In terms of acreage necessary for parking, the upper-limit scenario (assuming no carpooling) would require less than 2 acres for parking. The Applicant has used 2 acres for estimating Project acreage and habitat impacts associated with vehicle parking. Section 2.2.6, ‘Project Construction Schedule and Workforce’ contains tables summarizing estimates for numbers of workers by work elements and time frames.

Transportation of Hazardous Materials

As described in Section 3.16, ‘Health and Safety’, diesel fuel is the only potentially hazardous material that will be used in any significant quantity during construction of the Project. During construction, fuel-tanker trucks will be used for the refueling of fuel-storage tanks on site. The fuel-tanker trucks will be properly licensed and professionally driven and will incorporate appropriate design features such as overflow prevention devices and fixed couplings to prevent accidental spills. Operating procedures to prevent and contain any accidental spills resulting from fuel transportation and transfer are described in detail in Section 3.16, ‘Health and Safety’. Construction of the Project will not result in the generation of any hazardous wastes in quantities regulated by state or federal law.

Potentially hazardous materials that will be transported to the site during construction include lubricating oils, cleaners, and herbicides in quantities below state and federal regulatory thresholds. Transportation of these materials will be conducted in a manner that is protective of human health and the environment and in accordance with applicable federal and WSDOT requirements.

Traffic Hazards

It is anticipated that the overall accident rate or pattern would be similar to existing conditions.

A Traffic Management Plan will be submitted to EFSEC for review prior to the startup of construction, and that plan will include measures to minimize impacts of construction-related traffic and to minimize hazards during construction.

Traffic generated by the construction or operation of the Project is not anticipated to affect the accident rate on roadways that are part of the Transporter Routes. Accident rates are based on average daily traffic volumes, which will not be affected by Project-related traffic. (Project-related traffic is a minimal addition to ADT.) See Section 3.15.1.5 'Accident Rates' for a qualitative description of sight distance at the Project site entrance intersection, which is located across from the entrance to the Rye Grass Landfill. There are no anticipated sight distance safety issues. There are no crests in the roadway, winding geography, or steep side slopes to obstruct vision to the site entrance intersection. This intersection also has adequately widened shoulders that may be beneficial to vehicles turning into and out of the site. The area will be adequately signed for construction traffic.

3.15.2.2 Operation

Vehicular traffic

The Project will operate continuously (24 hours per day, 7 days per week) using an automated monitoring system. It will also employ an estimated 14 to 18 full time workers who will staff the Project during core operating hours. The operations crew will normally work 8 hour days Monday through Friday, with additional hours on weekend shifts as required. This equates to a maximum of 36 trips a day, or 18 trips during the peak hour. It is anticipated that nearly all of the operations workers will reside within 30 miles of the Project site, most likely Ellensburg or the surrounding area. These operations workers will access the site in the same manner as described for construction workers above in Section 3.15.2.1 'Construction'. It is anticipated that Project operations crews will drive light trucks and vans on site to perform maintenance and supervision activities.

Traffic between the O&M facility and the individual turbines will be light during operations. Besides any trips by operation crews, scheduled maintenance is normally performed only every 6 months on each turbine. The Applicant will be responsible for maintenance of turbine string access roads, access ways, and other roads built or improved by the Applicant to construct and operate the Project.

Table 3.15.2-4 below describes current and future traffic volumes and LOS during the operation phase of the Project, including traffic volumes from the generation plant site, assuming a 30-year Project life. Future year 2034 background volumes were estimated using a 1 percent growth factor. This growth factor is considered reasonable because of the area's rural nature. As shown in Table 3.15.2-4, all roadways will operate at LOS C or better during evening peak conditions.

Table 3.15.2-4: Future Peak-Hour Roadway Segment Traffic Volumes and LOS with and without Project Impacts

	2004 PM Peak without Project	**2004 PM Peak with Project**	**2034 PM Peak without Project (Horizon Year)**	**2034 PM Peak with Project (Horizon Year)**

Roadway	Traffic	LOS	Traffic	LOS	Traffic	LOS	Traffic	LOS
Transporter Route								
I-90 (West of	842	A	860	A	1,089	B	1,107	B
Main Street	306	B	324	B	396	B	414	C
No 81 Road	199	A	217	A	257	A	275	A
Vantage Highway (West of site access)	175	C	193	C	227	C	245	C
Transporter Route								
I-90 (West of	617	A	617	A	799	A	799	A
Vantage Highway (East of site access)	230	C	230	C	297	C	297	C

** Freeway PM Peak volumes are directional.*
Source: Washington State Department of Transportation, 2002.

A 60/40 directional split was assumed for level of service calculations for the existing traffic scenarios. This split was updated accordingly in the HCS analysis, assuming that peak hour operations traffic would be added in the peak direction. Truck percentage was also updated in the HCS analysis.

Maintenance trails for the transmission feeder line(s) will be privately owned and located on the Project site and along the feeder line(s). Maintenance roads for turbines will be the same turbine string roads used for Project construction. A detailed maintenance schedule has not been determined, therefore the expected frequency of use of maintenance roads can not be reported. There will be no uncontrolled public access to Project facilities on privately owned land during construction, operation or decommissioning of the Project.

Parking
During the operational phase, parking will be at the O&M facility parking lot. With an anticipated operations workforce of 14 to 18 people, plus occasional guests and visitors, delivery vehicles, etc. no more than 30 vehicles are expected to be parked at the facility at any one time. The permanent parking area at the O&M facility will be graveled to reduce dust and soil erosion.

Transportation of Hazardous Materials
Hazardous materials to be transported to the site during operation include lubricating and mineral oils, cleaners, and herbicides in quantities below state and federal regulatory thresholds. Transportation of these materials will be conducted in a manner that is protective of human health and the environment and in accordance with applicable federal and WSDOT requirements.

No substantial quantities of industrial materials will be brought onto or removed from the Project site during Project operations. The only materials that will be brought onto the site will be those related to maintenance and/or replacement of the Project facilities (e.g., nacelle or turbine components, electrical equipment). The only materials that will be removed from Project facilities will be those parts or materials replaced during maintenance activities. Those materials removed or replaced will not constitute a significant amount.

Traffic hazards

Traffic generated by the operation of the Project is not anticipated to affect the accident rate on roadways that are part of the Transporter Routes. Accident rates are based on average daily traffic volumes, which will not be affected by Project-related traffic. (Project-related traffic is a minimal addition to ADT.) See Section 3.15.1.5, 'Accident Rates' for a qualitative description of sight distance at the Project site entrance intersection.

Although the additional vehicular and construction traffic attributable to the Project could increase the risk of accidents, it is anticipated that the overall accident rate or pattern would be similar to existing conditions.

Roadway grades on the Transporter routes currently do not exceed 8% so no means to ensure access are necessary on State or County roads. In the event that on-site maintenance roads exceed 8% grade, safety precautions and adequate all-terrain vehicles will be used during inclement weather.

Air navigation Considerations and Lighting

To respond to the Federal Aviation Administration's (FAA) aircraft safety lighting requirements, the Project will be marked according to guidelines established by the FAA. Section 3.11.3.3, 'Operations - Turbine Lighting', describes details of FAA requirements and anticipated Project lighting plans.

3.15.3 Comparison of Impacts of the Proposed Scenarios

Under the different design scenarios, there is no significant change to the construction schedule or associated impacts on ADT volumes, LOS values, accident rates or roadway conditions. This is because the road, underground trench, and overhead collector line lengths are unchanged under each scenario. It is also because the Large WTG Scenario requires larger foundations for a smaller number of WTGs while the Small WTG Scenario requires excavation of smaller foundations for a larger number of WTGs. Therefore, the materials requirements are substantially similar under each scenario. The number of construction vehicles on site is substantially similar under each scenario. The number of total truck deliveries is reduced by 14% under the Large WTG Scenario and reduced by 7% under the Small WTG Scenario.

3.15.4 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this section 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.15.5 Mitigation Measures

No significant unavoidable adverse impacts on traffic and transportation are associated with construction or operation and maintenance of the Project. However, the Applicant has proposed specific mitigation measures for Project construction as described below.

3.15.5.1 Construction

During construction, roadways and intersections in the vicinity of the Project site will provide an acceptable level of passage for traffic, even during the evening peak periods. However, the following mitigation measures are proposed to further reduce the impact of Project construction on roadway traffic in the region:

- The Applicant will prepare a Traffic Management Plan (to be submitted to EFSEC prior to construction for review) with the construction contractor outlining steps for minimizing construction traffic impacts;
- The Applicant will provide notice to adjacent landowners when construction takes place to help minimize access disruptions;
- The Applicant will provide proper road signage and warnings of "Equipment on Road," "Truck Access," or "Road Crossings;"
- When slow or oversized wide loads are being hauled, advance signage and traffic diversion equipment will be used to improve traffic safety. Pilot cars will be used as the DOT dictates, depending on load size and weight;
- The Applicant will construct necessary site access roads and an entrance driveway that will be able to service truck movements of legal weight;

- The Applicant will encourage carpooling for the construction workforce to reduce traffic volume;
- In consultation with Kittitas County, the Applicant will provide detour plans and warning signs in advance of any traffic disturbances;
- The Applicant will employ flaggers as necessary to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents;
- Where construction may occur near the roadway, one travel lane will be maintained at all times.

3.15.5.2 Operation

Because Project operation and maintenance will not significantly affect traffic and transportation, no mitigation is proposed.

3.15.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on traffic and transportation are associated with construction of operation and maintenance of the Project.

3.16 HEALTH AND SAFETY

3.16.1 Impacts of the Proposed Action

3.16.1.1 Risk of Fire and Explosion

Fire Risk

Unlike thermal power plants, wind power projects pose a much smaller risk of explosion or fire potential, as there is no need to transport, store or combust fuel to generate power. As with any major construction undertaking, construction of the Project does present some fire risks. Fire risk mitigation starts with Project design, especially with electrical design that needs to comply with the National Electric Code (NEC) and the National Fire Protection Agency (NFPA). A strict fire prevention plan will be enforced both during construction and operations to mitigate fire risks.

Given the fact that there are only three residences within 2 miles of the Project site and there are no valued timberlands or residences downwind of the Project site for more than 10 miles at which point the land reaches the Columbia River, the risk of unintentional or accidental fire or explosion during both construction and operations spreading to sensitive areas is minimal. As the Project site is generally arid rangeland with a predominant groundcover of grasses and sagebrush, the highest expected fire risks are grass fires during the hot, dry summer season. Fire risk potential is constantly tracked and reported during the summer fire season by the DNR and this will be actively posted at the construction job site during the high risk season. The Project site roads act as firebreaks and also allow for quick access of fire trucks and personnel in the event of a grass fire.

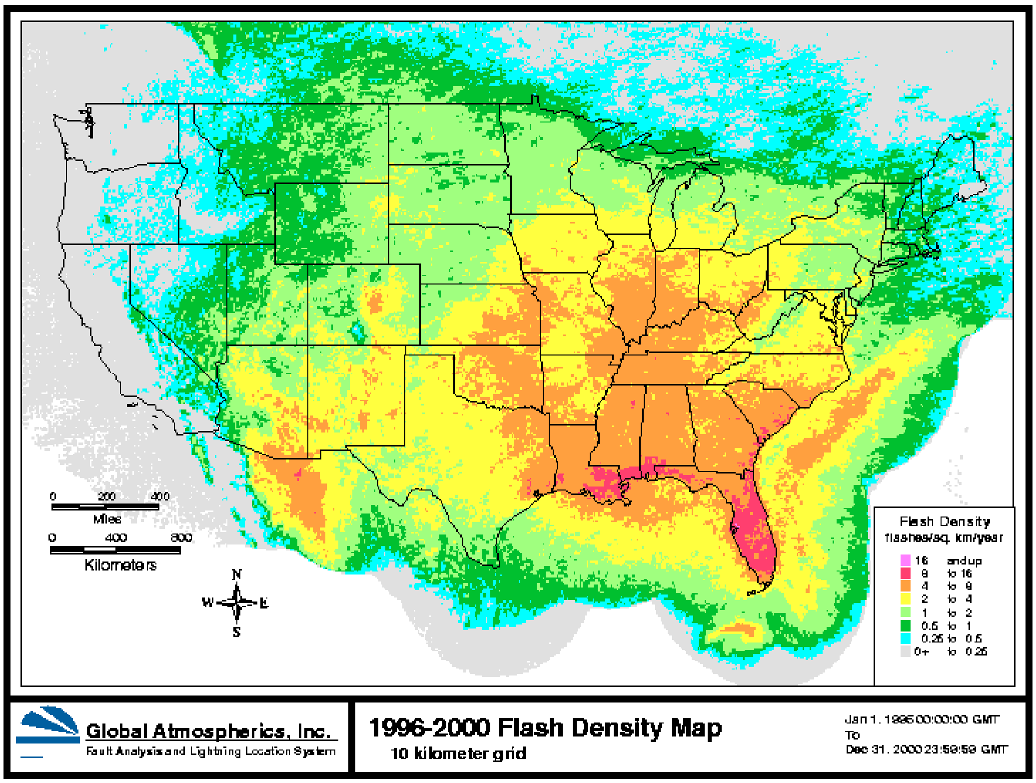
The Applicant is in the process of determining which Fire District will be responsible for fire protection services for the Project and will submit this information as part of the Fire Protection and Prevention Plan to EFSEC prior to construction. EFSEC, as well as the appropriate local fire district will review and approve all plans before they are implemented. The Fire Protection and Prevention Plan will include specifics regarding range fire prevention and property protection.

Lightning

Lightning induced fires are rare in the Project area. As shown in the flash density map in Figure 3.16.1-1, the Kittitas Valley and interior Washington in general, is not a highly lightning prone area. In fact, this area falls in the second lowest of eight categories of lightning intensity. The map is based on data from lightning flash sensors installed nation-wide over a four-year period. Since the wind turbines will be the highest structures in the surrounding area, the probability of lightning strike may be higher, however, the mitigation measures in place are designed to mitigate this risk significantly.

Both the wind turbine generators and the substation are equipped with specially engineered lightning protection systems, as described in Section 2.2.5, 'Construction Methodology'.

Figure 3.16.1-1: Lightning Flash Density Map of the USA



Turbine Fires

As is the case with almost any complex machine, there is some potential for fire inside the wind turbine generators. With the types of modern wind turbines proposed for the Project, however, turbine malfunctions leading to fires in the nacelle are extremely rare. The turbine is equipped with several thermal couple type temperature sensors to detect overheating of turbine machinery. Internal fires would be detected by these sensors and the turbine's control system causing the machine to shutdown immediately and send an alarm signal to the central SCADA system which would notify operators of the alarm by cell phone or pager.

One very useful source of information regarding the risks associated with operating wind Projects is the insurance industry. The Applicant contacted Worldlink Insurance in Palm Springs, CA to gain comparative information regarding the types and degree of risk associated with wind power Projects. Worldlink stated that they insure over 17,000 WTGs, and that principals at the company had 15 years of experience with the wind industry. They stated that fires from wind turbines were very rare, averaging approximately two to three incidents per year among the 17,000 turbines insured by the company. This translates into a rate of one fire per 4,000 to 6,000 turbines. Worldlink also noted that the vast majority, approximately 85-90%, of those fires were related to older (i.e. pre-1995) wind turbine technology. Perhaps most importantly, they stated that the firm had only one third-party claim ever, which was for a haystack that burned on a neighbor's property as a result of a fire related to an older wind Project in Altamont, CA.

There is little to no potential for nacelles to catch on fire during construction, as they will not be operating yet. In the event of a nacelle fire, Project operations staff and fire personnel will not attempt to climb the tower to put it out, but only prevent the fire from spreading to any adjacent land. This will be achieved either by use of fire suppressant material or a small controlled burn around the base of the tower out side of the graveled area that surrounds the tower base.

Substation Fires

As substation transformers are filled with mineral oil, they present a potential fire risk. The substation will be constructed and designed with a very robust grounding system to mitigate lightning strike damage potential as described in detail in Section 2.2.4, including an underground grounding grid with multiple grounding rods and direct buried copper cable as well as overhead shielding wires which span across the steel pole structures to provide a cone of protection over the entire substation.

Substation transformers will be surrounded by a containment trough filled with heavy, nonflammable gravel which will limit the amount of oil exposed in the event that an oil leak from the transformer tanks combines with a fire. By reducing the surface area of a potential mineral oil spill, the containment trough reduces the fire hazard potential from the oil.

Fire Risk During Decommissioning

The potential fire risks during decommissioning and construction are similar in nature, but are lower for Project decommissioning. Fire prevention measures during decommissioning would be substantially similar to those for Project construction.

Handling Medical Emergencies Associated with Fires and Explosions

Medical emergencies will be normally handled by calling 911 and alerting the EMS (Emergency Medical Services) system. The City of Ellensburg fire department provides emergency medical services (EMS) for the entire county, directly billing for services that include treating, burns, fractures, lacerations, fall injuries, and heart attacks. Ambulances are located in Ellensburg, and the towns of Kittitas. Also, Cascade Search and Rescue is located in Ellensburg. Emergency calls are dispatched through the Sheriff's office to the fire districts that provide search and rescue support.

Kittitas Valley Community Hospital in Ellensburg serves the entire county. The hospital has Level Four trauma service, with a limited number of specialists available. Patients with head injuries, severe burns, and/or trauma are transported to a different facility, usually Harbor View Medical Center in Seattle. Less severe accident victims are sometimes transported to Yakima for hospitalization and treatment. There is a heliport on the roof of the hospital, and a helicopter is available for emergency response (Eric Jensen, Kittitas Valley Community Hospital administrator, personal communication). MedStar, a critical care transport service located in Moses Lake, Washington, also provides air ambulance support services to Kittitas County.

All operations personnel, working on the turbines, will work in pairs. All turbine maintenance staff will be trained in lowering injured colleagues to prepare for the possibility of an injury while working in the nacelle that prevents a worker from climbing down the tower safely. A rescue basket, especially designed for this purpose, will be kept at the operations and maintenance facility and will be available for use by local emergency medical services personnel. Training in its use will also be provided to local EMS personnel.

3.16.1.2 Electromagnetic Fields (EMF)

EMF is associated with electric transmission and is not specific to wind power Projects. Electromagnetic fields are only ever considered a possible issue when associated with the siting of high voltage (115kV+) overhead transmission lines in close proximity to residences.

EMF at Wind Turbines
EMF is generally not an issue related to wind turbines, which have low voltage drop-cables (575 – 690V) contained within steel towers and have a predominately underground collection system also at a low voltage (34.5 kV), all of which is located more than 1 ¾ miles from the nearest residences.

EMF from Transmission Feeder Lines
For this Project, EMF exposure is very low because the line passes over and through undeveloped land. The high voltage transmission feeder lines have been sited along a path which does not bring them close to nearby residences or developed areas where people spend time. The closest residence is approximately ¼ mile from the PSE feeder line as illustrated in Exhibit 15-A, 'Residences in Project Vicinity Map'. The feeder lines will be designed and built according to industry standards to avoid any potential EMF impacts. Exhibit 34 contains a detailed EMF report prepared by TriAxis Engineering which estimates the peak EMF levels at various intervals including the peak EMF on the edges of the proposed 230 kV transmission line right-of-way (a distance of 75 linear feet from the transmission line centerline) to be 19.6 milli-Gauss for the magnetic field and 0.56 kV/m for the electric field as indicated in Table 1 of Exhibit 34. Based on the TriAxis report, the highest EMF levels expected at the nearest residence at a distance of more than 1,000 feet from the transmission lines will be less than 0.12 milli-Gauss for the magnetic field and 0.001 kV/m for the electric field. Average magnetic-field strength in most homes (away from electrical appliances and home wiring, etc.) is less than 2 mG. Very close to appliances carrying high current, fields of tens or hundreds of milligauss can be present.

Electric Shock Potential

Due to the distant proximity of the proposed transmission line routes to any residences or metallic structures, nuisance shock potential caused by induced EMF is very low. In areas where the transmission feeder lines runs parallel to existing wire fence lines, the fence line will be grounded with a copper grounding rod and ground straps at adequate intervals (typically every 1,000 feet depending on the fence line and soil conditions) to reduce the potential shock hazard from induced EMF in the fence wire.

3.16.1.3 Spillage Prevention and Control – Releases of Hazardous Materials

Construction Spill Prevention, Containment and Control Plan
This section describes measures that will be taken to prevent and mitigate any accidental spills or discharges. A detailed construction spill prevention plan will be developed by the EPC Contractor and submitted to EFSEC for review prior to construction. EFSEC, as well as pertinent local emergency response organizations, where appropriate, will review and approve all plans before they are implemented. The plan will address prevention and clean up of any potential spills from construction activities.

Construction of the Project will require the use of diesel and gasoline fuels for operating construction equipment and vehicles. Measures to prevent and contain any accidental spills resulting from this fuel storage and use are described below.

Petroleum fuels are the only potentially hazardous materials that will be used in any significant quantity during construction of the Project. Construction of the Project will require the use of diesel fuel for operating construction equipment and vehicles. Measures to prevent and contain any accidental spills resulting from this fuel storage and use are described in detail in below in '*Construction Spillage Prevention'*. Construction of the Project will not result in the generation of any hazardous wastes in quantities regulated by state or federal law.

Construction Spill Prevention:
Fuel and lubricating oils from construction vehicles and equipment and the mineral oil used to fill the substation transformer(s) are the only potential sources for a spill. The EPC contractor will be responsible for training its personnel in spill prevention and control and, if an incident occurs, will be responsible for containment and cleanup.

Fuel Spill Prevention:
During construction, the EPC contractor will utilize fuel trucks for refueling of construction vehicles, fuel storage tanks and equipment on site. The fuel trucks will be properly licensed and will incorporate features in equipment and operation, such as automatic shut off devices, to prevent accidental spills. Fueling of large, heavy construction equipment such as cranes and earth moving equipment will occur on site where the equipment is located. The fuel truck will drive to the equipment. Some construction vehicles, such as pick up trucks, will be fueled in town at gas stations. Any spills will be addressed in accordance with the construction spill prevention plan that will be developed by the construction contractor and will be submitted to EFSEC for review and approval prior to construction**.**

The risks associated with driving fuel trucks along gravel roads at the Project site are low. The road slopes are shallow enough to allow heavy WTG delivery trucks access to all WTG strings, and can safely accommodate fuel trucks as well. The roads are designed for wide loads and are a minimum of 20 feet wide, with a 2-foot shoulder on either side. Roads between contiguous turbines in a string will be 34 feet wide to accommodate large turbine erection cranes. Most roads are along ridges where slopes are typically less than 5 degrees. In areas of steeper grades, a cut and fill design will be implemented to keep grades below 15% to facilitate access and help prevent erosion.

Potential risks will be additionally mitigated by using dedicated fuel-delivery trucks driven by professional, appropriately licensed drivers and by ensuring adherence to the Project site speed-limits. No other equipment fueling plan is anticipated. A fuel tanker accident would trigger activation of the Spill Prevention Controls and Countermeasures (SPCC) plan. The SPCC plan will include a description of procedures that will be followed in the event of a fuel tanker spill and will contain a list of equipment that will be on site for spill response emergencies.

Lubricating Oils

Lubricating oils used during construction will mostly be contained in the vehicles and equipment for which they are used. Small quantities of lubricating oils may also be stored in appropriate containers at the construction staging area located at the site of the O&M facility. The details of storage and containment of lubricating oils and other materials at the construction staging area will be addressed in the construction spill prevention plan, which will be developed by the construction contractor and submitted to EFSEC prior to construction for review and approval. Appropriate measures will be taken to ensure these materials are not spilled and that if a spill does occur, it is promptly cleaned up and reported to the proper agencies.

Transformer Mineral Oil

The Project will have a substation with one or two substations transformers, which need to filled with mineral oil on site as they are delivered without oil in the tank. The main transformers(s) will be filled and tested as part of the commissioning process. The oil truck will be properly licensed and will incorporate several special features in equipment and operation, such as automatic shut off devices, to prevent accidental spills. The substation transformers have a specifically designed containment system including a full perimeter containment trough large enough to hold all of the oil from the transformer in the event of a tank breach.

Pad mounted transformers or transformers mounted in the turbine nacelles will be filled at the factory and not at the site during construction.

The construction spill prevention plan, which will be submitted to EFSEC for review and approval, will address prevention and clean up of any potential spills from construction equipment.

