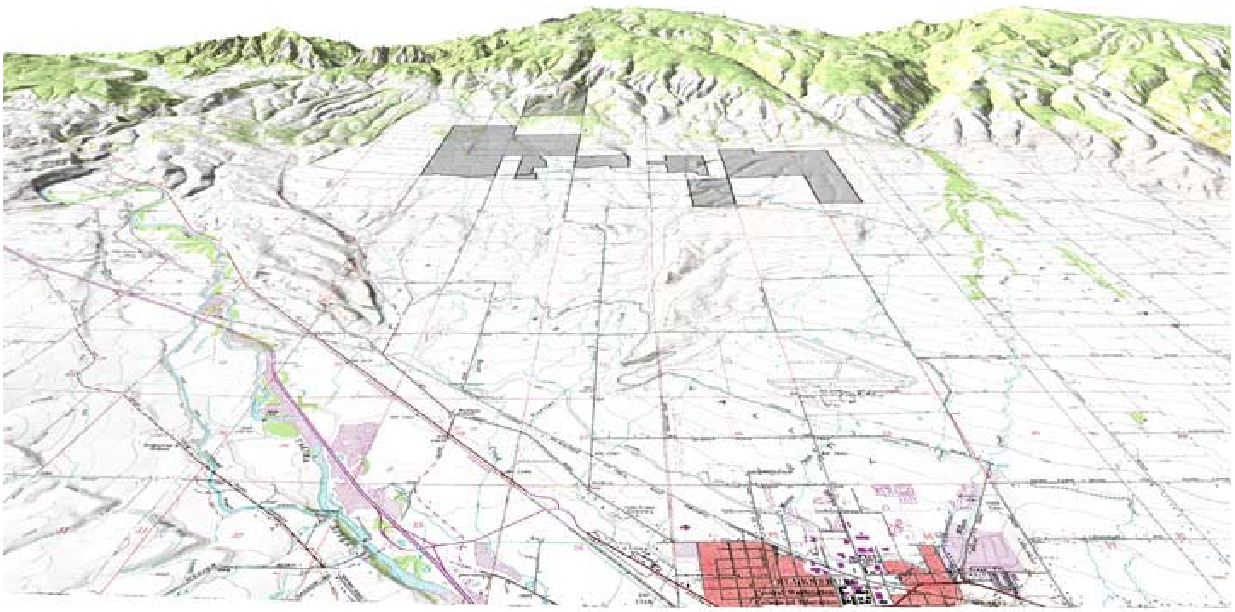
Desert Claim Wind Power Project

Final Environmental Impact Statement

VOLUME I



Kittitas County

August 2004

1. SUMMARY