Worst Case Scenario
A worst-case hazardous materials scenario, while difficult to determine, might occur during construction and involve the catastrophic failure of one of the on-site, 1,000 gallon, diesel fuel storage tanks, perhaps by collision with a fully-loaded fuel-tanker truck. Assuming, as the worst-case scenario must, that the two fuel vessels and the containment tank are ruptured and that sustained exposure to a high-temperature ignition source is sufficient to cause ignition of associated vapors, there is a remote possibility that the ensuing combustion would ignite the fuel. Assuming that the fuel storage tank was full when ruptured, approximately 2,000 gallons of diesel fuel would burn and be difficult to extinguish. Even if such a scenario occurred during the dry season, it is unlikely that the burning diesel fuel would ignite grass fires outside the cleared 500’ x 500’ fuel storage location. Given the remote and isolated location of the site the impact to the public would be nil.

Diesel fuel is classified as a “combustible liquid”, which is a lower risk rating than the “flammable liquid” classification used for gasoline. The flash point for diesel fuel is relatively higher than that for gasoline, and sparks or static charges are not sufficient to ignite diesel vapors. However, diesel fuel is relatively difficult to extinguish once ignited.

A somewhat more likely scenario is that such catastrophic failure would cause the contents of both vessels to spill into the containment tank and overflow onto the ground, where excess fuel would be impounded within the earth containment berm. Emergency response procedures would be activated. Under either scenario the impacts of such releases to the public would be nil because of the remote and isolated location of the site.

Operations Spill Prevention, Containment and Control Plan
An Operations Spill Prevention, Containment and Control Plan will be developed and submitted to EFSEC prior to the commencement of Project operations. Operation of the Project will not require the storage or use of significant quantities of fuel or other materials that could cause a spill or other accidental release.

Project operations will not require the use of a permanent fuel storage tank, as fuel use during operations is limited to maintenance vehicle fueling which will be done at existing licensed gas stations in nearby communities (Ellensburg or Cle Elum.) The potential for accidental spills during Operations is minimal, as the only materials used during Project operations that present any potential for accidental spills are lubricating oils and hydraulic fluids used in the wind turbine generators and transformers.

Wastes
Operation of the Project will not result in the generation of regulated quantities of hazardous wastes. As no fuel is burned to power the wind turbine generators, there will be no spent fuel, ash, sludge or other process wastes generated. The primary type of waste generated by operations the Project will be municipal solid waste generated at the Operations and Maintenance facility, consisting of typical office wastes (paper,

cardboard, food waste, etc.) which will be stored in a dumpster until it is hauled to the transfer station.

Periodic changing of lubricating oils and hydraulic fluids used in the individual wind turbine generators (WTGs) will also result in the generation of small quantities of these materials. These waste fluids will be generated in small quantities because they need to be changed only infrequently, and the changing of these fluids is not done all at once, but rather on an individual WTG basis. These waste fluids will be stored for short periods of time in appropriate containers at the O&M facility for collection by a licensed collection service for recycling or disposal. Procedures for collecting, storing and transporting these materials for recycling or disposal are described in detail in below.

The replacement fluids will be stored on a concrete surface inside the O&M facility and will be surrounded by a catch-basin berm or trough to trap any leaks or spills. Specific details of the volumes of the containment structure(s) will be addressed in the operations spill prevention plan to be submitted to EFSEC for review and approval.

Wind Turbine Fluids

Each turbine model has different specifications for lubricating oil and hydraulic fluid quantities. There are three main types of fluid in a wind turbine generator (WTG): Cooling fluid for the generator (a mix of glycol and water, similar to that used in automobile radiators), lubricating oil for the gearbox (typically a synthetic lubricating oil), and hydraulic oil for operating the blade pitch system, yaw mechanism and brakes. The approximate volumes of fluids contained in the various WTG scenarios for the Project are listed below in Table 3.16.2-2.

All of the WTGs being considered for this Project are equipped with sensors to automatically detect loss in fluid pressure and/or increases in temperature which enable them to be shut down in case of a fluid leak, as well as fluid catch basis and containment systems to prevent any accidental releases from leaving the nacelle. Based on the limited quantities of fluids contained in the WTGs and the leak detection and containment systems engineered into their design, the potential for an accidental spill from WTG malfunction is extremely limited. Furthermore, any accidental gear oil or other fluid leaks form the wind turbines will be contained inside the turbine towers which are sealed around the base. As stated in Section 2.2.3, 'Project Facilities', both the nacelles and the towers incorporate adequate containment to capture any fluids in the event of a leak or spill. Specific details of the volumes of the containment structure(s) will be addressed in the operations spill prevention plan to be submitted to EFSEC for review and approval.

Turbine Fluid Replacement

The fluids described in the table above are checked by Operations staff periodically and must be replenished or replaced on an infrequent basis (generally less than once per year and sometimes only once every five years.) When replacing these fluids, Operations staff will climb up to the nacelle and remove the fluids in small (typically 5 gallon) containers and lower them to the ground using a small maintenance crane built into the nacelle itself. The containers are then transferred to a pickup truck for transport to the O&M facility for temporary storage (typically less than one month) before being picked up by a licensed transporter for recycling. Replacement fluids are added in the same method, only in reverse. Small quantities of replacement fluids, typically no more than a few 50 gallon drums, of lubricating oil and hydraulic oil may be stored at the O&M facility for replenishing and replacing spent fluids. These fluids will be stored indoors in appropriate containers. All Operations staff will be trained in appropriate handling and spill prevention techniques to avoid any accidental spills. Because only small quantities of fluids are transported, added or removed at any one time and are stored for short periods of time, the potential for an accidental spill during routine maintenance is extremely limited.

Pad Mounted Transformers:
As described in Section 2.2.3, 'Project Facilities', each wind turbine generator has a pad mounted transformer located at its base. These transformers contain mineral oil which acts as coolant. Each pad-mounted transformer would contain up to 500 gallons of mineral oil under the largest anticipated WTG scenario. The transformer is designed to meet stringent electrical industry standards, including containment tank weldment and corrosion protection specifications. Pad mounted transformers do not typically incorporate a containment structure, as the volume of mineral oil contained in them is much smaller than in the substation transformers and the risk of a spill is minimal.

Substation Transformer(s):
As described in Section 2.2.3, 'Project Facilities', the entire Project will be electrically connected to the grid at the substation which will be equipped with either one or two transformers. Each substation transformer contains up to 12,000 gallons of mineral oil for cooling. The transformer is designed to meet stringent electrical industry standards, including containment tank weldment and corrosion protection specifications. The substation transformers are equipped with an oil level sensor that detects any sudden drop in the oil levels, and sends an alarm message to the central SCADA system. Finally, the substation transformers are surrounded by a concrete berm or trough to ensure that any accidental fluid leak does not result in any discharge to the environment. The substation transformers will be surrounded by a containment berm or trough, as described in detail in Section 2.2, 'Description of the Proposed Project'.

3.16.1.4 Miscellaneous

There are no specific health and safety standards related to the siting of wind energy facilities. The major applicable regulatory standards used in the design of the Project are listed in Section 2.5 of this Application. The standards most related to health and safety regarding the construction an operation of a wind energy facility and related transmission lines would be the regulations listed in Section 2.5 of this Application as, "Aviation Regulations and Lighting", "Electrical Construction Permit" and "Building Codes"

<u>*No Radiation from Wind Power Project*</u>

Pursuant to WAC 463-42-115 the Applicant requests a waiver of WAC 463-42-352(5), requiring information related to radioactivity. No radioactive materials will be used, consumed, or released during construction or operation of the Project.

Potential for Encountering Contaminated Soils
Applicant commissioned KTA of Seattle, WA to conduct a Phase I Environmental Site Assessment (ESA) of property to be developed as part of the Wild Horse Wind Power Project. The objective of the ESA was to identify and characterize obvious or potential environmental concerns that may exist at the site. To accomplish this objective, a Phase I ESA was performed focusing on a review of environmental records, including information on the physical setting, historical use, and known environmental hazards near the Site. KTA performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E 1527. This assessment revealed no evidence of environmental impairment within the Project area. Based on these findings, it is not anticipated that any environmental contamination will be encountered during construction or operation of the Project. In the unlikely event that contaminated soils are encountered, Applicant will coordinate with appropriate personnel at Department of Ecology to determine an appropriate action plan in compliance with CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) and MTCA (Model Toxics Control Act of 1988).

Shadow Flicker
Shadow flicker, or strobe effects, can occur only if the turbine is located in close proximity to a receptor and is in a position where the blades interfere with very low-angle sunlight. The Project is not expected to result in any shadow flicker effects to any sensitive receptors, such as residences, due to the distance of more than 9,000 feet to the nearest residence which is well beyond the distance at which shadow flicker can cause impacts. A detailed discussion and analysis of the Project's potential to create shadow flicker and any potential health effects in included in Exhibit 9, 'Shadow Flicker Briefing'. Applicant is not aware of any evidence or studies that indicate that shadow flicker affects animals.

Wind Power Project Safety Standards
Construction and operation of a wind energy facility would create some potential for health and safety hazards common to constructing, operating and maintaining large electromechanical systems. These hazards are well documented and systems of design and construction standards to mitigate these hazards have evolved to a large extent.

The wind turbines proposed for the Project meet international engineering design and manufacturing safety standards. This includes tower, blade and generator design. There is an international quality control assurance program for turbines, and a number of relevant safety and design standards. The lead organization for development of international standards for wind turbine generating systems is the International Electrotechnical Commission (IEC), and the most broadly applied standard covering machinery and structures is IEC 61400-1: '*Wind Turbine Generator Systems – Part 1: Safety*

Requirements' (IEC Edition 2 1999). In the U.S., the American Wind Energy Association (AWEA) is the designated organization for participation on IEC committees.

Independent agencies are retained by wind turbine manufacturers to certify that the design and construction of a given turbine/tower assembly conform to accepted standards in terms of design load assumptions, construction materials and methods, control systems and safety measures. This is a generalized type of certification provided at manufacturers' expense. Once a specific system make and model are selected, the user then customarily funds a second independent certification attesting to the applicability of the system design and construction to the site-specific conditions. In addition, foundation design and commissioning checks address potential failure due to extreme events such as earthquakes or extreme wind loadings, as well as frequency tuning of the different parts of the structure to avoid failure due to dynamic resonance.

International experience to date has indicated very low risks associated with tower collapse, components falling from towers, ice throw and blade throw. Despite the very rare destruction of a wind turbine, no member of the public has ever been killed or injured by a wind turbine other than a parachutist in Germany who jumped into one. Risks have been continually reduced as turbine technology has improved. Publications such as *Wind Power Monthly* and *Wind Stats* provide current information on industrial accidents and failures of components.

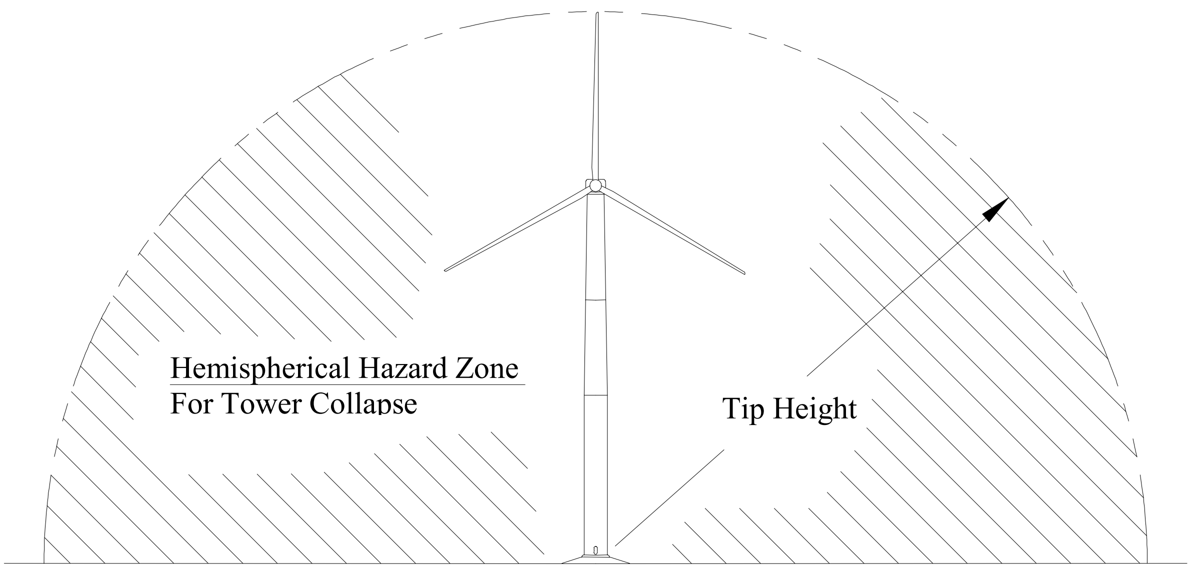
Wind Turbine Tower Collapse

Applicant is not aware of any documented collapse of a tubular tower wind turbine. Turbines and towers are designed to strict standards in order to withstand extreme weather events. Collapse of a turbine tower which has been constructed in accordance with international standards and local building codes is an extremely remote possibility. There is no single agency or entity that is responsible for tracking tower collapse, blade throw, blade icing issues nationally or internationally, however, one very useful source of information on the risks associated with operating wind Projects is the insurance industry. As mentioned in Section 3.16.1.1 above, the Applicant contacted Worldlink Insurance in Palm Springs, CA about the types and degree of risk associated with wind power projects. Worldlink stated that they were not aware of any tubular wind tower structure ever collapsing.

In the extremely unlikely event of a turbine tower collapse, the potential risk to the public is negligible since the Project will be constructed on property with controlled access across private land and the nearest public road is approximately 2 miles away. Persons, animals and facilities within the affected environment could be at risk of being struck by the tower, the nacelle or the turbine rotor blades. A tower collapse onto live electrical circuitry could conceivably start a fire.

Failure of the tower at its base, or of its anchorage to the foundation, would create a hemispherical hazard zone with a radius approximately equal to turbine tip height as illustrated in Figure 3.16.1-2. Tubular steel towers could buckle at some point along their length. This failure mode would result in a smaller hazard zone due to the reduced radius.

Figure 3.16.1-2 Turbine Tower Collapse Potential Hazard Zone



The Project is not expected to result in any tower collapse risk due to the distance of more than 9,000 feet to the nearest residence and 2 miles for the nearest public road to the nearest turbine which far exceeds the maximum tip height of any of the proposed turbines. A summary of the tower collapse hazard zone for the various proposed turbine scenarios is contained in Table 3.16.2-1.

Blade Icing and Ice Throw

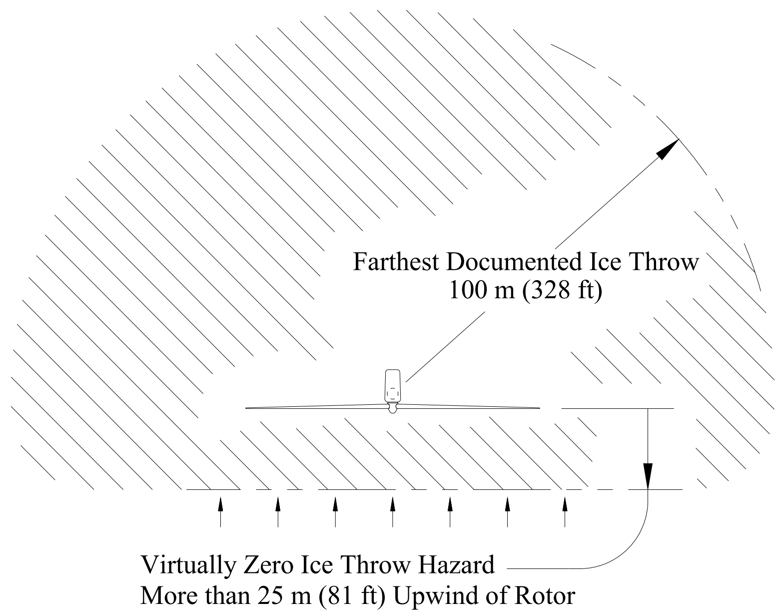
While ice buildup on blades is an occasional problem for wind turbines in terms of lost energy production, flying ice is not. When ice builds up on the blades, the blades turn very slowly (at only several revolutions per minute) until the ice is shed. This is because the airfoil has been compromised by the ice, and the blades are unable to pick up any speed.

It is important to note that while more than 55,000 wind turbine generators have been installed world-wide, there has been no reported injury caused by ice thrown from wind turbines. Studies of long-term weather data for the area by the Applicant's consulting meteorologist, Ron Nierenberg, indicate that icing conditions occur on average 3 to 5 days per year, as outlined in Exhibit 29. This is categorized as a 'Moderate icing' risk according to the 'Wind Energy in Cold Climates' (WECO) study commissioned by the

European Union's Environment Directorate. Reported data on ice throws indicates that ice fragments were found on the ground between 15 and 100 meters (50-328 feet) from turbines and were in the range of 0.1 to 1 kg in mass.

Under certain conditions ice can form on wind turbine towers and rotor blades in a variety of ways. It has been observed that moving rotor blades are subject to heavier buildups of ice than stationary structures through the mechanism of rime icing. Rime icing occurs when a sub-freezing structure is exposed to moisture-laden air with

Figure 3.16.1-3 Blade Ice Throw and Blade Fragment Throw Hazard Zone



significant velocity. If the ice then becomes detached while the blades are rotating, there is the possibility of "ice throw" over a considerable distance from the turbine.

Because of the large number of variables and the need for established guidelines in risk assessment, WECO has supplemented this modeling effort with continuation of an information outreach program originally initiated by the German Wind Energy Institute (DEWI) and the Finnish Meteorological Institute (FMI). This effort consists of gathering experiential data from a large number of wind turbine operators regarding occurrence of icing, and details of any ice throw events. Findings from this effort were presented by WECO team members at the BOREAS IV wind energy symposium in 1998. Significant findings included that the risk of being struck by ice becomes very small at distances greater than 100 meters from each tower at the proposed facility.

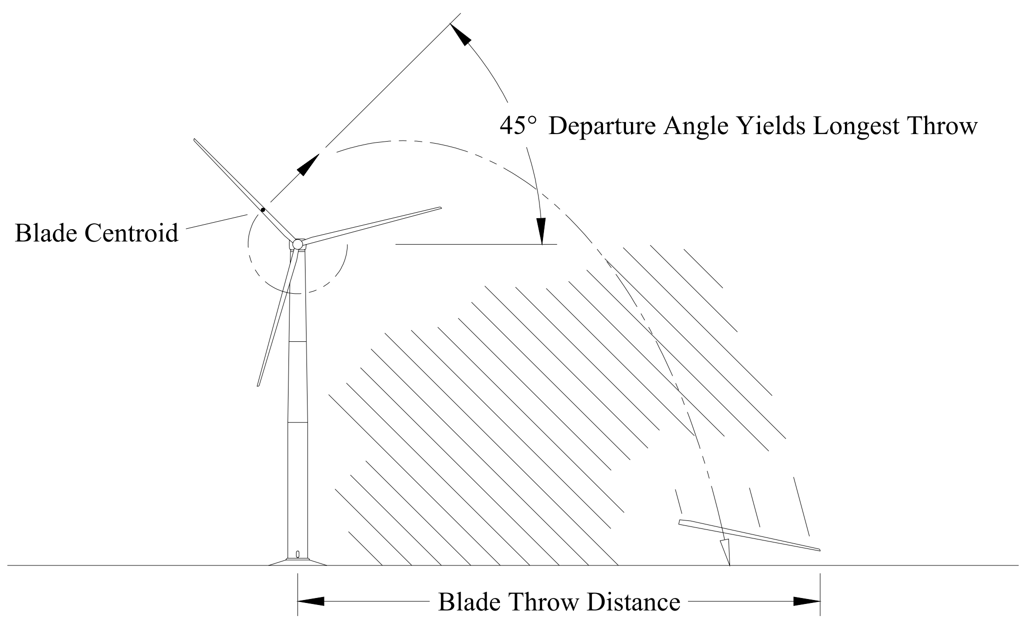
The ice throw hazard area extends in a direction normal to the prevailing wind direction and downwind from the turbine and there is essentially zero ice throw hazard as little as 25 meters upwind from the plane of the rotor as illustrated in Figure 3.16.1-3.

Persons, animals and facilities within the ice throw hazard zone of approximately 100 meters (328 feet) could theoretically be at risk of being struck by an ice fragment. The Project is not expected to result in any ice throw risk given distances of more than 9,000 feet to the nearest residence and 10,000 feet to the nearest public road. These distances far exceed the maximum ice throw potential of any of the proposed turbines. A summary of the tower ice throw hazard zone for the various proposed turbine scenarios is contained in Table 3.16.2-1.

Blade Throw

An extensive literature search on this potential hazard indicated that no advanced analytical modeling has been accomplished; this is likely due to the complexity of the analysis, coupled with the extremely low incidence of blade throw reports. Only two

Figure 3.16.1-4 Blade Throw Distance



incidents of blade throw are known. One was the directly linked to improper assembly, resulting in immediate failure upon startup and the other resulted from a blade being struck by lightning.

The simplified worst-case loss of a whole blade would occur with the blade rotating at maximum speed, when oriented at 45º from the horizontal axis and rising. This is the classic maximum trajectory case from standard physics texts as illustrated in Figure 3.16.1-4. Review of these data indicates that for the maximum turbine envelope, the worst-case blade throw distance is approximately one turbine tip-height.

Persons, animals and facilities within the blade throw hazard zone could theoretically be at risk of being struck. The Project is not expected to result in any blade throw risk due to the distance of WTGs from residences and public roads as discussed in the '*Blade*

Icing and Ice Throw' section above. A summary of the tower blade throw hazard zone for the various proposed turbine scenarios is contained in Table 3.16.2-1.

<u>*Blade Fragment Throw*</u>
Similar to ice throw concern, is the potential of a blade fragment throw. Lightning strikes causing blade failure have been documented. Acts of vandalism such as gun shots could also conceivably damage rotor blades causing a blade fragment to be thrown.

Persons, animals and facilities within the blade fragment throw hazard zone could theoretically be at risk of being struck. The Project is not expected to result in any blade fragment throw risk due to the distance of WTGs from residences and public roads. The distances presented for ice throw in Figure 3.16.1-3 provide a reasonable approximation of the hazard zone for blade fragment throw.

3.16.2 Comparison of Impacts of the Proposed Scenarios

The health and safety impacts of the various proposed turbine scenarios for the Project are summarized below in Table 3.16.2-1, and in the quantities of fluids used in each type of WTG as summarized below in Table 3.16.2-2.

Table 3.16.2-1: Summary of Wind Turbine Hazard Zone Distances

	104 Turbines 3 MW each (Large WTG Scenario)	**136 Turbines 1.5 MW each (Most Likely Scenario)**	**158 Turbines 1 MW each (Small WTG Scenario)**
Max Turbine Tip Height	125 m (410 ft.)	105 m (344 ft.)	90 m (295 ft.)
MAX Tower Collapse Hazard Zone Distance	125 m (410 ft.)	105 m (344 ft.)	90 m (295 ft.)
Estimated MAX Blade Throw Distance	125 m (410 ft.)	105 m (344 ft.)	90 m (295 ft.)
Estimated MAX Ice / Blade Fragment Throw Distance	100 m (328 ft.)	100 m (328 ft.)	100 m (328 ft.)

Table 3.16.2-2: Approximate Fluid Quantities for Wind Turbine Generators Under Different Scenarios

Turbine Component	**Fluid Type**	**Large WTG Scenario**	**Most Likely Scenario**	**Small WTG Scenario**
Gearbox lubrication	Lubricating oil	110	90	70

(gal)				
Generator cooling system (gal)	Glycol-water mix	55	40	30
Hydraulic systems (blades, brake, yaw, etc.) (gal)	Hydraulic oil	85	65	45

3.16.3 Impacts of No Action Alternative

Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in this ASC 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, green houses 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 user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Baseload 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 or "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.) See Section 2.3, 'Alternatives'.

3.16.4 Mitigation Measures

A broad array of measures are proposed to mitigate the potential hazards associated with the Project and the exposure of persons, animals and facilities to the hazards. These measures can generally be classified as preventive, exclusionary or corrective actions.

3.16.4.1 Prevention

Primary among the means of preventing hazards described herein will be adherence to appropriate design and construction protocols such as IEC 61400-1. This will assure that the load assumptions, design, construction standards and safety features are in accordance with industry norms and benefit from the experience of many manufacturers and operators.

A second important form of prevention is the establishment of a skilled workforce, implementing effective facility-wide maintenance, monitoring, compliance, and security programs.

3.16.4.2 Exclusion From the Affected Area

Every hazard identified herein decreases as some function of distance. In many cases, therefore, it is possible to reduce or eliminate hazards to persons and facilities by prohibiting or controlling presence in the area potentially affected by the hazard. Where multiple hazard areas overlap, the largest distance should govern. The fact that all of the Project facilities will have controlled access across private land will facilitate the limiting of access to the facility to persons aware of safety setbacks and potential risks.

3.16.4.3 Failure of Machinery and/or Structures

Wind turbine generators are equipped with multiple safety systems as standard equipment. As examples: rotor speed is controlled by a redundant pitch control system and a backup disk brake system; critical components have multiple temperature sensors and a control system to shut the system down and take it off-line if an overheating condition is detected. Lightning protection is standard on the turbines and a specially engineered lightning protection and grounding system will be installed for the Project as described more fully in Section 2.2.4.

Tower Collapse
The selected wind turbine generator/ tower combination will be subjected to engineering review to assure that the design and construction standards are appropriate for the Project. This review will include consideration of code requirements under various loading conditions and give a high degree of confidence of structural adequacy of the towers. The turbines have been sited at locations more than 9,000 feet from the nearest residence and more than 2 miles from public roads, which far exceeds a reasonable set-back requirement of one tip-height.

Blade Throw
Certification of the wind turbine to the requirements of IEC 61400-1 will assure that the static, dynamic and defined-life fatigue stresses in the blade will not be exceeded under the combined load cases expected at the Project site. The standard includes safety factors for normal, abnormal, fatigue and construction loads. This certification, together with regular periodic inspections, will give a high level of assurance against blade failure in operation. Proposed WTG locations far exceed a reasonable set-back requirement of one tip-height.

3.16.4.4 Ice Throw

Ice throw over 100 m has never been documented as a hazard and no ice throw injury has ever been reported from any existing wind power projects. Icing is a rare event and the turbines are situated in a very remote area. The turbines have been sited at locations which far exceed the reasonable set-back requirement of 100 meters (328 feet).

3.16.4.5 Fire Hazard Mitigation

As some portions of the Project area are currently outside of existing fire districts, it is anticipated that the Applicant will enter into contract(s) for fire protection with local service providers during Project construction. This is discussed further in Section 3.13.1, 'Public Services and Utilities/Recreation - Existing Conditions'. Applicant has begun discussions with Rural Ellensburg Fire District #2 for providing fire protection service under contract during the construction period. Applicant will work with EFSEC, the Kittitas County Fire Marshal and other appropriate agencies to develop and implement a Fire Protection and Prevention Plan listing requirements that will mitigate fire hazards associated with the Project prior to construction. Section 3.16.1, 'Health and Safety' discusses sources of potential fire and explosion along with their risk of occurring.

Construction and operations staff will be given appropriate fire safety training and a work plan that minimizes the risk of fire will be implemented. This would be defined in cooperation with relevant agencies as part of the emergency response plan to be submitted to EFSEC for review. EFSEC, as well as local emergency response organizations, where appropriate, will review and approve all plans before they are implemented. Fire suppression equipment will be made available to designated employees trained in the use of the equipment. The Construction Manager will be responsible for staying abreast of fire conditions in the Project area and for implementing any additional fire precautions as necessary.

Normal operation and maintenance of the Project equipment includes review of real time and stored temperature sensor readings which will highlight developing problems and facilitate prevention of equipment-caused fire. During both operation and construction, all staff working on turbines will work in pairs for safety.

Table 3.16.4-1 summarizes potential fire and explosion hazards and mitigation measures that will be implemented to mitigate the specific risks.

Table 3.16.4-1: Fire and Explosion Risk Mitigation Plan

Constr/ Operation (C/O)	Potential Fire or Explosion Source	Mitigation Measures
C & O	General Fire Protection	• All on-site service vehicles fitted with fire extinguishers • Fire station boxes with shovels, water tank sprayers, etc. installed at multiple locations on-site along roadways during summer fire season

Table 3.16.4-1: Fire and Explosion Risk Mitigation Plan		
Constr/ Operation (C/O)	**Potential Fire or Explosion Source**	**Mitigation Measures**
		• Minimum of 1 water truck with sprayers must be present on each turbine string road with construction activities during fire season
C & O	Dry vegetation in contact with hot exhaust catalytic converters under vehicles	• No gas powered vehicles allowed outside of graveled areas • Mainly diesel vehicles (i.e. w/o catalytic converters) used on site • Use of high clearance vehicles on site if used off-road
C & O	Smoking	• Restricted to designated areas (outdoor gravel covered areas)
C & O	Explosives used during blasting for excavation work	• Only state licensed explosive specialist contractors are allowed to perform this work – explosives require special detonation equipment with safety lockouts • Clear vegetation from the general footprint area surrounding the excavation zone to be blasted • Standby water spray trucks and fire suppression equipment to be present during blasting activities
C & O	Electrical fires	• All equipment is designed to meet NEC and NFPA standards. • Graveled areas with no vegetation surrounding substation, fused switch risers on overhead pole line, junction boxes and pad switches. • Fire suppressing, rock filled oil containment trough around substation transformer.
C & O	Lightning	• Specially engineered lightning protection and grounding systems used at wind turbines and at substation • Footprint areas around turbines and substation are graveled with no vegetation
C	Portable Generators – hot exhaust	• Generators not allowed to operate on open grass areas • All portable generators to be fitted with spark arrestors on exhaust system
C	Torches or field welding on-site	• Immediate surrounding area will be wetted with water sprayer • Fire suppression equipment to be present at location of welder/torch activity
C & O	Electrical arcing	• Electrical designs and construction specifications meet or exceed requirements of NEC and NFPA

3.16.4.6 Security

The Project generally consists of a substation, an O&M building and graveled site access roads which lead to the wind turbines. Security is primarily a function of controlled access to the Project areas and lock-out provisions to major equipment and controls. Much of the security monitoring activities will be straight forward since there is only one site access way to the Project site which will be controlled both during construction and operations.

Worldlink Insurance, a leading insurer of wind power projects around the world, surveyed 15 years of data for more than 17,000 WTGs operating in 14 different countries. Worldlink reported that there were no recorded cases of terrorism, sabotage or other similar security threats. Vandalism occurred on some wind power projects which was generally limited to petty theft of tools and/or equipment.

A security plan will be implemented during Project construction. Upon completion, a comprehensive operations security plan will be prepared along with a detailed emergency plan which is more fully described in Section 4.6, 'Emergency Plans'.

Construction Phase Security

Security Plan:
The Site Project Manager will work with a security contractor to develop a plan to effectively monitor the overall site during construction, including drive-around security and specific check points. EFSEC, as well as local emergency response organizations, where appropriate, will review and approve all plans before they are implemented. The security inspection and monitoring plan will be modified as appropriate during construction, based on the level of construction activity and amount of sensitive or vulnerable equipment in specific areas. Site access will be controlled and all on-site construction staff and visitors will be required to carry an identification pass.

Secured Lay-down Areas:
Construction materials will be stored at the individual turbines locations, or at the lay-down area around the perimeter of the Operations and Maintenance (O&M) facility and site construction trailers. Temporary fencing with a locked gate may be installed at the lay-down areas for storage of equipment or materials.

Operational Phase Security
Site visitors including vendor equipment personnel, maintenance contractors, material suppliers and all other third parties will require permission for access from authorized Project staff prior to entrance. The Plant Operations Manager, or designee, will grant access to any critical areas of the site on an as-needed basis. Site access will be controlled and all visitors or contractors on the site will be required to carry an identification pass.

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

The plant operations group will prepare a detailed security plan to be implemented to protect the security of the Project and Project personnel. EFSEC, as well as local emergency response organizations, where appropriate, will review and approve all plans before they are implemented.

3.16.5 Significant Unavoidable Adverse Impacts

With the possible exception of adverse indirect impacts created by lightning, all of the health and safety environmental impacts addressed herein which derive from the electromechanical nature of the Project can be mitigated by prevention, safety zone setbacks and proper operating procedures.

3.17 CUMULATIVE IMPACTS

3.17.1 Introduction

The State Environmental Policy Act (SEPA) requires that agencies address cumulative impacts. According to Ecology's SEPA Handbook, an EIS should look at how the impacts of a proposal would contribute to the total impact of development in the region over time (Ecology 1998). In the context of the proposed Project, cumulative impacts are identified largely on the basis of significant proposed and reasonably foreseeable future developments.

For the purpose of this analysis, the proposed Desert Claim and Kittitas Valley Wind Power Projects were identified as the only major reasonably foreseeable developments in the area that could contribute to cumulative impacts. The wind power projects are shown in Figure 3.17-1. The Kittitas Valley and Desert Claim Projects are relatively close to each other (within 1.6 miles at the closest point), while the Wild Horse Project is 14 miles from Desert Claim and 21 miles from the Kittitas Valley Project. The Desert Claim and Kittitas Valley Wind Power Projects are summarized below.

No other present or reasonably anticipated future project is expected to result in cumulative impacts near the Wild Horse Project. Several other wind power projects in the Pacific Northwest are either operating or proposed. The cumulative effects of these other wind power projects could be similar in nature to the effects described herein. However, for the purposes of defining the geographic scope of the cumulative study area, the Kittitas Valley, Desert Claim, and Wild Horse Wind Power Projects in Kittitas County are sufficient for the evaluation of cumulative impacts.

3.17.2 Desert Claim Wind Power Project

On January 28, 2003, Desert Claim Wind Power, a limited liability company wholly owned and managed by enXco, Inc., submitted an application to Kittitas County for permits to build and operate a wind electrical generation facility in the Reecer Creek area approximately 8 miles north of Ellensburg (Desert Claim Wind Power LLC 2003). A Draft EIS for the Desert Claim project was issued by Kittitas County in December 2003. The Desert Claim Project consists of up to 120 wind turbines with a total nameplate capacity of 180 megawatts, associated generators, towers, foundations, and pad-mounted transformers on 5,237 acres. Other Project elements include:

- Project access roads, control cables, and power collection cables necessary to serve the Project;
- One or more substations to convert Project-generated electricity to the higher voltage required to interconnect into the regional electric transmission grid;
- An overhead transmission line required to connect the Project substation with nearby high-capacity electrical transmission lines;

- An O&M facility co-located at the Project substation site or, alternatively, located in an area; and zoned for industrial use within or near Ellensburg.

3.17.3 Kittitas Valley Wind Power Project

Sagebrush Power Partners, LLC, a wholly owned subsidiary of Zilkha Renewable Energy, plans to construct, own, and operate a wind electrical generating facility (referred to as Kittitas Valley) in eastern Kittitas County, of between 82 and 150 wind turbine generators with a total nameplate capacity of between 181.5 to 246 megawatts (MW). The Project site is located on open ridgetops between Ellensburg and Cle Elum, about 12 miles northwest of the City of Ellensburg in Kittitas County, Washington. An Application for Site Certification was submitted to EFSEC in January 2003 and a Draft EIS for the Kittitas Valley Project was issued in December 2003. The Project spans approximately 5,000 acres, but only 90 acres are expected to be permanently impacted. The Kittitas Valley Project would interconnect to existing PSE and/or Bonneville transmission systems which traverse the proposed site (Peeples 2003).

3.17.4 Project Comparison

Based on information gathered from available sources, including the DEIS for the Kittitas Valley Project and the DEIS and Development Activities Application submitted to Kittitas County for the Desert Claim Project (Desert Claim Wind Power LLC 2003), the basic features of the three projects are summarized in Table 3.17-1.

Table 3.17-1: Summary of Proposed Wind Power Project Features in Kittitas County

Feature	Kittitas Valley[1]	Desert Claim	Wild Horse[2]
Number of Turbines	121	120	136
Total Nameplate Capacity	181.5 MW	180 MW	204 MW
Project Area Size	7,000 acres	5,237 acres	8,600 acres
Existing Zoning	Agriculture-20 Forest and Range	Agriculture-20 Forest and Range	Agriculture-20 Forest and Range
Construction Duration	12 months	9 months	12 months
Construction Employees	253 workers	150 workers	253 workers
Operational Employees	12-14 workers	10 workers	12-14 employees

Sources: Sagebrush Power Partners LLC 2003a; Desert Claim Wind Power LLC 2003; Weinman 2003; Kittitas County 2003.

Notes:

1 Data represent middle scenario, as defined in Chapter 2.

2 Assumes use of 1.5 MW turbines.

The construction schedules for the three projects have not been finalized at this time. However, the most recent preliminary schedules for the Kittitas Valley and Wild Horse Projects indicated that there is a possibility that their construction could potentially overlap for a period of about eight months. The proposed construction schedule for the Desert Claim Project is not known. However, the cumulative impact analyses presented assumes an unlikely worst-case scenario in which all three projects are constructed simultaneously during an eight-month period.

3.17.5 Earth Resources

Significant cumulative impacts on soil, topography, and geology resulting from construction of the three proposed wind power Projects in Kittitas County are not anticipated. The three project areas are not characterized by high geologic hazards. Impacts on earth resources from development of the three wind power projects would be limited to localized, temporary erosion impacts from ground disturbance during construction. The impacts on near-surface soils would be within the construction footprint for the respective Project; they would not geographically overlap each other. Consequently, there would not be an interactive effect among any two of the Projects or all three projects (e.g., erosion impacts related to the Desert Claim Project would not exacerbate erosion conditions near the Kittitas Valley Project). The combined effects of the three projects would not result in a significant cumulative impact on earth resources.

Cut and fill would be required to construct access roads, tower foundations, transformer pads, and other Project facilities. The Wild Horse Project anticipates using on-site resources for cut and fill materials. Therefore, the construction of the Wild Horse Project will not impact the availability of offsite fill resources. The specific quantity or source of anticipated cut and fill materials required for the Desert Claim Project has not been specified at this time. However, if substantial amounts of fill are required to construct facilities such as access roads, this could result in increased demand for offsite resources such as gravel or crushed rock, assuming that the Project did not use onsite resources.

3.17.6 Vegetation, Wetlands, Wildlife, and Fisheries

3.17.6.1 Vegetation

Implementation of the proposed Projects would result in the loss of vegetation through clearing and ground disturbance, including the potential loss of lithosols, a unique habitat often associated within the shrub-steppe region. The potential cumulative impacts on this lithosol habitat would depend on the quality of habitat at each Project site and the combined amount of permanent disturbance. Lithosols could occur in grassland, low sagebrush, and shrub-steppe vegetation communities.

The permanent footprint for the Wild Horse Project would displace approximately 165 acres of existing vegetation, including 139 acres of shrub-steppe. Impacts on vegetation from development of the Desert Claim and/or Kittitas Valley Wind Power Projects would be similar to those described for Wild Horse and would generally consist of localized impacts on similar vegetation communities. Construction of Desert Claim Project facilities would result in the permanent loss of 78 acres of existing vegetative cover, and the Kittitas Valley Project would result in the permanent loss of 93 acres.

For each wind power project, the area of existing vegetation permanently displaced by the project facilities amounts to a small portion (approximately 2% or less) of the respective project area. The combined figures for the three projects amount to approximately 336 total acres of existing vegetation lost, including approximately 100 acres of lithosols. In the context of the three wind power project areas that cover approximately 17,000 acres, the approximate 2% loss of vegetation at each project site would not be considered an adverse cumulative effect.

Habitat types at the three sites are not regionally unique (Daubenmire 1970; Franklin and Dyrness 1988; Cassidy et al. 1997; Johnson and O'Neil 2001). Within about 50 miles east and south of the proposed project areas, there are several large areas of protected grassland, shrub-steppe, and sagebrush vegetation communities (e.g., the Colockum, Quilomene, and L.T. Murray wildlife areas and the Yakima Training Center) (WDFW 2003g). Therefore, the combined loss of approximately 336 acres of vegetation, would similarly not be considered cumulatively adverse in a more regional context. Because the precise regional extent of lithosols is not quantitatively known, it is difficult to assess the specific magnitude of cumulative lithosol impacts at the three wind power project sites within the context of the surrounding region.

No federally listed rare plants were identified at the Wild Horse, Kittitas Valley, or Desert Claim project sites. However, one Washington State listed species, hedgehog cactus, was found extensively in lithosol habitats at the Wild Horse Project site. Fewer than 10% of the individuals identified during the rare plant survey are considered at risk from direct impact from the Wild Horse Project. Please see Section 3.4, 'Vegetation and Wetlands', of this Application and Exhibit 12, 'Rare Plant Resources Report', for further information.

The wet meadow areas in the Desert Claim Project area provide potential habitat for the Ute ladies'-tresses, an orchid that is federally listed as endangered. Field surveys of the wet meadow habitats did not locate this species, and no other rare plants protected by either the federal or state governments were found in searches of the areas of likely disturbance in the Desert Claim Project area (Kittitas County 2003). The minimal potential impacts of the proposed wind projects on rare plants would not represent a significant cumulative impact on any species.

3.17.6.2 Wetlands

Project construction could affect wetland resources in the region. Cumulative impacts on wetlands could result from directly filling or grading wetland systems, as well as from indirect effects caused by stormwater runoff, increased pollutant loading, and water quality degradation, which in turn could result in loss of wetland diversity and reduced wetland functions and values. No wetlands were identified within a 164-foot buffer around the planned locations for Wild Horse Project facilities; therefore, no impacts to wetlands are anticipated for the Wild Horse Project (See Section 3.4, 'Vegetation and Wetlands', of this Application for further information). The Kittitas Valley Project would disturb between 135 and 185 square feet of one potential wetland system at the project site (see Section 3.2 of the Draft EIS for the Kittitas Valley Wind Power Project).

Based on current plans for the Desert Claim Project, construction activities would temporarily disturb approximately 16 acres of wetland area, while the permanent project footprint would overlap with an area estimated at 9 acres. Final "micro-siting" for project facilities could be used to avoid at least some of these wetland areas. To the extent that avoidance of wetland areas is not feasible, mitigation would be developed to enhance or replace wetland areas (Kittitas County 2003).

The collective effects of the three proposed wind power projects would be the same as the effects identified for the Desert Claim Project. The wetland impacts of the Desert Claim Project would be minor as a result of wetland avoidance and/or required mitigation for wetlands that could not be avoided. Because the collective effects of these projects would be minor and are not expected to extend to downstream surface waters or wetlands, no significant cumulative impact on wetland resources is expected.

3.17.6.3 Wildlife

Following is a summary of the wildlife cumulative impacts analysis prepared for the Kittitas Valley, Desert Claim, and the Wild Horse Wind Projects (WEST Inc. 2003).

<u>Big Game</u>
The Kittitas Valley, most of Desert Claim, and all of the Wild Horse Project sites are located in mule deer winter range (WDFW Priority Habitats database). The Wild Horse Project and the northern portion of the Desert Claim Project also are located in elk winter range. The Kittitas Valley Project is not located in elk winter range. A defined elk migration corridor crosses the northern portion of the Desert Claim Project and is adjacent to the Wild Horse Project site.

Minor temporary displacement of wintering mule deer and elk is anticipated from winter construction activities of the three wind power projects. These temporary impacts may be greater if construction occurs simultaneously on two or all three of the projects because of the larger area subject to disturbance. See Section 3.6, 'Wildlife', of this Application for a discussion of the literature covering impacts of energy projects and roads on big game, especially during the winter. No impacts to elk winter range are anticipated at the Kittitas Valley or Desert Claim Projects, and the impacts from the Wild Horse Project are discussed in Section 3.6, 'Wildlife', and Exhibit 14, 'Wildlife Baseline Study'.

The Wild Horse Project area is located southeast of the mapped Quilomene elk migratory corridor. No heavy construction activity is anticipated during winter months. However, any disturbance from surveying or other activities could result in elk in the process of moving to winter range east of the Project, avoiding areas close to the Project and traveling farther to the north. Given that the Project is located to the southeast of this movement corridor, the maximum increase in distances needed to travel would appear quite minor (<1 mile).

The same effect would be anticipated for the Desert Claim Project. The northernmost region of the Project area overlaps approximately 320 acres of the south edge of the Quilomene elk migration corridor. If this area of the Desert Claim Project influences elk use during construction or continued O&M activities, it is expected that elk will shift their path to the north without migratory hindrance due to the large size of the corridor. The maximum increase in travel distances would be less than 1 mile. The corridor, as mapped within the WDFW PHS database, is approximately 2 miles wide (north to south measurement) where the Desert Claim Project is located.

During the construction period, deer would likely be temporarily displaced from the three project sites due to the influx of humans and construction equipment and associated noise and disturbance. Temporary loss of habitat from Project construction would be considered a minor impact because of the vast expanse of suitable habitat for mule deer near the proposed Projects. Some tolerance of construction and operations activities by mule deer is expected at the Kittitas Valley and Desert Claim Projects, considering the amount of existing residential development and the existing roads and disturbance (e.g., gravel quarry) in the vicinity of those two projects. The Wild Horse Project is located in a relatively undeveloped area used primarily for livestock grazing and recreation (hunting) creating seasonal increases in the level of human activity in this area. Cumulative impacts to winter big game during construction may occur if more than one Project is constructed during the same winter.

Approximately 300 acres of mule deer winter range will be permanently lost due to the footprint of the three projects, which is <2% of vegetation at the project sites, and much less than 0.5% of the winter range located near the Project sites. Mitigation of permanent loss of habitat at Wild Horse and the Kittitas Valley sites meet or exceed the WDFW mitigation guidelines. Mitigation parcels determined for those two sites are located in mule deer winter range.

Human activity levels from operation and maintenance at the Kittitas Valley and Desert Claim projects are not expected to significantly differ from current human activity levels. Human activity levels from operation and maintenance at the Wild Horse site would occur at a low level year-round. While operational impacts on wintering mule deer and elk at the Wild Horse site may be greater than under existing conditions, cumulative impacts for all three wind power projects are expected to be low.

3.17.6.4 Birds

Raptors

Based on the estimated levels of raptor use within the three project study areas, raptor mortality is expected to be slightly higher compared to other new wind generation Projects with similar turbine types. Under the three projects, the estimated combined raptor mortality rate at all three project sites with combined turbines numbering between 361 and 391 turbines, depending on the final configuration of each project, would be between 14 and 15 raptor fatalities per year respectively. Because the Wild Horse Project is approximately 20 miles from the Kittitas Valley Project and 13 miles from the Desert Claim Project, and given the typical home-ranges of the raptors at risk for collision with the three projects, the same breeding raptors that use the Kittitas Valley and Desert Claim Project areas are not expected to use the Wild Horse Project area. Section 3.6, 'Wildlife', of this Application further addresses avian use at the Wild Horse Project.

Red-tailed hawks, American kestrels, and northern harriers account for much of the raptor use at the three projects during spring, summer, and fall. During winter and early spring, red-tailed and rough-legged hawks account for most of the raptor use. These species are expected to be the raptor species with the highest risk of mortality across the projects. The mortality risk associated with other raptor species such as turkey vulture, golden eagle, and prairie falcon is expected to be much lower than the risk for red-tailed hawks and American kestrel because of their less frequent use of the sites. Recent published data for new wind energy projects in the West indicate there have been few northern harrier fatalities recorded at these wind power sites, and no bald eagle or rough-legged hawk fatalities have been observed (Erickson et al. 2000). Golden eagle use of the three proposed project areas is low relative to other wind sites, and mortality is also expected to be low.

Bald Eagles

Based on other studies and available information, Bald Eagles occupy the Kittitas Valley from approximately late December to early April. The number of bald eagles in the valley appears to increase from late December to approximately mid- February. They are not the most common raptor in the area, but their numbers appear to be increasing most likely due to overall recovery of the species in Washington as well as throughout the western states and North America.

Cumulative impacts on bald eagles could result in loss of winter habitat and fatalities; however, the Wild Horse Project is not expected to contribute to either one of these impacts because the site does not provide good roosting or foraging opportunities (winter habitat) and use of the site was essentially incidental, resulting in insignificant mortality predictions. None of the projects would contribute to the loss of roosting habitat (which is limited to the Yakima River riparian corridor) or foraging areas (which are primarily cattle lots and calving operations), and the cumulative impact on bald eagle winter habitat from the three proposed wind power projects would be small.

To date, no bald eagle fatalities have been reported from wind power projects in the United States. The foraging behavior of wintering bald eagles, primarily scavenging, may make them less susceptible to collision with wind turbines because they are presumably less focused on moving prey and more attentive to their surroundings while searching for carrion (dead animals). Based on infrequent use of the proposed wind power project areas in Kittitas County by bald eagles, and the lack of reported fatalities at any operating wind power projects in the United States, fatalities are expected to be low. However, due to roosting and foraging areas nearby the Kittitas Valley and Desert Claim project sites, bald eagles may regularly move through, thereby increasing their exposure. Assuming risk of collision is proportional to use, one bald eagle fatality across these two projects may occur every two to three years. The cumulative effect of this low level of mortality on the increasing bald eagle winter population in the Kittitas Valley and the state of Washington would not be measurable.

Passerines

Passerines (bird of the order Passeriforme, which includes perching birds and songbirds such as finches, warblers, sparrows, blackbirds, and jays) represent the most abundant avian fatality at other wind projects studied (see Johnson et al. 2002; Young et al. 2003b; Erickson et al. 2000, 2001, 2002). Both migrant and resident passerine fatalities have been observed. Given that passerines make up the vast majority of the avian observations at the three project sites, it is expected that passerines would make up the largest proportion of fatalities for the three projects combined. Passerine species most common to the Project sites would likely be most at risk, including the European starling, American robin, horned lark, cliff swallow, American goldfinch, Brewer's blackbird, American pipit, and vesper sparrow. Based on the mortality estimates from other wind projects studied, combined passerine mortality for the three proposed Projects would range from 430 to 740 fatalities per year. This level of mortality is not expected to have any population-level consequences for individual species because of the expected low fatality rates for most species and the high population sizes of the common passerine species such as European starling, American robin, horned lark, American pipit, and western meadowlark. A few of the species observed at these projects have documented declining populations in the Columbia Plateau including Brewer's blackbird, Brewer's sparrow, horned lark, loggerhead shrike, western meadowlark, mourning dove and killdeer. Many of these species are very common and widely distributed (e.g., western meadowlark, horned lark), but nevertheless have shown apparent declines in abundance from BBS data (Sauer 1999). Of these species, horned lark and western meadowlark appear to have the highest collision risks.

3.17.6.5 Bats

Bat fatalities are likely to occur at all three Kittitas County wind power projects. Bat research at other wind projects indicates that migratory bat species are at some risk of collision with wind turbines, primarily during the fall migration season. Most bat fatalities observed at wind projects have been tree-dwelling migratory bats, with hoary and silver-haired bats being the most prevalent. Although no specific surveys for bats have been conducted, both hoary bats and silverhaired bats may use the forested habitats near the three project sites and likely migrate though the three project areas.

Using mortality estimates from other wind projects (one to two bat fatalities per turbine per year), total annual bat mortality for all three wind power projects in Kittitas County is expected to range from 361 to 782. The significance of bat mortality from the three projects is hard to predict because there is little information available regarding the size of bat populations. Studies suggest, however, that resident bats do not appear to be significantly affected by wind turbines (Johnson et al. 2003; Gruver 2002) because nearly all mortality is observed during the fall migration period. Therefore, significant cumulative adverse impacts on resident bat populations are not expected.

3.17.6.6 Fisheries

Studies conducted for the Kittitas Valley Project did not identify any fish-bearing habitat within 0.5 mile of any proposed facility or construction location, and no impacts on fish habitat or fish species associated with construction and operation of the Kittitas Valley Project are anticipated (see Section 3.2 of the Kittitas Valley Draft EIS). Similarly, no fish are known to use the Wild Horse Project area, and the nearest fish habitat is located along Quilomene Creek approximately 1 mile north of the Project. The lower reaches of Whiskey Dick and Skookumchuck creeks also provide habitat for salmonids; these areas are approximately 5 miles downstream from the Wild Horse site. Assuming best management practices are used for erosion and sediment control (as would be required as permit conditions for all three projects), the Wild Horse Project would not adversely affect fish or fish habitat onsite or in downstream areas (Kittitas County 2003). Section 3.7, ‘Fisheries’, contains further information on lack of fisheries impacts at the Wild Horse site.

Development of the Desert Claim Project would result in minor disturbance or displacement impacts on streams and riparian zones in the Project area. Because none of the affected streams are known to contain fish communities, direct impacts on fish resources are expected to be negligible or nonexistent. Similarly, the potential indirect effect of the project on water quality and quantity would be a negligible effect on downstream water resources or the fish habitat they provide (Kittitas County 2003).

Proposed access road construction at the Kittitas Valley Project site would affect three streams and their associated riparian habitat for a total disturbance of between 1,041 and 1,245 square feet under the middle and lower end scenarios, respectively. However, potential impacts on the stream channels related to construction are expected to be short term and negligible with proper management (see Section 3.2 of the Kittitas Valley Draft EIS). At the Desert Claim Project site, approximately 41,645 square feet of stream and riparian habitat would be affected by temporary construction activities, with 112 square feet permanently affected by Project operations. If relocation of facilities to avoid these areas is not feasible, mitigation would be developed to enhance or replace riparian areas (Kittitas County 2003). No direct impacts on streams and riparian zones at the Wild Horse site are anticipated.

The cumulative effects of the three proposed wind power Projects would consist of negligible direct and indirect effects on water resources in three localized areas of the

Kittitas Valley. Because the effects of the respective Projects would be negligible and would not extend to downstream waters, no significant cumulative effect on fishery resources is expected (Kittitas County 2003).

3.17.7 Water Resources

As described in Section 3.3, 'Water Resources', the water resource impacts of the Wild Horse Project would be localized and temporary, primarily limited to the construction period. The water resource impacts of the Desert Claim and Kittitas Valley Projects would be similar to those described for the Wild Horse Project. All of the Projects involve the same types of construction activities and Project features, similar areas of ground disturbance, similar restoration and mitigation actions, and similar water demands. However, in the case of the Wild Horse Project, proposed construction includes development of gravel quarries and one or more concrete batch plants within the Project area. Consequently, water resource impacts associated with gravel extraction and concrete manufacture for the Wild Horse Project would be onsite and more concentrated, while these effects for the Kittitas Valley and Desert Claim Projects would be offsite and more dispersed. Construction activities for each Project would be required to follow stringent surface water protection regulations. None of the Projects would require extensive construction activity or permanent Project facilities along or near major streams. Overall, the effects of the individual Projects on water quantity and quality would be minor and would not result in noticeable changes in downstream areas.

Specific cumulative impacts on water resources from the three wind power projects would depend on the characteristics of common surface water bodies and aquifers to which the three proposed wind power Projects are hydrologically linked. Most of the Wild Horse Project area is within the drainages of Whiskey Dick and Skookumchuck creeks, which are small streams that drain eastward to the Columbia River. Part of the Wild Horse area drains to Whiskey Jim Creek and subsequently to Parke Creek, which is a minor tributary of the Yakima River that enters the river southeast of Ellensburg. Most of the Kittitas Valley Project area is located within the drainage of Dry Creek, which is an ephemeral stream that joins the Yakima River northwest of Ellensburg, while a portion of the area drains directly to the river. The Desert Claim Project area is situated within the drainages of Reecer Creek and several tributaries to Reecer Creek, which flows into the Yakima River near its confluence with Dry Creek. Neither of these streams is a major tributary to the Yakima River; Dry Creek is not a perennial stream, while Reecer Creek is perennial but has a documented flow range of 4 to 68 cubic feet per second.

Because the three projects are sufficiently distant from each other and are located in different tributary watersheds, there would not be a combined effect from multiple Projects on the same stream. The minor, localized effects of each Project would occur within the drainages of minor tributaries to the Yakima River and the Columbia River and at a distance of at least several miles upstream from either river. Therefore, significant cumulative effects on water resources within the Upper Yakima River basin or the northeastern portion of the Kittitas Valley are not expected, even if all three projects were constructed.

3.17.8 Health and Safety

The potential for exposure to fuel and non-fuel hazardous substances would increase, particularly during the construction period if construction periods were to overlap. During construction, diesel fuel and gasoline would be used at the proposed Project sites to fuel construction equipment and vehicles. In addition, mineral oil would be used to fill pad-mounted transformers at the turbines as well as to fill substation transformers. However, the effects would be localized in the area of the spill, and not likely to result in an adverse cumulative impact.

The cumulative risk of wildfires in central and eastern Kittitas County could increase during both the construction and operational phases of the three wind power projects. The greatest fire risk for each Project would occur during the construction period because of the level of activity and number of workers and equipment active at that time. The greatest cumulative fire risk would occur if and when construction schedules for two, or all three of the Projects, overlapped. The construction program for each Project is expected to include contracted fire protection services from the respective local fire district, which would facilitate response to any incidents that might occur. Trained personnel who could respond to fire hazards would also be present at the wind power construction sites. However, even with implementation of strict fire protection and prevention measures, the cumulative risk of potential fires associated with construction of the three proposed wind turbine Projects could remain significant.

Certain fire risks specific to wind energy projects would also exist during the operating period for each Project. However, specific measures to counteract or manage these risks would be implemented during Project operation. The wind turbine machinery is designed with fire safety in mind, and the cleared areas and gravel pads around the base of the turbines and other facilities would minimize the spread of fire. The Project facilities would be continuously monitored, and the project areas would be regularly patrolled. Access to the Project areas would be limited. Furthermore, wind power operations do not preclude water application from the air for fighting fires. Therefore, with implementation of these protective measures, the concurrent operation of the three proposed wind power Projects would not likely pose a significant cumulative fire risk.

Potential risks to the health and safety of site personnel from operations and maintenance of the three proposed wind power Projects would be minor because they involve relatively small numbers of workers (ranging from 30 to 42). Worker exposure to health and safety risks at the Desert Claim and Kittitas Valley wind power sites would not be greater than those potentially experienced at the Wild Horse site. No significant cumulative impacts are anticipated if appropriate site safety procedures are implemented at each Project site. The production of wind energy raises several health and safety issues specific to wind turbines operations. Site-specific health and safety concerns include the remote potential for ice to be thrown from rotating blades, blades to disengage and be thrown from the tower, and tower collapse during extreme weather conditions. Potential health and safety impacts from the three projects would be localized in nature, and the combined effects of the three projects would not result in a significant cumulative impact.

While the probability of any specific hazard occurring would be the same for each Project (based on similar numbers and sizes of wind turbines), the risk of exposure to those hazards would vary with the level of human activity near each Project. In general, the risk of exposure would be greatest (although still low, in probability terms) for turbines that are close to residences or public roads. Some individuals living in the northern portion of the Kittitas Valley might have common travel patterns that would involve trips through or past portions of both the Kittitas Valley and Desert Claim Project areas (e.g., along and near Green Canyon Road and Smithson Road). Based on the low probability associated with these hazards and the mitigation proposed to reduce the risks, this situation is not anticipated to involve a significant cumulative increase in health and safety risks.

Potential shadow-flicker impacts from the three proposed wind power Projects would be limited to the immediate vicinity (approximately 2,000 feet) of the wind turbines within each respective Project area. There are no occupied residences within this distance of the Wild Horse Project, and shadow-flicker impacts from this Project would be nonexistent. Some residences that are close to turbines at the Kittitas Valley or Desert Claim Projects would be subject to shadowflicker for varying hours per year. These impacts would be limited to a number of discrete locations that are well separated from each other and would not constitute a cumulative impact from these two proposed Projects (Kittitas County 2003).

The electric and magnetic fields associated with the Kittitas Valley, Desert Claim, and/or Wild Horse Wind Power Projects would be less than those produced by electrical facilities already present near the respective Project areas and would diminish to background levels at distances where public exposure could occur. Therefore, the wind power facilities would not add to the strength or extent of electric and magnetic field exposure that may already occur, and there would not be cumulative exposure impacts from development of multiple wind energy Projects (Kittitas County 2003).

3.17.9 Energy and Natural Resources

When combined with other planned wind Projects in the region, construction activity associated with the Wild Horse Project would contribute to local energy demands. The combined demands of the three projects for fuel and construction materials would cumulatively contribute to the local and regional demand for, and irreversible expenditures of, nonrenewable resources on a temporary basis. Types of nonrenewable resources include diesel fuel and gasoline to operate construction vehicles and equipment, as well as steel and concrete required to build wind power facilities. The single largest demand would be for sand and gravel resources that might, for the Kittitas Valley and Desert Claim Projects, be obtained from sources within the Project area. Overall, based on timing considerations and the incremental resource demands associated with the Projects, the combined effects of the three projects would not result in a significant cumulative impact on energy and natural resources.

The three proposed wind power Projects would provide a combined nameplate capacity of 565 MW of electricity (under the middle scenario for the Kittitas Valley). Assuming long-term operation of the three projects at a net capacity of 33%, the Wild Horse, Desert Claim, and Kittitas Valley Projects would produce approximately 186 average MW of electricity on a long-term basis. That collective energy output would represent a substantial increase in the amount of electricity currently produced within Kittitas County. Operation of the three projects would also cumulatively add to the capacity, production, and availability of renewable energy sources in Washington State and the greater Pacific Northwest, and would provide a sustainable, renewable source of electric power supply to supplement the region's existing hydroelectric, nuclear, and coal or gas-fired power projects, although it would represent a relatively small addition to the total regional electricity supply. Utilities receiving the wind energy would be able to diversify their energy resource portfolios and stabilize a portion of their long-term energy supply costs. Power produced by the wind Projects would also be responsive to the identified needs of regional utility providers, including Avista, PSE and Pacific Power.

3.17.10 Land Use and Recreation

Development of the Wild Horse Project concurrent with the proposed Desert Claim and Kittitas Valley Projects would result in permanent conversion of approximately 336 acres of open space and rangeland uses in central Kittitas County for wind energy production. Existing land uses such as grazing could continue up to the edge of Project facilities. In the short term, proposed wind energy facilities would not collectively disrupt or change the underlying land use pattern of this portion of the county.

The three proposed wind energy Projects would require either county approval for a rezone and Comprehensive Plan amendment, or EFSEC review and Governor approval. These permitting processes, and the underlying local land use regulations, are designed to prevent incompatible uses and the degradation of agricultural land, in particular. The implementation of these regulations minimize the potential for cumulative impacts.

Temporary population increases associated with Kittitas Valley, Desert Claim, and Wild Horse Wind Project construction workers could cumulatively increase demand for and use of local and regional recreation resources during overlapping construction periods. Peak construction of each Project could employ approximately 165 workers, or a combined total of about 500 workers. Increased demand would be most anticipated for offsite regional resources that could provide temporary accommodations for transient construction workers, such as campgrounds. It is possible that access to heavily used recreational resources throughout Kittitas Valley and central and eastern Kittitas County could be limited during peak recreation use months, such as during the summer. The exact nature and extent of cumulative demands for recreational resources would depend upon the timing of the three construction Projects. It is anticipated that upon construction completion, the permanent population increase associated with these three wind power projects (between 30 to 42 workers) would not result in substantial cumulative demands for recreation resources.

3.17.11 Socioeconomics

Cumulative impacts on population, housing, and employment must be considered when two or more large projects (wind power generating or otherwise) are proposed in the same general area with similar construction schedules. For example, if built at the same time, the construction workforce for the Kittitas Valley, Desert Claim and Wild Horse Wind Power Projects would be drawn from similar local labor pools and create a demand for the same temporary housing.

Cumulative population and housing impacts would likely be limited to a Project radius of approximately 75 miles (as a general rule, it is considered unlikely that construction workers would commute more than 75 miles to work). Furthermore, due to the relatively small area of potential effect, and the differing contexts within which the Projects would be built, cumulative impacts would need to be evaluated on a Project-specific basis.

The proposed Projects could contribute to increases in temporary and permanent job opportunities and populations in the region. Peak construction of each Project could employ about 165 workers, for a combined peak total of 500 workers. These estimates are based on the experience of the applicants at other facilities. The number of construction workers who would reside within or outside Kittitas County cannot be precisely predicted. Using the same assumptions in Section 3.12, ‘Population, Housing, and Economics’, of this Application and based on the Stateline Wind Project in nearby Walla Walla County for purposes of analysis, it is assumed that 30 to 50% of all workers would be local (i.e., already residing within reasonable commuting distance, defined as Kittitas or Yakima Counties) and the remainder would come from outside this localized area (e.g., Benton or King Counties). If conservatively 30% of wind facility workers are assumed to be local, 115 non-local workers would be employed by each Project, or a cumulative total of 345. The actual mix of local and non-local would depend on the availability and residence of construction workers with the particular skills needed for wind facilities, and competition from other concurrent construction projects in the region.

The majority of cumulative population and housing impacts would be temporary and would occur during construction. It is likely that some non-local construction workers would choose to live in housing located in Ellensburg or Yakima, both located within a reasonable commuting distance of the Project sites.

The workforce analysis conducted for the Wild Horse Project suggests that there is a sufficient labor supply available to complete both the Kittitas Valley and Wild Horse Wind Power Projects within the same time frame. If the Desert Claim Project were also to be constructed simultaneously, the local workforce supply might be strained. The result may be to draw more workers from outside of the Project area, thus potentially affecting local population and housing.

Assuming that all three projects could be constructed simultaneously, temporary population increases resulting from construction work forces could result in cumulative effects to the local housing supply. Temporary housing would be needed for those workers that would re-locate to the Ellensburg area during construction of these Projects. There were more than 1,700 vacant housing units in Kittitas County in 2000 categorized as “seasonal, recreational, or occasional use” units. In addition, more than 40% of the county’s total housing stock is rental housing, with a vacancy rate (per 2000 census data) of almost 7%. Motels/hotels, RV parks, and other transient lodging establishments in the Ellensburg and Cle Elum/Roslyn area could provide temporary lodging for wind power Project construction workers. Therefore, it appears that the study area has an adequate supply of temporary housing to accommodate the potential cumulative increase in construction workers from outside the area. Vacancy rates for temporary housing could decrease for a period of a few months, however.

Over their life times, each wind power Project is estimated to employ between 10 and 14 fulltime workers for operations and maintenance; cumulative operations employment would be between 30 and 42. These estimates are based on the applicants’ experience with other projects, which suggests that about half of the operations workers could be local residents. However, even if all were assumed to come from outside the area, the cumulative housing impact from a population increase of this size would not be considered significant.

3.17.12 Employment Income and County Revenues

The three wind power projects would increase retail sales and overall economic activity in the area, as well as employment opportunities for residents of Kittitas County. The three projects would also substantially increase the amount of annual property tax revenue to the county. Estimated direct, indirect, and induced income generated by the three wind power proposals is shown below for the construction and operation phases. These estimates are based on analyses of jobs, income, wages, and similar economic impacts prepared for each proposal and included in the corresponding EISs or application materials (see Section 3.12 of this Application for a discussion of the methodology used for the Wild Horse analysis).

In general, the analyses indicate that the Projects cumulatively would generate substantial income for the local economy and residents, almost $16 million during the construction period and approximately $5.3 million annually thereafter (see Tables 3.17-2 and 3.17-3). The direct impact figures for the construction phase primarily represent local labor income assumed to be paid to construction workers. The indirect and induced impacts reflect the local income effect from local construction purchases and the re-spending of those dollars within the local economy. The direct impacts for the operations phase

(Table 3.17-3) include local labor income to operations employees and annual lease payments to landowners (which have been estimated at $4,500 per turbine per year).

Table 3.17-2: Cumulative Income Impacts Generated by Construction Employment in Kittitas County (2002$) for Kittitas Valley, Desert Claim, and Wild Horse Projects

	Desert Claim	Kittitas Valley [1]	Wild Horse [2]	Cumulative Total
Direct	$ 3,333,000	$ 4,577,100	$ 4,577,100	$ 12,487,200
Indirect	$ 433,000	$ 518,100	$ 518,100	$ 1,469,200
Induced	$ 502,000	$ 701,800	$ 701,800	$ 1,905,600
Total	$ 4,268,000	$ 5,797,000	$ 5,797,000	$ 15,862,000

Sources: ECONorthwest 2002, as amended by Sagebrush Power Partners LLC 2003c; Kittitas County 2003.

[1] *Assumes 121 turbines.*

[2] *Estimated to be the same as the KVWPP.*

Table 3.17-3: Annual Cumulative Income Impacts in Kittitas County during Operations (2002$) for Kittitas Valley, Desert Claim, and Wild Horse Projects

	Desert Claim	Kittitas Valley [1]	Wild Horse [2]	Cumulative Total
Direct	$1,041,000	$ 1,489,400	$ 1,489,400	$ 4,019,800
Indirect	$124,000	$ 59,400	$ 59,400	$ 242,800
Induced	$168,000	$ 436,700	$ 436,700	$ 1,041,400
Total	$1,333,000	$ 1,985,500	$ 1,985,500	$ 5,304,000

Sources: ECONorthwest 2002, as amended by Sagebrush Power Partners LLC 2003c; Kittitas County 2003.

[1] *Assumes 121 turbines.*

[2] *Estimated to be the same as the KVWPP.*

It is possible for some large projects to increase the demand for labor sufficiently to place upward pressure on wages in certain sectors of the construction industry. However, it is expected that contractors for the three proposed wind power Projects would have access to a large construction labor pool from a geographic area that includes Seattle and Yakima. Thus, the effect on construction wages and income would not likely be significant.

The Kittitas Valley, Desert Claim, and Wild Horse proposals have each prepared analyses that estimate the fiscal (i.e., governmental cost and revenue) impacts of the individual Project. Each Project analysis also considered indirect and induced economic impacts (quantitatively or qualitatively) as well as direct fiscal impacts. Although the studies were performed at different times and/or were organized differently, refined information is now available for some of the proposals. As such, they provide a reasonable overview and estimate of the fiscal effects of each wind power proposal. The reader should consult the respective analyses to obtain greater detail about economic and fiscal issues.

Cumulative fiscal impacts, as summarized here, are considered to be the simple addition of the direct costs and revenues of each Project. There is no synergistic effect assumed from multiple Projects in terms of direct revenues; such an effect could occur, however, in terms of indirect or induced economic effects (e.g., additional jobs, income, spending, etc.). For purposes of estimating cumulative impacts, each Project is assumed to be approximately the same size (+/- 120 turbines), and the value of each turbine is assumed to be assessed at approximately $765,000. (This value is slightly higher than the value of $750,000 used in the ECONorthwest report [ECONorthwest 2002, as amended by Sagebrush Power Partners LLC 2003c] that evaluated the Kittitas Valley Project, which was updated to apply to the three proposed wind power Projects.) Therefore, each Project would have an initial assessed value of over $90 million and the combined assessed value for all three projects would be over $270 million. The combined value of the three projects would represent an increase of more than 10% over the current assessed valuation for all real and personal property in Kittitas County of approximately $2.5 billion (Kittitas County 2003).

The estimated potential property tax revenues in the first operational year would be more than $3.8 million, and more than $1 million for each Project. (Revenues for Wild Horse are assumed to be the same as for the middle scenario for the Kittitas Valley, 121 turbines.) Differences in methodology used among the three projects (in this case, primarily the applied tax levy rate) results in different revenue estimates for Projects with similar capital characteristics. The allocation of this potential property tax revenue to various government agencies/funds and special districts is shown in Table 3.17-4.

Because the value of the turbines would depreciate over time, property tax revenues would also decline over their 30-year lifetime. Depreciation schedules applicable to the Projects are not available at this time.

Current statewide legal limitations on property taxes would likely result in actual tax revenues lower than those indicated in Table 3.17-4. Initiative 747 limits the growth of local government property tax revenues to 1% per year, although the I-747 cap does not apply to the assessed value of new construction. Because the total assessed valuation for Kittitas County would increase substantially (over 10%) with inclusion of the value of the wind power Projects, the tax rates levied against the total assessed valuation base might need to be reduced to stay within the I-747 limit. In that event, actual revenues derived from the Projects would be less than indicated in Table 3.17-4, although taxpayers would benefit from the reduced levy rate. On balance, the actual effect of the Projects on property taxes would likely be some combination of increased revenues and decreased levy rates (Kittitas County 2003).

The three proposals could also generate some costs for public services (e.g., fire protection, law enforcement, road maintenance) that might not be covered by mitigation requirements. To the extent that this occurred, it would reduce the fiscal benefits that would otherwise be associated with the Projects. These potential service costs have not been quantified but are estimated to be minor, both individually and cumulatively. Expected cumulative revenues are projected to be significantly higher than estimated costs for the Projects and would result in a substantial benefit (a surplus of revenues relative to costs) for the affected local jurisdictions (Kittitas County 2003).

Table 3.17-4: Cumulative Potential Property Tax Revenues in Kittitas County with Wind Projects (First Operational Year)				
	Desert Claim	**Kittitas Valley**	**Wild Horse**	**Cumulative Total**
Local Schools	$ 375,700	$ 407,000	$ 407,000	$ 1,189,700
State	$ 264,800	$ 376,200	$ 376,200	$ 1,017,200
Road District	$ 149,700	$ 135,300	$ 135,300	$ 420,300
Fire Districts	$ 132,700	$ 80,300	$ 80,300	$ 293,300
County Government	$ 123,100	$ 168,300	$ 168,300	$ 459,700
Hospital District/Other Local Services[1]	$ 40,800	$ 63,800	$ 63,800	$ 168,400
Local Communities[2]	NA	$ 112,200	$ 112,200	$ 224,400
Total	$ 1,086,800	$ 1,343,100	$ 1,343,100	$ 3,773,000

Source: Kittitas County 2003.
Notes: Numbers rounded; NA = not available; revenue estimates based on assessed valuation calculated for each project and multiplied by levy rate of 1.18 for Desert Claim and 1.35 for Kittitas Valley and Wild Horse.
1 "Other local services" included for Kittitas Valley and Wild Horse, not for Desert Claim.
2 This category of revenue was not estimated for Desert Claim.

3.17.13 Cultural Resources

The proposed Project, in conjunction with other proposed or planned Projects, including the Desert Claim and Kittitas Valley Wind Power Projects, would result in ground disturbance that could potentially impact identified and unidentified prehistoric and/or historic sites, as well as cause impacts on traditional cultural properties. Cultural resource surveys have been conducted at each of the project sites. A summary of known resources identified in the wind Projects cumulative study area is summarized below.

As identified in Section 3.14, 'Cultural Resources', of this Application, cultural sites in or near the Wild Horse Project area include six previously recorded archaeological and historical sites and three previously unrecorded archaeological sites. Subsequently five additional previously unrecorded archaeological sites (rock features) were documented at the Wild Horse Project, as well as one historical property. Two previously unrecorded archaeological sites (lithic scatters) were documented for the Kittitas Valley Project. None of these cultural sites would be disturbed by proposed construction, although visible evidence of Project facilities would indirectly affect the setting for three of the sites (Kittitas County 2003).

The density of cultural resources in the Desert Claim Project area appears to be considerably greater than in the Kittitas Valley or Wild Horse areas. A field survey of the

Desert Claim Project area identified 13 previously unrecorded prehistoric sites and 18 previously unrecorded historic sites (as well as one recorded historical site), along with more numerous prehistoric and historic isolates. Potential direct and indirect impacts on those cultural resources could generally be avoided or reduced through final turbine "micro-siting" and other mitigation measures. Therefore, the combined effects of the three proposed wind power Projects on cultural resources appear to be the possible disturbance of a small number of sites and the alteration of the visual setting for up to 35 to 40 cultural sites (Kittitas County 2003).

During consultations between EFSEC and the Yakama Nation regarding the Kittitas Valley Project, tribal representatives expressed concern about the cumulative effect wind power Projects could have on tribal lands. Concerns raised on past wind Projects include how wind power developments may affect the cultural and spiritual practices of the Yakama People, particularly Projects located on sacred lands that could affect sacred foods and medicines (Benton County and Bonneville 2003). The Yakama Nation submitted a comment letter to EFSEC on the Kittitas Valley DEIS raising concerns regarding potential impacts to several resources including cultural, bird migration, lithosol degradation and riparian zones. Efforts to bring together wind power facility applicants, state and federal government agencies, and tribal representatives to discuss these and other issues of concern are ongoing. The Confederated Tribes of the Colville Reservation (CCT) expressed potential concerns about Traditional Cultural Properties for the Wild Horse Project (CCT 2004). The Applicant and EFSEC met with CCT on February 19, 2004 and the Applicant is responding to CCT's concerns.

While impacts from these and other Projects in Kittitas County could result in a net cumulative loss of cultural resource values in the region, implementation of mitigation programs in each individual Project should help to limit Project-specific impacts, therefore reducing overall cumulative impacts on cultural resources.

3.17.14 Visual Resources

Figure 3.17-1 shows the locations of the proposed Kittitas Valley, Desert Claim, and Wild Horse Wind Power Projects around the Kittitas Valley. As this map indicates, the Kittitas Valley and Desert Claim Projects are relatively close to each other (within 1.6 miles at the closest point), while the Wild Horse Project is 14 miles from the Desert Claim Project and 21 miles from the Kittitas Valley Project.

In addressing the potential cumulative visual impacts of multiple wind power Projects, it is most important to consider the Desert Claim and Kittitas Valley Projects together because of their proximity. Because the Wild Horse Project is located so far from the other two Projects and in an entirely different portion of the landscape, it has limited potential to be seen in the same view as the other two Projects. Should both the Kittitas Valley and Desert Claim Projects be built, the visual consequences would include approximately 240 wind turbines (120 for each project) on the valley floor and adjacent slopes in the north-central portion of the Kittitas Basin.

The Kittitas Valley and Desert Claim Projects were examined to identify the extent to which there are viewpoints from which both projects could be seen in foreground to middle ground views. Because of topographic conditions, there are no areas where the Kittitas Valley Project could be seen in the foreground and the Desert Claim Project in the middle ground or background. However, there are a number of locations where the Desert Claim Project could be seen in the foreground to middle ground and the Kittitas Valley Project could be seen in the middle ground to background.

Figure 3.17-2 shows the locations of two viewpoints selected to simulate the cumulative visual impacts of the Kittitas Valley and Desert Claim Wind Power Projects. These two viewpoints are representative examples of the combined effects of both Projects on views from these areas.

Viewpoint 1 is located on Reecer Creek Road at a point slightly west of the Kittitas County Fire District Station No. 2. Figure 3.17-3 illustrates the existing view from Viewpoint 1 on Reecer Creek Road, looking northwest. Simulated views of the Kittitas Valley Project, Desert Claim Project, and combined (cumulative) scenario with both Projects are shown in Figures 3.17-4, 3.17-5, and 3.17-6, respectively. All views are shown from Viewpoint 1 on Reecer Creek Road looking northwest. The Kittitas Valley Project would be seen in the middle ground to background zones, whereas the Desert Claim Project would be much more prominent, seen in the near middle ground zone. The addition of the Kittitas Valley Project in the middle ground to background zones of the view with the Desert Claim Project in the near middle ground would not substantially increase the effect that the Desert Claim Project alone would have on the visual character and quality of the view.

Viewpoint 2 is located just outside of the National Forest boundary where the view expands sufficiently to allow substantial portions of both the Kittitas Valley and Desert Claim Projects. Figure 3.17-7 shows the existing view from outside the Wenatchee National Forest, looking south. Figure 3.17-8 is a simulation from this viewpoint that illustrates what the Kittitas Valley would look like with development of both Projects. The view in this figure is also looking south from outside the Wenatchee National Forest. Both Projects would be located in the background zone of this view, but would substantially alter the existing visual character and quality of the Kittitas Valley from this viewpoint.

Because the Wild Horse Project is located so far from the other two Projects and in an entirely different portion of the landscape, it has limited potential to be seen in the same view as the other two Projects. There may be some locations near the Kittitas Valley and Desert Claim Wind Power Project sites from which there is an unobstructed line of sight toward Whiskey Dick Mountain and the Wild Horse Project site. However, because of the large distances involved (21 miles from the Kittitas Valley Project and 14 miles from the Desert Claim Project), the Wild Horse turbines would be barely (if at all) detectable and would have essentially no effect on the view.

There may also be some viewpoints in or near the valley from which all three projects would be visible. One example is a segment of I-90 as it enters the Kittitas Basin near the Elk Heights interchange. The eastbound view in this instance includes the northern margin of the valley (with large portions of both the Kittitas Valley and Desert Claim Project areas) and Whiskey Dick Mountain in the distant background. In this case, the Kittitas Valley and Desert Claim turbines would be 2 to 10 miles away, while the Wild Horse Project would be so far away as to be an insignificant background feature (Kittitas County 2003).

The preceding discussion addresses the potential for cumulative visual impacts from specific viewpoints or localized areas. The overall effect of multiple wind energy Projects on the regional landscape and the experience of viewers when considered over time and at multiple locations is also a consideration. For example, drivers passing through Kittitas County on I-90 would likely notice a major wind development (the Wild Horse Project) for a time in the stretch of highway east of the Columbia River and again in the eastern end of the Kittitas Valley (primarily around the community of Kittitas), and could subsequently view a more extensive area of wind turbines to the north and west of Ellensburg (the Desert Claim and Kittitas Valley Projects). Travelers would be likely to recall having seen a collection of wind turbines a few minutes before seeing more wind turbines. This progressive realization could leave the impression with some viewers that wind turbines are plentiful in Kittitas Valley.

This type of impression would also occur for residents of and frequent visitors to the local area. While residents of Ellensburg, for example, might not see turbines from one or more of the wind Projects on a daily basis, they would likely experience repetitive views of wind turbines through their local travels over a period of weeks, months, or years. Consequently, some local residents and frequent visitors might perceive a substantial change to the overall character of the Kittitas Valley landscape, and such a response would be more likely with the development of multiple wind Projects (Kittitas County 2003).

The development of the three proposed wind power Projects would also cumulatively contribute to increased nighttime lighting in the Kittitas Valley. At present, the proposed wind power Project sites and surrounding areas are relatively dark at night. Proposed flashing red lights required by the FAA on the tops of a certain number of turbine towers would be most noticeable in the areas within a mile of each project.

3.17.15 Transportation

If two or more large Projects were constructed on similar or the same schedules, such as the Kittitas Valley, Desert Claim, and Wild Horse Wind Projects, commuting construction workers and construction supply and material deliveries could contribute to added congestion on the same local roads and highways. For example, the Kittitas Valley and Desert Claim sites are less than 5 miles apart by surface road, increasing the likelihood that construction workers and delivery trucks at both sites could use common routes.

Planned transportation improvement projects could also reduce capacity on local roads, making the burden of additional commuter traffic difficult to absorb. Some temporary cumulative impacts on the local road and highway network would result from the combined construction activities.

The Applicant has prepared a cumulative traffic impact analysis of construction traffic from the Kittitas Valley and Wild Horse Projects, which is summarized below. It is followed by a discussion of the possible added construction traffic effects of the Desert Claim Project.

3.17.15.1 Kittitas Valley and Wild Horse Wind Power Projects

There are two transporter routes for the Wild Horse Project. Both routes begin in the City of Seattle and continue east on I-90. These routes overlap with the entire I-90 segment of the Kittitas Valley Project transporter route and continue on to the towns of Kittitas (Exit 115) and Vantage (Exit 136).

The primary route used to transport equipment to the Kittitas Valley site begins in the City of Seattle and continues east on I-90 to US 97 (Exit 106) in Ellensburg. In the vicinity of the project, I-90 is classified as a rural-interstate, according to the WSDOT road classification system. The segment of I-90 immediately west of Exit 106 carries an ADT volume (in both directions) of 22,000 vehicles, with an estimated 21% trucks (WSDOT 2001).

In the event that construction occurs simultaneously for the Kittitas Valley and Wild Horse Projects, the segment of I-90 immediately west of Exit 106 may temporarily carry construction traffic for both Projects. This is the only roadway that may potentially be affected by combined construction traffic.

To analyze the combined effects, base year (2001) traffic volumes on this I-90 segment were forecast to the year 2004 using a 2% growth factor. This 2% growth factor is based on historical ADT levels and background growth in the Cle Elum and Ellensburg area due to large nearby capital projects. The growth on this roadway is considered reasonable because of the area's rural nature. This growth resulted in a background 2004 ADT of 23,320 vehicles (Table 3.17-5). Peak-hour traffic volumes in one direction were estimated at 1,210 vehicles for 2001 and 1,283 vehicles for 2004, based on a standard 10% peak- hour factor and a 55% directional factor to the respective ADT levels for two-direction traffic in each year.

Methodology from the Highway Capacity Manual (HCM) (Transportation Research Board 2000) is typically used to determine the LOS for a roadway. LOS A represents free flowing conditions (the equivalent of 11 or fewer passenger cars per lane mile for a freeway), while LOS F represents extremely congested conditions (more than 45 passenger cars per lane mile). Applying the HCM methodology for a freeway to the baseline conditions for the segment of I-90 west of Exit 106 indicates this roadway segment would function at LOS A under the baseline condition in both 2001 and 2004.

The estimated construction traffic volumes for the Kittitas Valley and Wild Horse Projects were then added to the 2004 background traffic volumes to achieve a combined peak-hour directional volume. As a worst case, the Kittitas Valley Project is estimated to generate 149 heavy construction trips and 20 light duty delivery truck trips traveling on I-90, for a total of 169 peak-hour trips (middle scenario). The Wild Horse Project is estimated to have 143 heavy construction trips and 15 light duty delivery truck trips for a total of 158 peak-hour trips traveling on Transporter Route 1. Transporter Route 2 of the Wild Horse Project is estimated to carry six heavy construction trips in the peak hour.

The combined construction traffic for the Kittitas Valley and Wild Horse Projects would result in a total maximum peak-hour volume of 1,616 vehicles (Table 3.17-6). The combined volume was then analyzed for LOS. Based on the most current HCM guidance for freeway segments, with the estimated combined baseline and construction traffic volumes during the PM peak hour, this segment of I-90 would continue to operate at LOS B during the construction period. By state standards, the LOS threshold for rural highways is LOS C. Therefore, while the combined construction traffic for the Kittitas Valley and Wild Horse Wind Power Projects could result in a temporary decrease in the LOS on I-90, there would not be a significant impact on traffic operations.

Table 3.17-5: Existing and Future Daily and Peak-Hour Traffic Volumes and LOS without Project

Roadway	**Daily**		**Estimated Directional Peak Hour without Project**			
	2001	**2004**	**2001**	**LOS**	**2004**	**LOS**
I-90 (west of US 97)	22,000	23,320	1,210 (10.1 cars/lane mile)	A	1,283 (10.7 cars/lane mile)	A

Sources: Kittitas County 2003.

Table 3.17-6: Total PM Peak Hour and LOS for Combined Construction Impacts on the Roadways from the KVWPP and Wild Horse Project

Roadway	**2004 PM Peak**[1]	**Kittitas Valley Transporter Route 1**[1]	**Wild Horse Transporter Route 1**[1]	**Wild Horse Transporter Route 2**[1]	**Total PM Peak**[1]	**LOS**
I-90 (west of US 97)	1,283	169	158	6	1,616 (13.4 cars/lane mile)	B

Sources: Kittitas County 2003.

[1] *Directional volumes*

3.17.15.2 Desert Claim Wind Power Project

Peak-hour construction trips for the Desert Claim Project have not yet been estimated, although total turbine delivery trips and potential concrete delivery trips are identified. Assuming that the volume of construction trips for the Desert Claim Project would be similar to the volumes estimated for the Kittitas Valley and Wild Horse Projects (based on the similar size of the Projects), total peak-hour trips shown in Table 3.17-6 would be increased by approximately 120 to 140 trips. Applying a mid-range factor of 130 trips, the total peak-hour trips in 2004 if all three proposed Projects were under construction simultaneously would be close to 1,750. This corresponds to an equivalent of 14.7 passenger cars per lane mile, an operating condition that is still within the numerical range for LOS B. Therefore, the added effect of the potential Desert Claim construction traffic would not result in a significant cumulative impact on the operating condition for I-90 during the construction period (Kittitas County 2003).

Aside from the increased traffic on I-90, there would be relatively little combined construction traffic effects on other roadways because of the geographic separation of the three projects. Cumulative increases in general construction traffic volumes would likely be restricted to roadways in the area around the intersection of I-90 and US 97, and would be associated primarily with the Kittitas Valley and Desert Claim Projects. If turbine components or offsite gravel materials were being delivered to multiple Projects at the same time, there could be increased delays or additional detours within the area near the Kittitas Valley and Desert Claim Projects. Additional vehicle delay could affect segments of US 97 and Smithson Road. The potential for delay could be reduced if the contractors for the different Projects coordinated the delivery of turbine components to avoid a situation in which a number of transporters were traveling at the same time on a given road segment.

3.17.15.3 Cumulative Tourist Traffic

Development of multiple wind power Projects in the Kittitas Valley area would likely result in a larger total number of tourists visiting these facilities compared to conditions if just one Project were built. However, with the geographic separation of the proposed Projects, roads adjacent to the Wild Horse Project (for example) would not likely experience substantially more tourist traffic because one or two other Projects were developed. In fact, the presence of additional wind power Projects could result in spreading tourists over a larger portion of the valley, with fewer tourist visits to a single Project than might otherwise be expected. Tourist interest in multiple wind Projects would likely result in an increase in the amount of traffic on local roads near the respective Project areas. The tourist traffic would likely be localized to the individual areas around the Projects and would not likely be cumulative (i.e., it is likely that most tourists interested in wind energy would visit any one of the Projects but would not visit two or all three projects).

3.17.16 Air Quality

Construction of the Projects would result in construction-related emissions such as fugitive dust from foundation excavation and cable trenching, and vehicle and equipment exhaust. Construction of the Wild Horse Project concurrent with the other two proposed wind power Projects would temporarily increase total regional dust loads in the atmosphere. Due to the proximity of the Kittitas Valley and Desert Claim Projects, the intensity of this potential cumulative air quality impact would be greatest if construction of these two Projects were to occur concurrently. Even with construction-related fugitive dust emission controls, the overall number of truck trips required to haul materials to the different construction sites could be significant.

Gravel required for the Wild Horse Project would be quarried onsite, and transportation would not be required. However, gravel needed for construction of the Kittitas Valley and Desert Claim Projects would likely be transported from offsite sources. If substantial amounts of heavy-duty truck trips are required to haul gravel to the Kittitas Valley and Desert Claim Project sites, there could be greater exhaust emissions from additional vehicle traffic and greater dust emissions from additional traffic on gravel roads for these two Projects. This activity could result in a temporary increase in localized cumulative air quality impacts on travel routes shared by the two Projects but not at a broader countywide level. This potential impact would be greatest if construction activities for the Kittitas Valley and Desert Claim Projects overlapped and occurred during periods of peak winds.

The air emissions from contemporaneous construction of multiple wind Projects would be additive in terms of their contribution to total regional pollutant loads. Based on the combined area of wind Project construction activity and volume of construction traffic relative to existing sources of air emissions in Kittitas County (e.g., vehicle traffic on I-90 and other roads and agricultural activities on over 350,000 acres of commercial agricultural lands), however, the incremental impact of the aggregate air emissions from construction of multiple wind power Projects would not be sufficient for regional air pollutant concentrations to temporarily exceed the applicable air quality standards. Consequently, there does not appear to be a potential for significant regional cumulative air quality impacts from the development of multiple wind power Projects in the Kittitas Valley, even if all three projects were constructed during the same period (Kittitas County 2003).

The only anticipated cumulative air emissions during operation of the three proposed wind power Projects would be from vehicles used for operations and maintenance activities. Given the small number of employees and associated trips anticipated during Project operations, no significant aggregated air pollutant concentrations that would exceed NAAQS/WAAQS standards are anticipated. In addition, the generation of electricity by the three proposed wind power Projects would avoid cumulative emissions of regulated pollutants from other fossil-fuel sources of power that might have otherwise been built or operated to produce an equivalent amount of electricity.

3.17.17 Noise

Construction noise would be temporary in nature, and would primarily be from operation of construction equipment and vehicles. The magnitude of this temporary cumulative impact would depend upon the timing of construction activities, but any adverse effects would be limited to the area immediately surrounding each construction site.

The Wild Horse Project would not affect noise levels at any residences or other permanent receptors. Given the distances that separate the Wild Horse Project from the Kittitas Valley and Desert Claim Projects, Wild Horse Project operations would not contribute to cumulative noise impacts in the region.

The proposed Kittitas Valley and Desert Claim Project sites are located near each other (within 1.6 miles at the closest point). However, receptors located between these two Projects should not be affected by combined construction activities even if their construction schedules were to overlap. There would be significant decreases in construction equipment noise levels at distances of about 5,000 feet (less than one mile) from the source, therefore minimizing potential cumulative noise effects. The two Projects are a sufficient distance apart that residents near the Desert Claim Project would not also experience elevated noise levels from Kittitas Valley Project facilities and vice versa. Noise modeling results for both Projects indicate that receptors located between the two Projects would be unlikely to notice increases in noise levels as a combined effect of the Projects (Kittitas County 2003).

Consequently, potential noise impacts from the proposed wind energy Projects would be confined to certain Project-specific locations, and there would not be cumulative noise impacts from the development of multiple wind Projects. Furthermore, proposed wind energy facilities would be subject to Department of Ecology noise restrictions and mitigation could be required if permissible levels are exceeded for nearby EDNAs (i.e., the area or zone within which maximum permissible noise levels are established).

3.17.18 Public Services and Utilities

Cumulative impacts on public services would result from development of the three wind power projects. Concurrent development of the three projects could create significant additional demand for law enforcement, fire protection, and emergency medical service response during both construction and operations and maintenance phases. The level of impact would depend on the timing of concurrent construction activities as well as the availability of emergency response resources at the time of an incident.

For example, calls for law enforcement service could increase during the construction phase because of traffic accidents and construction site theft or vandalism. The cumulative potential number of increased calls has not been quantified but is not anticipated to be significant. All three wind power Project applicants would provide onsite security for their respective Projects. Impacts during Project operations could result from calls for service in connection with vandalism or trespass but would not be expected to be cumulatively significant. The three proposed Projects would increase the risk of fire and the potential need for emergency medical services from accidents during both construction and operation. The western portion of the Desert Claim Project area is included within Kittitas County Fire District 2, while the remainder is not within an existing fire district service area (Kittitas County 2003). Most of the Kittitas Valley Project area is outside existing fire district boundaries, although Fire District 1 serves a portion of the site. No part of the Wild Horse site is within a rural fire district. The Applicant intends to contract with the appropriate rural fire district to obtain required fire protection services. For all three projects, such contracts would extend coverage to areas not presently served by a fire district. If a fire service contract does not cover the actual costs of extending service to a Project, there could be a gap between the time service is provided and the realization of Project-generated property tax revenues. Successful implementation of emergency response and fire prevention and risk mitigation plans would minimize potential significant cumulative impacts.

Increased permanent worker populations required to operate the three proposed wind power facilities could contribute to increased cumulative demands for school services in central and eastern Kittitas County. The combined operations work force of the three projects would be 30 to 42 workers. If all of these workers were hired from outside the local area and all or most of those were located in a school district with capacity limitations, there could be adverse impacts on school services. These circumstances, however, are considered unlikely because local residents would probably fill a portion of the operations jobs, and it is unlikely that all of the in-migrants would locate in the same school district. Therefore, no significant cumulative adverse impacts on schools are anticipated from Project operation.

Cumulative impacts on utility service providers would consist primarily of cumulative increases in the demand for solid waste disposal services. However, this cumulative increased demand would be limited to Project construction and is not anticipated to be significant with respect to either collection capability or the capacity of the County's construction and demolition waste disposal site.

No long-term cumulative impacts on regional water and wastewater treatment plants are anticipated because water and wastewater demands would be limited to temporary needs generated during construction activities and those from operations and maintenance staff. It is anticipated that long-term cumulative water and wastewater needs would be met through Project specific water wells and septic tanks, and would therefore not burden the region's treatment processes. The combined effects of the three projects would not result in a significant cumulative impact.

Because no individual impacts are anticipated from each Project, no cumulative impacts to telecommunications are anticipated. Based on the distances between the respective Project facilities, there does not appear to be a potential for significant cumulative interference impacts on radio and television reception in the areas near the proposed wind power Projects (Kittitas County 2003).

3.17.18.1 Cumulative Impacts to Utility Grid

In order to be interconnected to either the BPA or PSE grids, the Projects will require interconnection and transmission agreements which comply with FERC (Federal Energy Regulatory Commission) and NERC (National Electric Reliability Council) standards. The interconnection and transmission agreements ensure the safe and reliable delivery of power from the Project to the grid.

In order to gain access to the grid, every type of power project wishing to access the grid must apply for access under the utility's OATT (Open Access Transmission Tariff). Under the OATT both a detailed System Impact Study (SIS) and a Facility Study (FS) need to be performed by the interconnecting host utility. The detailed SIS engineering work performed examines the impacts to the grid of injecting power from the Project including the power injected from other Projects. The Facility Study examines the costs and schedule requirements to construct the interconnection facilities to allow for the injection of power from the Project. The main purpose of the rigorous SIS is to determine the requirements for the interconnection facilities to provide adequate system protection, grid stability and to ensure that overall reliability is maintained. All three projects are currently under study (i.e. SIS and FS) by both BPA and PSE.

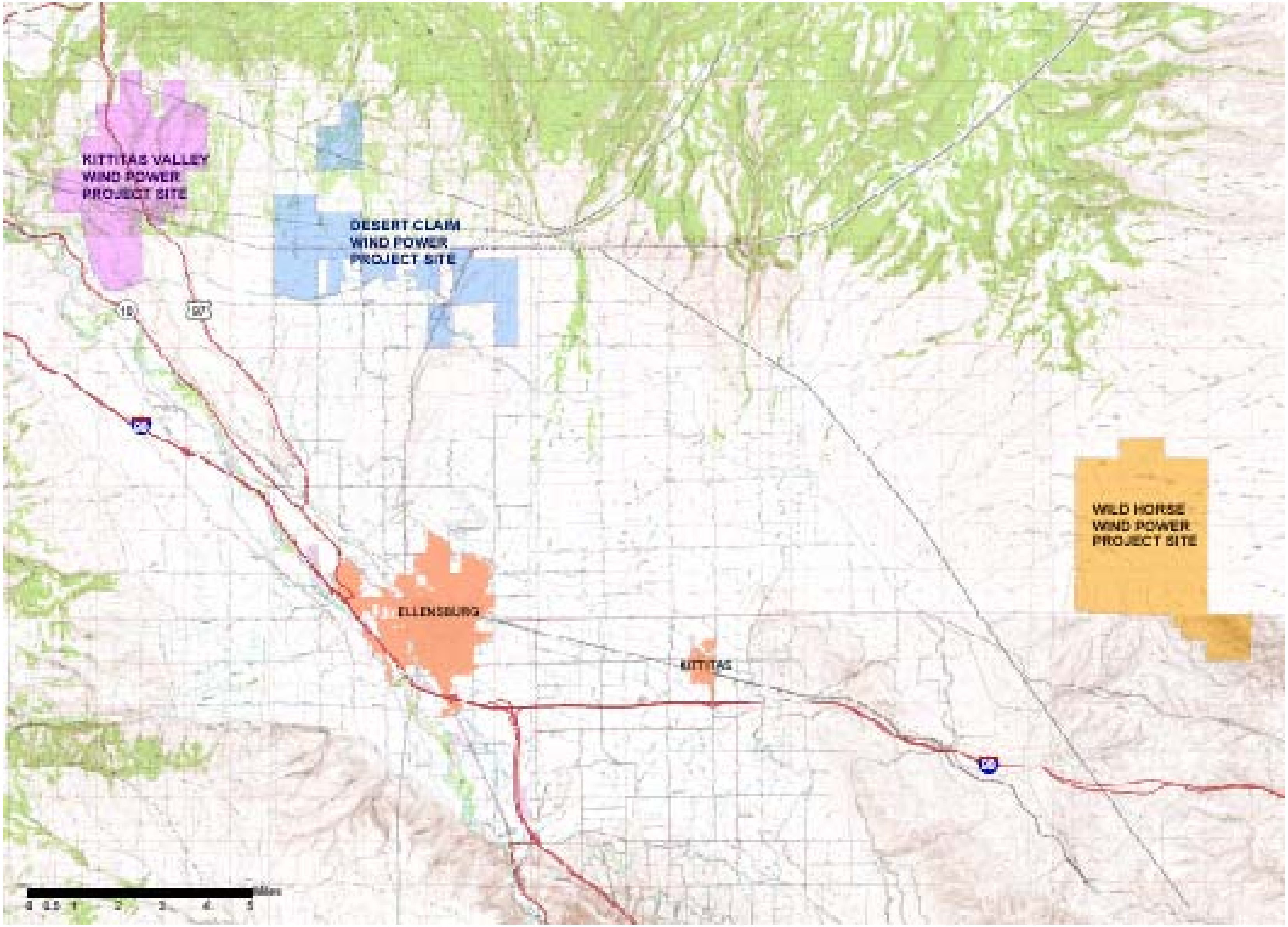


Figure 3.17-1: Proposed Project Site Locations

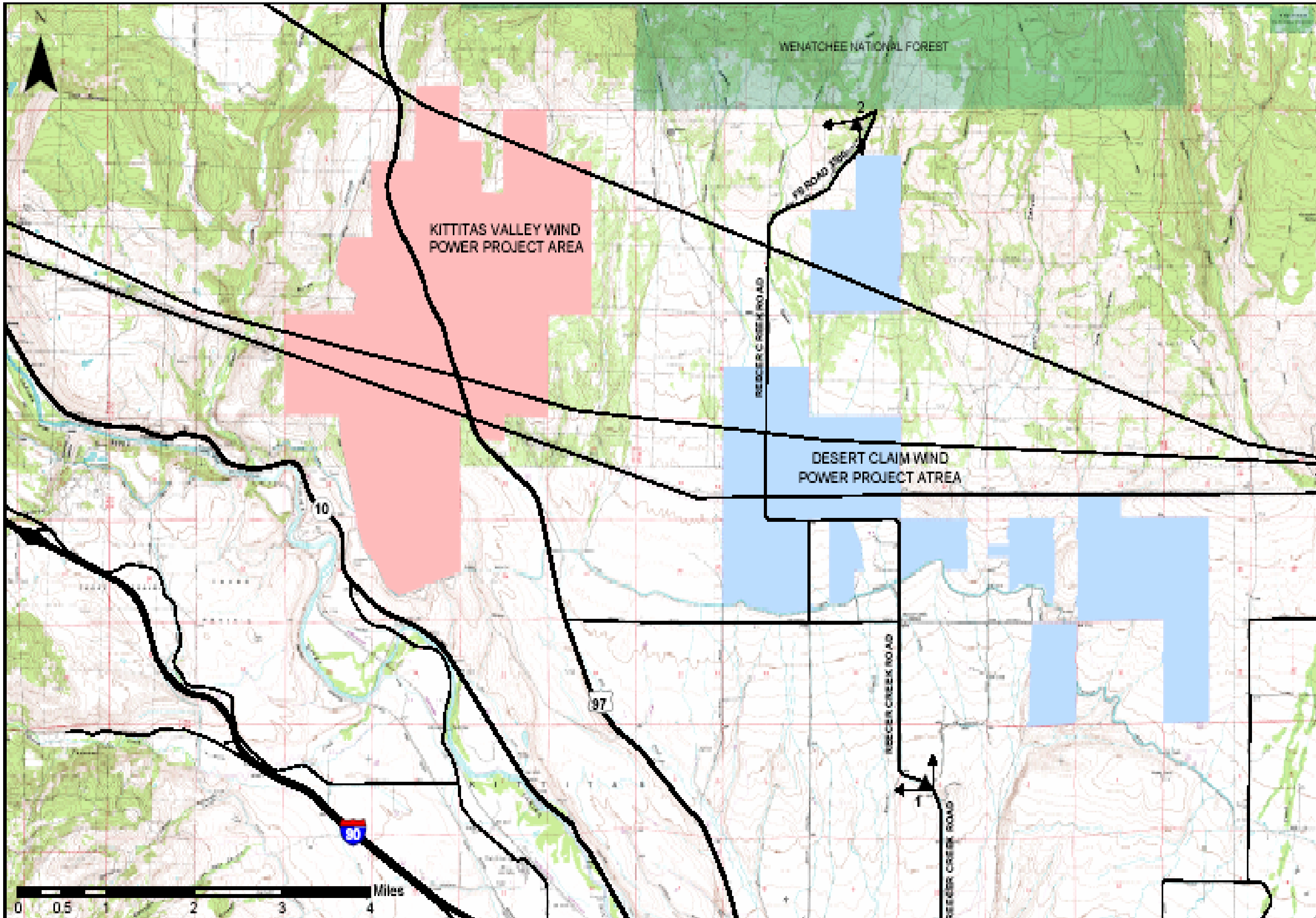


Figure 3.17-2: Photograph Locations for Cumulative Analysis

Figure 3.17-3: Viewpoint 1: Existing Conditions

Figure 3.17-4: Viewpoint 1: Simulated Conditions Kittitas Valley Wind Power Project

Figure 3.17-5: Viewpoint 1 Simulated Conditions Desert Claim Wind Power Project

Figure 3.17-6: Viewpoint 1, Simulated Conditions Cumulative Scenario

Figure 3.17-7: Viewpoint 2 Existing Conditions

Figure 3.17-8: Simulated Conditions Cumulative Scenario

3.18 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG TERM PRODUCTIVITY

This section considers whether a proposed action is sacrificing a resource value that might benefit the environment in the long term, for some short-term value to the sponsor or the public. For example, cutting a 20-acre forest to create an open space for an annual county fair might be considered elimination of long-term productivity for a short-term use. An impact that has short-term benefits and long-term impacts might fall into the same category.

Overall productivity of the of the Project site and transmission line corridors will remain similar to existing conditions because land uses will not be changed except where access roads, tower foundations, substations, and the O&M building are built. All of these structures have small footprints that are insignificant with regard to the entire Project site, representing 165 acres out of over 8,500 acres, or less than 2%. The same uses and activities for which the land is presently used are possible during the operation and lifetime of the Project.

The use of these 165 acres will result in the generation of renewable energy which will help meet growing demand for energy in the Pacific Northwest without consuming finite resources or discharging pollution to the air, water or land. Overall, the Project's use of the environment has a positive impact on the maintenance and enhancement of long-term productivity.

3.19 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

This section evaluates whether the Project would result in a commitment of or loss of resources. One example might be the construction of a regional shopping center over a coal resource that would make the coal inaccessible. Another might be the use of a renewable resource in a way that prevents renewal.

Energy and materials would be consumed for facilities and construction. Some of these materials, such as steel and other metals, would be recycled at the end of their useful life, the others may be considered irretrievable. Wind is an infinitely renewable energy source, thus during operation of the Project there would be no irretrievable loss of nonrenewable fuel as there would be in the operation of a natural gas electric generation facility.

4.1 ASSURANCES

4.1.1 Insurance Policies

The Applicant will establish or cause to be established and maintained, policies of insurance during the development construction and operation of and for the Wild Horse Wind Power Project. Such forms of insurance will be established and maintained as required by state, federal and local ordinance or law, customary business practice and third-party participants and lenders. The following coverage will be included:

4.1.1.1 Commercial General Liability Insurance

The construction contractor, and subcontractors or Applicant, will be required to carry commercial general liability insurance, including products and completed operations in specified amounts to respond to liability and property damage claims arising during the construction and startup phase of the Project.

The Applicant will obtain and maintain in full force and effect, commercial general liability insurance against claims for liability and property damage arising out of the use and occupancy of the premises.

The Applicant will purchase insurance policies to cover liabilities arising from casualty and other major incidents. The insurance industry views facilities such as the Wild Horse Wind Power Project as low risk. Therefore, high coverage limits are available at reasonable costs. The potential for damages can be defined. Damages would occur only if engineered safeguards would fail. In many cases, more than one simultaneous failure would be required to produce significant damages.

Upon completion of power plant design, insurance underwriters will evaluate the design and estimate potential damages. In some cases, design changes may be implemented to mitigate the damages.

4.1.1.2 Automobile Insurance

The construction contractor, and subcontractors, will be required to carry automobile liability insurance covering all owned, leased, non-owned and hired automobiles used during the construction and startup phase of the Project.

The Applicant will obtain and maintain in full force and effect automobile liability insurance covering owned, non-owned and hired autos.

4.1.1.3 Property Insurance

The Applicant will obtain and maintain, at all times during the term of construction and operation of the Project, physical damage insurance on the buildings and all improvements that are to be erected on the premises on an "all risk" basis including coverage against damage or loss caused by earth movement and flood to the full insurable value of such improvements, if commercially available.

Upon completion of the Project, the Applicant will be required by its customer(s) and lenders to maintain specific forms of business interruption coverage to ensure continued operation of the Wild Horse Wind Power Project.

4.1.1.4 Machinery Insurance

The Applicant will obtain and maintain machinery insurance at all times during the term of construction, including testing, and operation of the facility. Coverage will be written on a comprehensive form for all insurable objects, including all production machinery located on or adjacent to the property in a minimum amount equal to the maximum foreseeable loss, and including expediting expenses, extra expense and business income.

4.1.1.5 Worker's Compensation And Washington Stop Gap Liability

The Applicant will fully comply with the worker's compensation and unemployment laws as required with respect to any employees performing work on the subject property and premises. The Applicant will also insure for exposure under Washington Stop Gap Liability. The Applicant will require that the construction contractor and subcontractors working on the Project similarly comply with the worker's compensation and unemployment laws with respect to their employees performing work on the subject property and premises. The Applicant also will require insurance for exposure under Washington Stop Gap Liability.

4.1.2 Environmental Impairment

The Applicant will be responsible, as required by law, for acts of environmental impairment related to the ownership and operation of the Project. Such losses may, in some circumstances, be covered by liability insurance, which the Applicant and/or the construction contractor will carry. In addition, the Applicant and/or its contracted operator will obtain environmental impairment liability insurance to the extent such coverage is commercially available on a commercially viable basis. This insurance will cover the acts of the Applicant and its operators at the Project site, consistent with, or in excess of, the then prevailing industry standards for such insurance in the wind power industry. The concept of commercial availability is determined by reference to the norm of the industry.

4.1.3 Project Site Abandonment

If the Project were to terminate operations or be abandoned after the commencement of construction activities, the Applicant would obtain the necessary authorization from the appropriate regulatory agencies to decommission the facilities. A Final Site Restoration plan would be developed and submitted to EFSEC for review and approval. Experience in other regions with older wind power projects indicates that a non-operating wind power project does not present any significant threats or risks to public health and safety or environmental contamination.

Experience with older wind plants which have been decommissioned and/or repowered has shown that the scrap value of the materials and equipment contained in the Project infrastructure (steel towers, electric generators, steel, copper, etc.) would exceed the cost of dismantling the Project, based on historic and current scrap prices. The Applicant will provide adequate financial assurances to cover all anticipated costs associated with decommissioning the Project 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 will rest with the Applicant.

4.2 SOURCES OF INFORMATION

4.2.1 References by Section

1.1 Introduction

1.2 Summary of Potential Impacts and Mitigation Measures

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1.3 Decisions to be Made

1.4 Description of Alternatives

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1.6 Cumulative Impacts

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1.7 Public Involvement/Consultation/Coordination

1.8 Issues to be Resolved

2 Proposed Project and Alternatives

2.1 Introduction

2.2 Description of the Proposed Site

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2.3 Alternatives

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2.4 Benefits or Disadvantages of Reserving Project Approval for a Later Date
2.5 Regulations and Permits
2.6 Coordination and Consultation with Agencies, Indian Tribes, the Public, and Non-government Organizations
2.7 Potential for Future Activities at Site

3 Existing Conditions, Impacts, and Mitigation Measures

3.1 Earth

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Washington State Department of Transportation. 2003. Road Restrictions for Oversize/Overweight Motor Vehicles. http://www.wsdot.wa.gov/freight/mcs/restrictedroadtest.cfm (21 April 2003)

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Kittitas County. 2003. Kittitas County Comprehensive Plan.

3.16 Health and Safety

Morgan, C., Bossanyi, E., Seifert, H., Assesment of safety risks arising from wind turbine icing (pdf), Proceeding of the International Conference, Wind Energy Production in Cold Climate, BOREAS IV, held at Hetta, Finland, 31 March - 2 April 1998, Published by: Finnish Meteorological Institute.

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Morgan, C., Bossanyi, et al, 1998. 'Energy Wise Renewables: Guidelines for Renewable Energy Developments', Energy Efficiency and Conservation Authority, 1995

Paul Gipe, Wind Energy Comes of Age , pg 361, John Wiley & Sons, New York, 1995. www.awea.org/faq/sagrillo/ms_zoning4.html

Mr. Bill Hanley, City of Portland Fire Bureau, Hazardous Materials Office. Personal communication Nov 3, 2003.

3.17 Cumulative Impacts

Washington State Energy Facility Site Evaluation Council. December 2003. *Kittitas Valley Draft Environmental Impact Statement.*

4 Required EFSEC Information

4.1 Assurances
4.2 Sources of Information

4.3 Legal Descriptions and Ownerships (including Memos of relevant documents and mailing addresses for 3 mile radius)

Kittitas County. November, 2003. Assessor's Office Records.

4.4 Construction Management

Code of Federal Regulations Title 8. General Industry Safety Orders, Construction Safety Orders, and High Voltage Safety Orders.

Code of Federal Regulations Title 29, Part 1926. General Industry Safety Orders.

National Fire Protection Association. 1994. A Compilation of NFPA Codes, Standards, Recommended Practices And Guides. Quincy, Massachusetts.

National Safety Council. 1992. Accident Prevention Manual, Volume 2, Chapter 6, Fire Protection.

4.5 NPDES
4.6 Emergency Plans

4.7 Criteria, Standards, and Factors Utilized to Develop Transmission Route

Bonneville Power Administration. April 1999. Technical Requirements for the Interconnection Of Generation Resources.

Bonneville Power Administration. March 2000. Connection of Transmission Lines and Loads.

4.2.2 Preapplication Studies

Exhibit 4: **CH2M Hill, June 2003.** Geotechnical Data Report, Wild Horse Wind Power Project

Exhibit 9: **Nielsen, Arne, 2003.** Shadow Flicker Modeling, Wild Horse, WA.

Exhibit 12: **Erickson, W.P., Lack, E., Sawyer, H., and G. Johnson. 2003.** Habitat Characterization and Rare Plant Resources Report: Wild Horse Wind Power Project (Kittitas County, Washington).

Exhibit 14: **Erickson, W.P., Jeffrey, J., Young, Jr, D.P, Bay K., Good, R., Sawyer, H., and G. Johnson. 2003.** Wildlife Baseline Study for the Wild Horse Wind Project: Summary of Results from 2002-2003 Wildlife Surveys.

Exhibit 20: **ECONorthwest,** *Economic Impacts of Wind Power in Kittitas County*. For the Phoenix Economic Development Group. October 2002.

Exhibit 24-A: **Comsearch. 2003.** Licensed Microwave Search and Worst Case Fresnel Zone Analysis for the Wild Horse Wind Power Project, Kittitas Valley, WA.

Exhibit 24-B: **Comsearch, 2003.** TV Propogation Measurement and Analysis Report for the Wild Horse Wind Power Project , Kittitas Valley Washington.

Exhibit 29: **Nierenberg, Ron, 2003**. Frequency of icing events at proposed windfarm near Kittitas, WA.

Also submitted under separate cover:

Flenniken, Ph.D, J.J., and P. Trautman, B.S. 2003. Archaeological Survey of the Wild Horse Wind Power Project, Kittitas County, Washington.

Although no separate technical reports were crafted as a result of these studies, extensive research was completed to produce Sections 3.1, 'Earth', 3.3 'Water', 3.13 'Public Services', 3.12 'Population, Housing and Economics'. Please refer to Section 4.10, 'List of Preparers'. Additionally, literature review, field research and surveys, and modeling were conducted to determine potential visual and noise impacts to the Project area. The results of this work are presented in this application as Section 3.11, 'Visual Resources, Light and Glare, and Section 3.9, 'Noise'. Aesthetic impact research and analysis was conducted by Dr. Tom Priestley of CH2M Hill. Noise impact modeling and analysis was conducted by Mr. Mark Bastasch of CH2M Hill.

Applicant has also performed on-going meteorological investigations of the wind resource at the Project site with the assistance of consulting meteorologists Jack Kline of RAM and Associates and Ron Nierenberg.

4.3 LEGAL DESCRIPTIONS AND OWNERSHIPS

The Wild Horse Wind Power Project will be constructed across a land area of approximately 8,600 acres in Kittitas County, although the actual permanent facility footprint will only comprise approximately 165 acres of land. Proposed turbine strings will be located primarily on the ridges in Township 18N Range 21E.

The Wild Horse Wind Power Project site is located on both public and privately owned land. The interconnections with transmission lines are located on private lands. The Applicant has obtained options to purchase the land within the Project site boundary from Caurus Power Inc., and to lease properties from the Department of Natural Resources and Department of Fish and Wildlife. Transmission and access easements will be obtained from adjoining the Project site landowners, and other landowners between the Project and transmission lines. Copies of the memorandum of options with Caurus Power, Inc. Washington State Department of Fish and Wildlife, and Washington Department of Natural Resources, together with copies of memoranda for options to purchase easements for the transmission facilities and access easements are contained in Exhibit 33.

The site is accessed by a private gravel road 11 miles east of the town of Kittitas on Vantage Highway. It is approximately 2 miles from the Highway to the Project Site.

Table 4.3-1 Legal descriptions of Land under Option with Applicant

Project Site

Caurus Power, Inc.
1275 Fourth Street #107
Santa Rosa, CA 95404
Phone No. 707-546-5435

<u>Legal Description:</u>
The Property consists of approximately 5,000 acres of land located in Kittitas County, Washington State, and more specifically described as follows:

All of sections 33, 29, 28, 27, 20, 21, and 22.

The south half of Section 15.

The south half of Section 17.

All in the Township 18 north, Range 21 east, W.M., in the County of Kittitas, State of Washington.

The Northeast quarter of Section 3, and the Northeast quarter of the Northwest quarter of Section 3; All in Township 17 North, Range 21 east, W.M., Kittitas County, State of Washington.

Washington Department of Natural Resources

All of Section 2 located in Township 17 North, Range 21 East, W.M., Kittitas County, State of Washington.

All of Section 35 located in Township 18 North, Range 21 East, W.M., Kittitas County, State of Washington.

Washington Department of Fish and Wildlife

All of Section 35 Located in Township 18 North, Range 21 East, W.M., Kittitas County, State of Washington.

Transmission Easement Option

PSE Transmission Feeder Line

Owner	Township	Range	Description
American Minerals and Land Corporation/Land Development and Promotion Services, Inc.	17N	21E W.M.	All of that portion of Section 9 lying Northerly of Vantage Highway
	17N	21E W.M.	All of Section 4
Doris Clerf	17N	21E W.M.	All of that portion of Section 9, being in the South 1/2 lying Southerly and Westerly of Vantage Highway
Poison Springs, LLC	17N	20E W.M.	Section 13, excepting that portion lying Westerly of the Lateral Irrigation Canal.
	17N	21E W.M.	Section 8, lying Southerly of the Vantage Highway and excepting there from that portion conveyed to the USA

			(BLM)
	17N	21E W.M.	All of Section 17
Ho Brothers, LLC	17N 17N	21E W.M. 21E W.M.	Section 18, the North 1/2. Section 18 Government Lots 1 & 2 and the East ½ of the Northwest ¼, and the Northeast ¼.
Charles Hopper	17N	20E W.M.	All of that portion of the Southeast 1/4 lying South of Bentley Road; and that portion of the Southwest 1/4 lying Southerly of Bentley Road and Easterly of Stevens Road, located withing Section 14. All that portion of the North 1/2 lying Northerly of US Highway I-90, located wihtin Section23.
Howard Clerf	17N	20E W.M.	The South 1/2 of the Southwewst 1/4 identified by Kittitas County Tax assessor's number 17-20-14030-0006, located within Section 14.
TRANSMISSION FEEDER LINE POINT ID	LAT (NAD27)	LONG (NAD27)	PROPERTY LOCATION (Assessors Number)
A - PSE	47.010000	-120.200000	Project Site
B - PSE	46.990000	-120.200000	17-21-04000-0009
C - PSE	46.970000	-120.200000	17-21-08040-0003
D - PSE	46.960000	-120.200000	17-21-18000-0001
E - PSE	46.960000	-120.300000	17-20-13000-0003
F - PSE	46.960000	-120.300000	17-20-23010-0001
G - PSE	46.960000	-120.300000	17-20-14030-0006

BPA Transmission Feeder Line

Owner	Township	Range	Description
American Minerals and Land Corporation/Land Development and Promotion Services, Inc.	18N	21E W.M.	All of Section 19
	18N	20E W.M.	All of Section 24
	18N	20E W.M.	The North 1/2, The Southwest 1/4, and The West 1/2 of the Southeast 1/4, located in Section 22, also known as Kittitas Tax Assessor's # 18-20-22000-0001
	18N	20E W.M.	The North 1/2 of the Northwest 1/4, the Southeast 1/4 of the Northwest 1/4, the South 1/2 of the Northeast 1/4, the Northeast 1/4 of the Northeast 1/4, the north 1/2 of the Southeast 1/4, and the Southeast 1/4 of the Southeast 1/4, all located within Section 23, also known as Kittitas County Tax Assessor's #18-20-23000-0001.
TRANSMISSION FEEDER LINE POINT ID	LAT (NAD27)	LONG (NAD27)	PROPERTY LOCATION (Assessors Number)
A - BPA	47.040000	-120.200000	Project Site
B - BPA	47.040000	-120.300000	18-21-19000-0001
C - BPA	47.040000	-120.300000	18-20-24000-0001
D - BPA	47.040000	-120.300000	18-20-23000-0001
E - BPA	47.050000	-120.300000	18-20-23000-0001
F - BPA	47.040000	-120.300000	18-20-22000-0001

Surrounding Property Owners

Mailing addresses of property owners within three (3) miles of the Project site boundary and within one (1) mile of the transmission corridors are provided in Exhibit 29.

4.4 CONSTRUCTION MANAGEMENT

4.4.1 Management Structure

The Applicant intends to enter into two primary agreements for the construction of the Project including an agreement for the supply, erection and commissioning of the wind turbines as well as an Engineering, Procurement and Construction ('EPC') contract for the construction of the balance of plant ('BOP') which includes all other Project facilities and infrastructure such as the roads, electrical collection system, substation, O&M Facility, etc.

4.4.1.1 Project Construction Management

The Project Management organizational structure will include two support groups: engineering and design specifications team and the field site management team. Figure 4.4-1 illustrates the construction management organizational structure for the Project. The Project Manager will handle contractual aspects of the agreements with the project managers of the wind turbine vendor and the EPC contractor. This organizational chart represents a typical structure for wind power projects. The exact organization may change after award of the turbine supply contract, EPC contract and other subcontracts.

4.4.1.2 Engineering and Design Specifications Team

The engineering and design specifications team is responsible for establishing the design and construction specifications for the various portions of the Project. The engineering team acts a third party verification group in conjunction with the Project's field QA/QC team. The engineering team will review proposals from the various turbine suppliers and EPC contractors for equipment supply and construction work. The turbine supplier and EPC contractor will be responsible for the detailed design work for the Project and for submitting these designs and equipment specifications to the Project engineering team for review. Review by the Project engineering team ensures that the detailed construction plans will meet the required design specifications, codes and standards for the Project.

4.4.1.3 Field Site Management Team

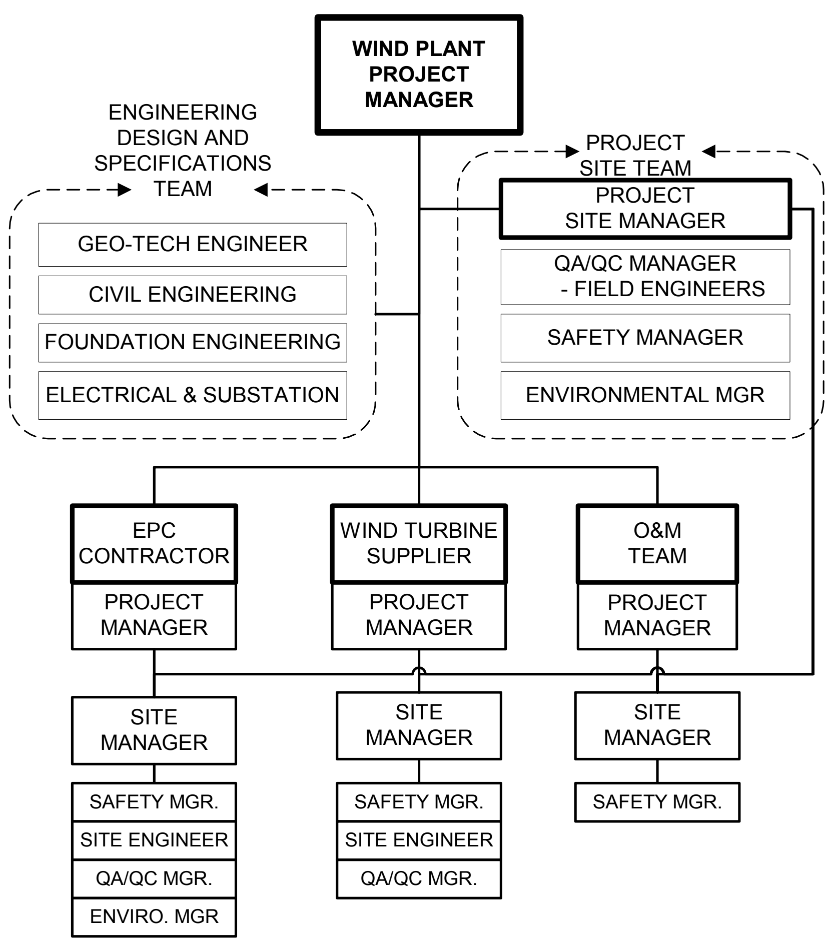
The field site management team will oversee all aspects of construction on-site and will ensure that work is performed in accordance with the engineering plans and specifications, environmental requirements and good industry practice. The field site team will generally be involved in day-to-day issues as they arise throughout the construction phase. The Project Site Manager will have a support team consisting of quality assurance and quality control (QA/QC) specialists, environmental inspectors, and site safety officers. The site team will also rely on the engineering team for in the field support during critical operations such as for energizing of the substation and for technical issues as they arise during Project construction.

4.4.1.4 EPC Contractor's Construction Management Team

The EPC Contractor will be responsible for managing several construction subcontractors including all BOP items such as the roads, electrical and communications system infrastructure, substation and O&M Facility. The EPC Contractor will have a lead Project Manager, a Project Engineer and a Site Manager supported by their own field engineering team, quality assurance and quality control specialists, environmental monitors, and site safety officers. The EPC Contractor will be required to implement and perform a safety plan, a QA/QC plan, and an environmental protection plan, including the storm water pollution prevention plan (SWPPP). The QA/QC plan, safety plan, environmental protection plan and SWPPP will be submitted to EFSEC for its review and approval prior to commencement of construction.

4.4.1.5 Wind Turbine Vendor's Construction Management Team

Figure 4.4-1 Project Construction Management Organizational Structure



The wind turbine supplier will be responsible for the supply, delivery, erection and commissioning of the wind turbines. The turbine supplier's construction team will include a lead Project Manager, a Site Manager, transportation specialists and several lead technician foremen to support the proper and safe handling, assembly, erection and commissioning of the WTGs. The turbine vendor's site team will also be supported by their own quality assurance and quality control specialists and site safety officers. The turbine supplier will be required to implement and perform a safety plan, a rigorous QA/QC plan and a detailed commissioning plan.

4.4.1.6 Project Operations and Maintenance (O&M) Team

The Project O&M group will be on site during the commissioning and start-up phase of construction. Once a turbine is commissioned, it is turned over to O&M group control. The O&M team generally consists of a Project site manager, a team of wind turbine field technician specialists, and administrative support staff.

4.4.2 Quality Assurance/Quality Control

A Quality Assurance (QA) and Quality Control (QC) Program will be implemented during all phases of the Project to ensure that the engineering, procurement, construction, and startup of the facility is completed, as specified. The EPC and Turbine Supply Contracts will require that a Project construction procedures manual be submitted prior to any site construction for review and approval. The manuals will describe how the contractors will implement and maintain QA/QC, Environmental Compliance Programs, Health and Safety Compliance Programs and integrate their activities with the other contractors during all phases of the work. The EPC contractor and turbine supplier will be responsible for enforcing compliance to the construction procedures program of all of its subcontractors.

In the QA/QC Program, the contractor will describe the activities and responsibilities within its organization, and the measures to be taken to assure quality work in the Project. Some of the topics that will be covered are design control, configuration management and drawing control. Independent QA/QC personnel will review all documentation (design, engineering, procurement, etc.) and witness field activities as a parallel organization to that of the construction contractors to assure compliance with the specifications. In the installation, alignment and commissioning of all major equipment and for the energization of all electrical systems, field inspectors' acceptance will be required.
QA/QC inspections of the major facilities and equipment listed below will typically include, but not be limited to, the following operations, checks and review:

Factory QA/ QC

- Inspection of turbines at manufacturer's facilities;
- Review and inspection of 3rd party test verification reports;
- Review and inspection of manufacturer's QA/QC procedures for ISO compliance;

- Review and inspection of main component suppliers' ISO QA/QC procedures;
- Manufacturing drawing review and verification;
- Verification of welding procedure specifications (WPS) compliance;
- Material mill certificates tracking system and verification;
- Overall visual inspection (including assembly, fastening systems and welding);
- Inspection of flange interface flatness measurements, finishing and protection;
- Witness or review of turbine nacelle and drive train run-in load testing;
- Witness or review of turbine blade load testing;
- Inspection of paint finishing and protection;
- Inspection of painting/marking/preparation for shipment;
- Verification of factory wiring and tagging;
- Shipment packaging and handling, tracking and identification;
- Pre-Commissioning field testing and verification.

Field Inspection QA / QC

- Review equipment and material delivery acceptance inspection procedures;
- Inspection of all critical interfaces including flanges and electrical terminations points;
- Verification of all mechanical assembly work including turbine erection;
- Verification of field wiring and tagging;
- Pre-Commissioning field testing and verification.

Roadways and Civil Work

- Field verification of road locations to site plan and survey markings;
- Review of clearing and grubbing and compaction process;
- Verification of adequate road materials and compaction to engineer's specifications;
- Verification of road grade, dimensions and compaction requirements to plans.

Concrete/Structural

- Inspection of batch plant facilities, engineer's review of mix design and break test verification;
- Inspection of forms, structural steel and rebar prior to backfilling and prior to casting;
- Field engineer's witness of concrete pouring;
- Inspection of concrete testing during pour (slump) and verification of break tests results.

Electrical Collection System

- Inspection of cables and trenches prior to burial and backfilling;
- Witness of proper backfilling procedures;
- Inspection of terminations and termination hardware at pad transformers, junction boxes, pad switches, risers, etc.;
- Witness and/or review of polarity, cable marking and phase rotation tests;
- Witness and/or review of grounding system resistance measurements;

- Inspection of all lock-out tag-out locations and energization sequences and plan.

Pad-Mount Transformers and Main Substation Transformers

- Inspection of trasformers at manufacturer's facilities;
- Witness and/or review of winding resistance, polarity and phase displacement tests;
- Witness and/or review of no load losses and excitation current at rated voltage and frequency;
- Witness and/or review of impedance voltage and load losses at rated current and rated frequency;
- Witness and/or review of high potential and induced potential tests;
- Witness and/or review of impulse tests, reduced full wave, chopped wave and full wave tests;
- Witness and/or review of regulation and efficiency calculations;
- Verification of compliance to engineering specifications;
- Inspection of painting/tagging/preparation for shipment;
- Verification of field wiring and tagging.
- Substation Breakers
- Witness and/or review of rated continuous current and short circuit tests;
- Witness and/or review of dielectric withstand tests;
- Witness and/or review of switching tests;
- Witness and/or review of insulator tests;
- Witness and/or review of mechanical life tests;
- Witness and/or review of terminal loading tests;
- Witness and/or review of partial discharge tests;
- Verification of compliance to engineering specifications;
- Inspection of painting/tagging/wiring/preparation for shipment;
- Verification of field wiring and tagging.
- Substation Relaying and Instrumentation
- Inspection of manufacturer's facilties
- Verification of instrument and relay compliance to specifications;
- Verification of installation in accordance with drawings;
- Witness and/or review of instrument and relaying calibration;
- Verification of field wiring and tagging.
- Substation Structural Steel Work
- Inspection of manufacturer's facilities;
- Review and inspection of manufacturer's QA/QC procedures;
- Manufacturing drawing review and verification;
- Verification of welding procedure specifications (WPS) compliance ;
- Material mill certificates tracking system and verification;
- Overall visual inspection (including assembly, fastening systems and welding);
- Inspection of flange interface flatness measurements, finishing and protection;
- Inspection of paint finishing and protection.

Safety

- Review of safety procedures;
- Observation and attendance of safety training for supervisors and field staff (tail gate meetings);
- Review of construction safety techniques and implementation;
- Verification of safety incident reports and statistical data.
- Witness of construction implementation;
- Inspection of spill sites and cleanup and review of spill reports;
- Environmental Protection
- Review of erosion control and storm water pollution prevention plans;
- Witness of construction implementation;
- Witness of erosion control performance;
- Ensuring sensitive areas are flagged and avoided;
- Inspection of spill sites and cleanup and review of spill reports;
- Continuous inspection for trash and debris removal from the Project site.

4.4.3 Environmental Protection

The Environmental Compliance program will ensure that construction activities meet the conditions, limits and specifications set in environmental standards established in the Site Certification Agreement and all other environmental regulations.

Copies of all applicable construction permits will be kept on-site. The lead Project construction personnel and construction Project Managers will be required to read, follow and be responsible for all required compliance activities. A Project Environmental Monitor will be responsible for ensuring that all construction permit requirements are adhered to, and that any deficiencies are promptly corrected. The Environmental Monitor will ultimately report to the Project Manager and will provide weekly reports on environmental problems reported or discovered as well as corrective actions taken to resolve these problems. The Environmental Compliance Program will cover avoidance of sensitive areas during construction, waste handling and storage, stormwater management, spill prevention and control and other components required by state and county regulation. Upon identification of an environmental noncompliance issue, the EPC contractor Environmental Monitor will work with the responsible subcontractor or direct hire workers to correct the violation; if not corrected in a reasonable period of time a “stop work” request can be issued for that portion of the work not in compliance with the Project environmental requirements.

4.4.4 Safety Program

4.4.4.1 Health and Safety and Spill Prevention Control and Countermeasure (SPCC) Plans

Prior to the commencement of any construction work, the Wind Plant Project Manager will require a Health and Safety and Spill Prevention Control and Countermeasure Plan

(SPCC) from both the main EPC contractor and WTG vendor. These plans apply to all work performed on the construction site and to all subcontractors that both the EPC or WTG vendor may have on site. The Health and Safety Plans are designed to ensure that all laws, ordinances, regulations and standards concerning health and safety issues are complied with.

4.4.4.2 Health and Safety Plan

Generally, Health and Safety Plans for wind power project construction and operations cover many areas which relate to all aspects of construction and operations activities. The operations safety plan will be the same as the construction safety plan with variations on the training program suitable for the emphasis on the types of work being performed. The Safety Plans will include, but not be limited to:

- General Facility Information
  - Owner / Operator
  - Construction and Operation
  - Persons Assigned to Safety Plan Leadership
  - Project and Area Map
- Emergency Plan
  - Locations of Hospitals, Emergency Contacts, Air Lift Plan, etc.
- Safety Training Programs and Policies
  - Drug and Alcohol Free Workplace Policy
  - Personal health and safety
  - Fall Safety
  - Confined Space
  - Excavation Safety
  - Crane and rigging safety
  - Equipment and operations safety
  - Fire prevention and fire safety (hot work permits)
  - Electrical safety – lock-out tag-out
  - Hazard Notices and Communication

4.4.4.3 Spill Prevention Control and Countermeasure (SPCC) Plan

The Spill Prevention Control and Countermeasure Plan (SPCC) will cover high risk liquids that are expected to be on site during construction and operations. The general contents of the SPCC will include but not be limited to the following main areas:

- General Facility Information
  - Owner / Operator
  - Construction and Operation
  - Persons Assigned to Spill Prevention and Control
- Potential Spill Hazard Sources and Vulnerability
- Spill Response Plan Procedures (Available Equipment, Materials and Suppliers)
- Spill Incident Reporting and Record Keeping

- Facility Drainage
- Personnel Training
- Tank Management Program
- Personal health and safety

4.4.4.4 Safety Managers

As illustrated in Figure 4.4-1 above, a safety manager is part of every construction team including the Project Site Management team, the EPC Contractor, the WTG Vendor and the O&M team. Each team safety manager is responsible for construction health and safety issues in the field and each will ensure that any identified deficiencies spills and/or accidents are corrected as fast as possible.

4.4.4.5 Stop Work Authority

Each team safety manager (i.e. EPC Contractor, the WTG Vendor and the O&M team) has the authority to issue a "stop work" notice when health and safety issues, including any subcontractor safety issues, are violated and the health and safety of construction personnel are in danger. For health and safety "stop work" orders, the action may only be for a portion of the work that endangers a limited portion of the Project site or activities. The Project construction procedures will clearly spell out the "stop work" procedures which will require a written action request with justification on the part of the designated Safety Manager.

Upon identification of a health and safety issue, the Safety Manager will work with the responsible subcontractor or direct hire workers to correct the violation; if not corrected in a reasonable period of time the "stop work" request can be issued. The on-site safety manager and on-site construction manager will determine the amount of time that is reasonable and prudent to rectify or take action on a potential safety hazard. Generally the definition of "reasonable time" is not more than 24 hours. If a serious safety issue is identified which poses an immediate threat, the affected area will be required to be shut down immediately and remain roped off and off limits until the safety violation is rectified. If immediate action is not taken by the construction contractor(s), the construction management team will take action to immediately shut down the area of concern. For issues relating to safety procedures, the general contractor will be given 24-48 hours (at the discretion of the on-site safety manager) to provide tailgate safety training to all involved on-site construction staff.

4.5 NPDES

4.5.1 NPDES Permit Application and Permit Requirements

The Project will require a Stormwater General permit for construction activities because construction of the facility will disturb more than five acres of land. EFSEC has jurisdiction regarding the National Pollution Discharge Elimination System (NPDES) Permit over the Project pursuant to Chapter 463-38 WAC. The applicable statutes and regulations which establish permits applicable to the discharge of waste material from industrial, commercial and municipal operations into groundwaters are as follows:

- Chapter 90.48 RCW Water Pollution Control Act
- Chapter173-226 WAC Waste Water General Permit Program establishes general stormwater permits for the Washington Department of Ecology (DOE) 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; and
- Chapter 173-216 WAC Washington Department of Ecology Waste Water Discharge Program,

Federal statute(s) and regulations implemented by the above state statute(s) and regulations include: 42 USC 1251 Federal Clean Water Act; 15 CFR 923-930. An NPDES Pemit will also be required for construction activities.

4.5.2 NPDES Application

See Exhibit 8, for the completed Washington DOE Application for General Permit to Discharge Stormwater Associated with Construction Activity.

4.6 EMERGENCY PLANS

4.6.1 Introduction

On-site emergency plans will be prepared to protect the public health, safety and environment on and off the Project site in the case of a major natural disaster or industrial accident relating to or affecting the Project. The Applicant shall prepare the plans and be responsible for implementing the plan with its operations team in coordination with the local emergency response support functions. The plans will describe the emergency response procedures to be implemented during various emergency situations that may affect the Project or the surrounding community or environment.

The emergency plans described in this section are an outline of the details that will be included in the detailed emergency plans to be developed prior to the construction and operating phases of the Project. This outline is based on Applicant's experience in operating other similar wind power projects. For wind power projects, the key element of an effective emergency and safety plan is the ability to communicate. During both construction and operation of the Project, all operations and construction team leaders will be equipped with two-way short-band radios and cellular phones.

Preliminary construction emergency plans will be developed and submitted for review by EFSEC prior to the start of construction activities. EFSEC, as well as local emergency response organizations, where appropriate, will review and approve all plans before they are implemented. Preliminary operations and maintenance emergency plans will also be developed and submitted for review by EFSEC and prior to the start of plant operations. During the Project construction and startup period, the emergency plans will be updated to conform to manufacturer and vendor safety information for the specific equipment installed at the Project.

4.6.2 Events Covered By Emergency Plans

The emergency plans cover a number of events that may occur at or near the Project site by natural causes, equipment failure or by human mistake. The following is a list of potential events that will be covered by the emergency plans and form its base table of contents.

- Personal medical injury;
- Construction emergencies;
- Project evacuation;
- Fire or explosion;
- Floods;
- Extreme Weather Abnormalities;
- Earthquakes;
- Volcanic eruption;
- Facility Blackout;
- Chemical or Oil Spill or Release;
- Blade or Tower Failure;
- Aircraft Impact;
- Vandalism
- Bomb Threat.

The Project operating and maintenance (O&M) group and third party contractors will receive regular emergency response training as part of the regular safety training program to assure that effective and safe action will be taken to reduce and limit the impact of emergencies at the Project site.

4.6.3 Personal Medical Injury

Medical emergencies will be normally handled by calling 911 and alerting the EMS (Emergency Medical Services) system. The City of Ellensburg fire department provides emergency medical services (EMS) for the entire county, directly billing for services that include treating, burns, fractures, lacerations, fall injuries, and heart attacks. Ambulances are located in Ellensburg, and the towns of Kittitas. Also, Cascade Search and Rescue is located in Ellensburg. Emergency calls are dispatched through the Sheriff's office to the fire districts that provide search and rescue support.

Kittitas Valley Community Hospital in Ellensburg serves the entire county. The hospital has Level Four trauma service, with a limited number of specialists available. Patients with head injuries, severe burns, and/or trauma are transported to a different facility, usually Harbor View Medical Center in Seattle. Less severe accident victims are sometimes transported to Yakima for hospitalization and treatment. There is a heliport on the roof of the hospital, and a helicopter is available for emergency response (Eric Jensen, Kittitas Valley Community Hospital administrator, personal communication). MedStar, a critical care transport service located in Moses Lake, Washington, also provides air ambulance support services to Kittitas County.

All operations personnel, working on the turbines, will work in pairs. All turbine maintenance staff will be trained in lowering injured colleagues to prepare for the possibility of an injury while working in the nacelle that prevents a worker from climbing down the tower safely. A rescue basket, especially designed for this purpose, will be kept at the operations and maintenance facility and will be available for use by local emergency medical services personnel. Training in its use will also be provided to local EMS personnel.

The following actions will be taken for personnel injuries:

- The Site Construction Manager(s), O&M Manager, or designee, will be notified of the injury(s);
- A qualified first aid attendant will administer first aid until medical assistance arrives;
- The Site Construction Manager(s), O&M Manager, or designee, will notify Kittcom, the county-wide emergency response (911) system;
- All key supervisors will be paged or called and advised of the injury;
- For off-site assistance, the Construction Manager(s), O&M Manager, or designee, will meet the emergency responders at a prearranged gate and direct them to the location of the emergency;

- Should an employee become injured and require emergency off-site medical transportation, they will be accompanied by a Project representative to give pertinent information needed;
- In the event of death, only a professional medical practitioner can confirm the death. The paramedics will be called first and then a physician. Notification of the Kittitas County Sheriff's office and the local Emergency Medical Service (EMS) is required plus OSHA per the requirements of the OSHA Health and Safety Act of 1970 which requires the notification within eight hours after the death of any employee from a work-related incident or the in-patient hospitalization of three or more employees as a result of a work-related incident;
- If a medical practitioner declares death, the Construction Manager(s) or O&M Manager, as the case may be, will inform the deceased's next of kin.

4.6.4 Construction Emergency Plan

The Project will be managed and constructed by personnel and contractors experienced and familiar with the construction of wind power projects of the type proposed for the Project. The construction specifications will require that the contractors prepare and implement a Construction Health and Safety Program that includes an emergency plan. The Construction Health and Safety Program will include the following provisions:

- Construction Injury And Illness Prevention Plan;
- Construction Written Safety Program ;
- Construction Personnel Protective Devices;
- Construction On-Site Fire Suppression Prevention; and
- Construction Off-Site Fire Suppression Support.

Each contractor will develop its own plans which will be tailored to suit the specific site conditions, design and construction requirements for the Project. The outline, as presented in this section and Section 4.4.4, 'Construction Management - Safety Program', will provide the minimum requirements for the Project.

In the event of a construction emergency, the construction plan will require an alert broadcast to all on-site personnel and the requirement that all employees gather at a predetermined gathering place to receive further instructions. The construction emergency plan will focus primarily on personnel injury, construction related accidents and on weather related events. The Construction Emergency Plan will be submitted to EFSEC prior to the start of construction.

4.6.5 Project Evacuation

Under the most severe weather events, a potential threat to the Project property or workers such as a bomb threat, the Project site area may have to be evacuated. The Construction Written Safety Program, the operating power plant Emergency Action Plan or the Plant Operational Safety Program, whichever is in force, will provide the plans for the site evacuation and include the following actions:

- A predetermined evacuation area will be designated unless the evacuation area is in danger;
- The Site Construction Manager(s), O&M Manager, or designee, will broadcast via two-way short band radio and over cell phones, a predetermined alarm and announce the specific egress, gathering area and the nature of the emergency. Acknowledgement from each on-site team leader and their crews will be required;
- The Site Construction Manager(s), O&M Manager, or designee, will notify the appropriate local authorities such as Kittcom (911) for fire, injury or hazardous material spills or other disturbances;
- For off-site assistance such as from the local fire district, Ellensburg EMS, or the Kittitas County Sheriff's Office, the Site Construction Manager(s), O&M Manager, or designee, will meet the off-site emergency response assistance at a prearranged location and direct them to the source of the emergency;
- All visitors and vendors/subcontractors will be guided by their key on-site contact;
- If required, the Project will be shut down using the central SCADA system or by opening breakers at the main substation as required. If a shut down is performed, the utility transmission system operator (either BPA or PSE) will be notified of the anticipated outage;
- The Site Construction Manager(s), O&M Manager, or designee, will proceed to predetermined evacuation area, perform a head count and provide further instructions to evacuated personnel;
- After all employees are accounted for, the employees may leave the area or go back to work, whatever the situation calls for.

4.6.6 Fire or Explosion

Prevention of fires or explosions is discussed in detail in 43.16.3, 'Health and Safety – Mitigation Measures'. Detailed measures will be spelled out in a number of the on-site safety programs including: the Construction Written Safety Program, the Construction On-Site Fire Suppression and Prevention Program, the Operational Safety Program, the Operations Written Safety Program and the plant Emergency Action Plan and the plant Fire Prevention Plan.

All on-site employees will be responsible to contribute to prevention through the following programs:

During Construction:

- Construction Written Safety Program;
- Construction On-Site Fire Suppression And Prevention;
- Construction Off-Site Fire Suppression Support.

During Operation:

- Operational Safety Program;
- Operations Written Safety Program;
- Emergency Action Plan;
- Fire Prevention Plan.

4.6.7 Floods

The Project Site and Feeder Line Transmission corridor lie entirely in Flood Zone C classified areas. Flood Zone C is defined by FEMA as a 'flood insurance rate zone that corresponds to areas outside the 1-percent annual chance floodplain, areas of 1-percent annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1-percent annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1-percent annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone. Insurance purchase is not required in this zone'. The closest 100 year flood zone is approximately 2.4 miles from the PSE Interconnect Substation and 4.4 miles from the Project site boundary. Exhibit 10 shows the Project with Flood Zone Overlays.

Since Project facilities are located significantly outside the floodplain of the Yakima River and are more than 500 feet in elevation above the level of river or other water body, the risk of flood impacts is insignificant and is therefore not discussed here.

It is extremely unlikely that the 100-year rainstorm event will occur during Project construction, which could produce local short term sheet flooding on the Project site. However, most of the construction activities at the Project site will be outdoors and require access to roads which would be exposed to such local sheet flooding. Therefore, the Applicant has developed the following list of actions to be performed under these unlikely conditions:

- The Project Construction Manager(s) will consult with appropriate authorities at the County to determine the severity of local flooding;
- Construction materials that can be damaged by water or pollute waters if submerged will be moved to either enclosed areas or elevated areas above the short-term local sheet flooding to remain dry;
- If the flooding is severe, construction work will be shut down.

4.6.8 Extreme Weather Abnormalities

Extreme weather events might include blizzards, massive sleet or hail, ice storms, or extremely high winds. In the event of extreme wind gusts, the wind turbine generators automatically shut down and go into standby mode. All Project transportation vehicles will be maintained in good running condition with full fuel tanks. The Project will have adequate foul weather gear for personnel. If extreme weather events occur, the following actions will be taken:

- When there is a weather warning issued by the National Weather Bureau, the Site Construction Manager(s), O&M Manager, or designee, will consult with appropriate authorities at the local weather service offices and at the county to determine the anticipated severity and duration of the weather event;
- The O&M Manager will hold planning meetings prior to a foul weather incident to prepare and implement a foul weather prevention plan;
- Loose materials that can be blown around or damaged will be moved inside or tied down;
- All doors will be secured;
- If the Project is shut down, the O&M Manager, or designee, will notify the electric transmission line operator (BPA or PSE) of the anticipated outage;
- Communication equipment will be checked;
- The substation high voltage line transmission facilities will be double checked for secure terminations on poles, relays, transformers and supports.

4.6.9 Earthquake

Project facilities including the wind turbines, towers, foundations and substation are all designed for the seismic class zoning at the Project site. Earthquakes occur without warning, thus damage prevention measures and plans must be made in advance. The probability of a severe earthquake at the Project site is described in Section 2.2.4, 'Design Criteria for Protection from Natural Hazards'. The wind turbines are all equipped with an over vibration sensors which will automatically shut down the turbine in the event of a severe earthquake.

Injuries and fatalities can be reduced by properly storing heavy objects and placing furniture to prevent displacement and overturning that will injure personnel. The following actions will take place during an earthquake:

- All personnel will seek safety at the nearest protected location;
- Personnel located inside the wind turbines will be instructed to get out of the turbine immediately, or if they are up-tower, they should stay there and take cover;
- Personnel will take cover so displaced material is not a problem and wait until the shaking has stopped;
- All personnel will check the immediate area to identify injuries and equipment failures and report to the Site Construction Manager, O&M Manager, or designee;
- All personnel will be instructed to report to a protected area, as necessary, or will continue monitoring the operating equipment;
- A determination will be made on missing personnel and a search and rescue effort will be taken if safe and appropriate;

- If the conditions warrant, Kittcom and BPA or PSE, (the electric transmission line operator), will be notified;
- Turbines will be shutdown manually as required depending on the severity of the quake and brought back on-line after they have been cleared for re-starting;
- Off-duty personnel will report, if they can, as designated in the emergency plan;
- The O&M Manager will approve re-entry to any turbines to carry out search and rescue efforts if the structures are intact and other plant safety issues are under control.

4.6.10 Volcanic Eruption

Volcanic eruption can result in ash falling on the Project site, which can cause lung damage, respiratory problems, and death by suffocation under extreme conditions. In addition, ash clogs machinery, filters, causes electrical short circuits, and makes roads slippery. Ash will damage computer disk drives and other computer equipment, strip paint, corrode machinery, and dissolve fabric. Communications and transportation may also be disrupted over a large area.

Precursory activity prior to eruption may provide early warning of impending eruptive activity. The decision to take shelter in-place or initiate a Project site evacuation will depend upon information concerning the safety of roadways. The actions to be taken are:

- Close all O&M building vents to prevent ash from entering buildings;
- Data processing equipment will be covered and all computers not required for safe Project operation or shutdown and other electronic equipment sensitive to dust will be shutdown;
- If the dust load is heavy enough, the Project will be shut down;
- If the conditions warrant, Kittcom and BPA or PSE (the electric transmission line operator) will be notified;
- A determination will be made if employees should be sent home immediately before roads become unsafe or if personnel must be sheltered on-site;
- Any ash cleaning operations would be initiated with cleanup personnel wearing protective equipment;
- The Project would coordinate all ash disposal activities with local Kittitas County officials.

4.6.11 Facility Blackout

A facility blackout would occur if the main utility grid power (either BPA's or PSE's system) de-energized or if a grid fault causes the substation's main circuit breaker to open. If the transmission system is shut down, the substation main circuit breaker connecting the power plant to the transmission system will be opened immediately, if not already opened. Such a power outage causes the turbines to shutdown, trip open the turbine main breaker and lock the rotors in place all automatically. Back up batteries at the substation main control house will be tripped on for emergency power to the substation relay controls and also to emergency lighting inside the control house. The O&M Facility will also have emergency indoor lighting which will come on-line. The central Supervisory Control and Data Acquisition (SCADA) system's Uninterruptible Power Supply (UPS) comes on-line automatically to provide backup power to the system and allow for controlled shut-down of the computer system. No Emergency diesel power generator will be installed at the facility.

In the event of a facility blackout, the following procedures will be followed:

- Station service switchgear will be checked and breakers not opened by under-voltage will be opened;
- Breaker control relays inside the substation control house will be inspected;
- The central SCADA system will be inspected;
- The O&M manager or designee will immediately contract the lead transmission system operator (BPA or PSE) on duty to determine the status, expected delay and appropriate course of action;
- If the main transmission system is energized, the restart will commence only when cleared by the transmission system operator;
- Once the transmission system is re-energized, the turbines will be brought back on-line manually or automatically depending on the appropriate course of action as permitted by the Transmission System Operator.

4.6.12 Chemical or Oil Spill Release

A detailed construction spill prevention plan will be developed by the EPC Contractor and submitted to EFSEC for review prior to construction and operations. The plan will address prevention and clean up of any potential spills from construction and operations activities. The only fluids on site during construction and operations of the Project will include: water, diesel fuel, mineral oil for the transformers, and lubricating oils and a glycol water coolant mix in the wind turbines. In the event of a spill, it is highly unlikely that it will constitute an emergency; however, if it results in a fire, injury, or other issue, the remedial action will be executed in accordance based on the appropriate emergency plan provisions. Spills of liquids will be handled as outlined in Section 3.16.1.3, 'Spillage Prevention and Control – Releases of Hazardous Materials' and the plan measures will include:

- Notification of on-site construction and/or operations management;
- Immediate containment of the spill area with an earth berm;
- Notification of Department of Ecology (DOE) to determine an appropriate action plan in compliance with CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) and MTCA(Model Toxics Control Act of 1988);

4.6.13 Blade or Tower Failure

If a wind turbine tower or blade has a catastrophic failure, it will be immediately de-energized to keep electrical power from the turbine. If the failure results in an injury, or other issue, the remedial action will be executed in accordance based on the appropriate emergency plan provisions. If such a failure occurs, the following actions will take place.

- Immediate notification of on-site construction and/or operations management;
- De-energization (electrical isolation) of the wind turbine and entire area of the electrical collection system;
- Tape off / rope off the area to restrict access;
- Inspect the area for safe access;
- Perform repair and removal of the wind turbine.

4.6.14 Aircraft Impact

In the event of an aircraft impact there would likely be both medical emergency requirements as well immediate notification requirements and actions as outlined in both, the emergency response plans for Sections 4.6.13, 'Blade or Tower Failure' and Section 4.6.3, 'Personal Medical Injury' above.

4.6.15 Vandalism

Vandalism does not necessarily present an emergency unless the vandal is caught in the act or if the act of vandalism results in a potential safety hazard. If a vandal is caught in the act, the Project staff person shall only collect as much information as possible about the scene and the culprit and notify the local police through 911. If it is noticed that an act of vandalism is creating a potential safety hazard such as the destruction of a power line, or otherwise, the appropriate remedial action will be executed promptly to eliminate or mitigate the hazard such as de-energization of the damaged power line, etc.

4.6.16 Bomb Threat

In the event of a bomb threat to the Project property or workers, the Emergency Action Plan would be activated and local law enforcement contacted. If necessary, the Project site would be evacuated as outlined in the plans for site evacuation in Section 4.6.5, 'Project Evacuation'.

4.7 CRITERIA USED FOR TRANSMISSION LINE ROUTE AND DESIGN

4.7.1 Transmission Line Route

As described in Section 2.2.3.10, 'Project Transmission Feeder Lines', one of the principal factors in selecting the proposed site for the Wild Horse Wind Power Project was access to suitable transmission lines. There are several sets of high voltage power lines within 8 miles of the Project site including 2 sets of Bonneville Power Administration (BPA) transmission lines and 1 set of Puget Sound Energy (PSE) transmission lines. The Project Area Overview in Exhibit 1-A and the Project Site Layout in Exhibit 1-B illustrate the routes of the Project's feeder lines indicated as the 'BPA feeder line' and the 'PSE feeder line' respectively.

Power from the Project will be fed from the on-site step-up substation(s) through the feeder line(s) to the interconnection substation(s). The proposed BPA and PSE interconnection substations are under review by BPA and PSE through formal System Impact Study (SIS) and Facility Study (FS) processes defined under their respective OATTs (Open Access Transmission Tariffs). In order to be interconnected to either the BPA or PSE grids, the Project will require an interconnection and transmission agreement that complies with FERC (Federal Energy Regulatory Commission) and NERC (National Electric Reliability Council) standards. This ensures the safe and reliable delivery of power from the Project to the grid.

The feeder line is a 230 kV class design and will consist of a wood frame H-pole configuration roughly 60 feet tall, with a 40 foot long top cross arm and with spans of approximately 500 to 700 feet between pole structures. Section 2.2.3.10, 'Project Transmission Feeder Lines' describes the construction of the Project's feeder lines in detail. The feeder lines will be constructed along a 150 foot wide right of way easement secured for the Project. An overhead (as opposed to underground) line design was selected primarily for safety, given that, at high voltages, underground facilities present safety concerns and are extremely costly. Very few areas of the world, other than large, congested cities (such as New York City) use underground 230 kV or higher voltage lines. Line work and line inspection at this voltage level is best performed at a substantial distance which is not possible for underground lines. Because the feeder lines will be located on property secured through an easement, and not owned by the Project, underground lines could present an additional digging safety hazard.

The Applicant has designed a transmission feeder line route that provides the best combination of safety, environmental protection, site access, economic cost, willing landowners, and appropriate zoning. In evaluating alternative routes, a primary consideration involves the willingness of underlying landowners to participate in the Project. Such participation is difficult to estimate without directly contacting the affected landowners, which is not a practical approach for analyzing hypothetical alternatives.

Factors that were considered in the siting of the transmission line route included:

- Safety
- Available access across willing landowners' properties
- Proximity and potential impacts of line route to residences
- Preservation of areas of cultural and historical significance
- Environmental impact and protection of wetlands and wildlife habitat
- Overall construction impact
- EMF (Electro Magnetic Fields)

Safety
The feeder lines are not routed alongside any existing power lines where line sway and fall-over could present a safety or system reliability problem. The feeder lines are also set back more than ¼ to the nearest residence and are not near any public parks where people might fly kites.

Available access across willing landowners' properties
Applicant has met with all of the landowners across whose land the transmission lines will be routed and has secured the required right of way easements to develop and build the lines. Copies of the memoranda of easements options that Applicant has negotiated with pertinent landowners are included as Exhibit 30-A.

Proximity and potential impacts of line route to residences
The feeder lines traverse open range land, which are not near any densely populated areas and the lines are located well away from any residences. For the PSE feeder line, the nearest residence is approximately ¼ mile away and for the BPA feeder line, the nearest residence is more than ½ mile away with the next nearest residence more than 1 ½ miles away. Exhibit 15-A, 'Residences in Project Vicinity Map' illustrates the location of both feeder lines as well as residences within 1 mile.

Preservation of areas of cultural and historical significance
Applicant has commissioned cultural resource surveys of the transmission line routes and has designed the routes to ensure that the lines will not disturb any areas of cultural or historical significance. Results of these studies are presented in Section 3.14, 'Cultural Resources'.

Protection of wetlands and wildlife habitat
Applicant's biologists have performed an extensive study of the transmission line routes (see Section 3.4 and Exhibit 12) to ensure that the lines are not disturbing any wetlands or areas with any threatened or endangered species. The feeder lines are routed mainly along ridge lines and not along drainages or canyons. The PSE feeder line does not impact any wetlands. The BPA feeder line crosses Parke Creek, however, the pole structures will be set back at least 200 feet from the stream bank and construction activities will not require the use of any heavy equipment in the streambed. Applicant has visited the Parke Creek crossing with Washington Department of Fish and Wildlife (WDFW) who have confirmed that the crossing would not have an impact on fisheries or

require a hydraulic permit as documented in Exhibit 11, ‘WDFW Hydraulic Permit Waiver Letter’.

Overall construction impact
All feeder line poles will be constructed on private property under right of way control by Applicant and as such, there will be no poles in public right of way areas and the impacts to the public are mitigated significantly compared to power lines constructed along roadsides, etc.

In general, transmission feeder lines should be located on relatively flat land where possible to avoid potential erosion problems with having construction trails along steep slopes. The routes should avoid environmentally sensitive areas such as major archeological resources and potential or known wetlands and should avoid possible impacts to endangered wildlife species. Feeder line routes should have sufficient access to allow for the safe delivery and construction of the pole structures and lines. 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. Because individual easements must be negotiated, it is typically most efficient to negotiate with a few landowners who control large parcels of land.

The feeder line routes should minimize the overall route length and number of angles or “corners” by building in straight lines where possible. This reduces the number of corner structures which require guy-wires and ground anchors and the resulting amount of temporary and permanent environmental impacts associated with construction is therefore also reduced. Minimizing the number of angles reduces the number of guy-wires and ground anchors required to support transmission towers.

EMF
As the nearest residence is more than ¼ mile away, EMF (Electro Magnetic Field) impacts are expected to be negligible for the feeder lines as detailed in Section 3.16.1.2, ‘EMF’ under ‘Health and Safety’.

4.7.2 Transmission Line Design

The transmission line structures and conductors, along with the guys and anchors, will be designed together as a structural system that safely supports conductor tensions and all anticipated environmental loads. The transmission line design will comply in all respects with the current edition of the National Electrical Safety Code (NESC), also known as American National Standards Institute C2. The current edition is NESC-2002 Edition (ANSI C2-2002), and this standard is revised approximately every three years.

4.8 INITIAL SITE RESTORATION PLAN

4.8.1 Project Design Life

The Projects will be designed to meet utility grade standards as well as a number of other stringent codes and requirements. As a result, the design life of all of the major equipment such as the turbines, transformers, substation(s) and supporting plant infrastructure is at least 20 years. Based on the site conditions, it is expected that the proposed turbine technology will continue to perform well into its third decade of operation.

The trend in the wind energy industry has been to replace or "repower" older wind energy projects by upgrading older equipment with more efficient turbines. A good portion of the value in the Project is in its proven wind resource, land agreements and in-place infrastructure. It is likely that after mechanical wear takes its toll, that the Project would be upgraded with more efficient equipment and, therefore, far beyond just the design life of 20 years.

4.8.2 Project Decommissioning

Prior to commencement of construction the Applicant will obtain EFSEC approval of a detailed Initial Site Restoration Plan.

If the Project were to terminate operations, the Applicant would obtain the necessary authorization from the appropriate regulatory agencies to decommission the facilities. A Final Site Restoration plan would be developed and submitted to EFSEC for review and approval. Experience in other regions with older wind power projects indicates that a non-operating wind power project does not present any significant threats or risks to public health and safety or environmental contamination.

4.8.2.1 Decommissioning Economics and Financial Surety

The scrap value of the materials and equipment contained in the Project infrastructure (steel towers, electric generators, steel, copper, etc.) would likely exceed the cost of dismantling the Project, based on historic and current scrap prices. The Applicant will provide adequate financial assurances to cover all anticipated costs associated with decommissioning. In all cases, final financial responsibility for decommissioning will rest with the Applicant.

As described in the Applicant's agreements with Project landowners, all 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 Project substation is generally valuable and often times in older power projects, the substation would revert to the ownership of the utility

(PSE and/or BPA). If the overhead power lines could not be used by the utility, all structures, conductors, and cables would be removed.

Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time the area is to be reclaimed, and would include regrading, adding topsoil, and reseeding all disturbed areas. Reseeding would be done with appropriate seed mixes, based on native plant types in the Project area. Decommissioned roads would be reclaimed or left in place based on landowner preferences, and rights of way would be vacated and surrendered to the landowners.

Restoration plans and activities would meet the following standards and requirements:

- Any future use of the Project site will be consistent with the planned uses described in the Kittitas County Comprehensive Plan.
- Demolition or removal of equipment and facilities will occur, to the extent necessary, to meet environmental and health regulations, to salvage economically recoverable materials or to recycle the Project site for future uses.

4.8.3 Preparation of Final Restoration Plan

Near the end of the useful operating life of the Project, the Applicant will review the Initial Site Restoration Plan and modify the plans to accommodate conditions, at that time, to meet both future needs for the Project site and site restoration laws and regulations then in force. To the extent then required by law or regulation, the Final Restoration Plan will be reviewed by appropriate regulatory agencies and any required permits obtained. Permits that may be required include demolition permits, special transportation permits and waste disposal permits.

Should the Project be suspended or terminated during construction, the Project will prepare and submit a Restoration Plan to EFSEC for review and approval. The Restoration Plan will include:

- Methods for securing the Project site for a specific period of time while attempts are made to obtain alternative financing or to seek an alternate owner.
- Methods for final restoration of the Project site should the Project be terminated.

4.8.4 Hazardous Materials Survey

Although no hazardous materials will be used on the site, an audit will be performed of the relevant operation records and a Project site survey will be performed to determine if a release of any hazardous material has occurred. An inspection of all facilities will be performed to determine if any hazardous or dangerous materials (as then defined by regulation) are present. The inspection will record the location, quantity and status of all identified materials.

Any solid waste generated during the facility shutdown or decommissioning will be disposed of, as necessary, to comply with the solid waste regulations then in place.

4.9 STUDY SCHEDULES

4.9.1 Wildlife and Habitat Monitoring Schedules

The Applicant plans to convene a Technical Advisory Committee (TAC) to evaluate the mitigation and monitoring program and determine the need for further studies or mitigation measures. The proposed compositions of the TAC would be representatives from Washington Department of Fish and Wildlife, EFSEC, Kittitas County, local interest groups (e.g., Kittitas Audubon Society), Project landowners, and the Applicant. The role of the TAC will be to review results of monitoring studies to evaluate impacts to wildlife and habitat, and address issues that arise regarding wildlife impacts during operation of the Project. The post-construction monitoring plan will be developed in coordination with the TAC.

The Applicant proposes to develop a post construction monitoring plan for the Project to quantify impacts to avian species and to assess the adequacy of mitigation measures implemented. The monitoring plan will include the following components: 1) one year of fatality monitoring involving standardized carcass searches, scavenger removal trials, searcher efficiency trials, and reporting of incidental fatalities by maintenance personnel and others; and 2) a minimum of one breeding season raptor nest survey of the study area and a 1 mile buffer to locate and monitoring active raptor nests potentially affected by the construction and operation of the Project.

The protocol for the fatality monitoring study will be similar to protocols used at the Vansycle Wind Plant in northeastern Oregon (Erickson *et al.,* 2000) and the Stateline Wind Plant in Washington and Oregon (FPL *et al.,* 2001).

4.10 LIST OF PREPARERS

4.10.1 ZILKHA RENEWABLE ENERGY

Chris Taylor, Project Manager
Economics, land use, public services, agriculture crops and livestock, mitigation measures, alternatives analysis, health and safety, public/agency involvement.

Andrew Young, Northwest Development Director
Project facilities, construction methodology and management, transmission, emergency plans, health and safety.

Phil Stenstrom, Project Manager
Calculation of Project footprint, quantities of materials used in construction, truck trips, earth excavated.

Jennifer Diaz, Project Coordinator
Research for recreation, housing, public services, visual resources, documentation of residences near Project site.

Hilary Foote, Project Coordinator
Preparation of maps, GIS analysis, figures, exhibits.

Christa Griffiths, Project Coordinator
Document production and distribution.

Darrel Peeples, Esq.
Regulations and permits, required EFSEC information.

4.10.2 INDEPENDENT CONSULTANTS

Avian and Wildlife Studies

WEST, Inc
Wally Erickson, Project Manager
Rhett Good, Raptor Nest Surveys
Jay Jeffrey, Field Observations

Habitat Mapping and Assessment, Rare Plant Resource Investigation, Wetlands

WEST, Inc
Elizabeth Lack, Botanist, field surveys

Visual Impacts, Aesthetics, Light, and Glare

CH2M HILL
Dr. Tom Priestley, Assessment of Visual Impacts

Wind Engineers
Arne Nielsen and Per Hansen, Preparation of Visual Simulations, ZVI analysis, shadow flicker analysis.

Noise Analysis and Air Quality

CH2M HILL
Mark Bastasch

Transportation and Traffic Analysis

CH2M HILL
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Josh Butler

Geotechnical Investigation

CH2M HILL
Vince Rybel
Josh Butler

Cultural Resource Investigation

Lithic Analysts
Pam Trautman
Jeff Flenniken

Meteorological Analysis, Icing Conditions

Jack Kline, **Meteorologist, RAM Associates**
Ron Nierenberg, **Consulting Meteorologist**

Telecommunications Obstruction Analysis, TV Interference Analysis

Comsearch
Les Polisky, Engineer, Project Manager
David Cole, Field Engineer
John Manzer, GIS Analyst

Phase I Environmental Screening Assessment

KTA Associates
Ken Taylor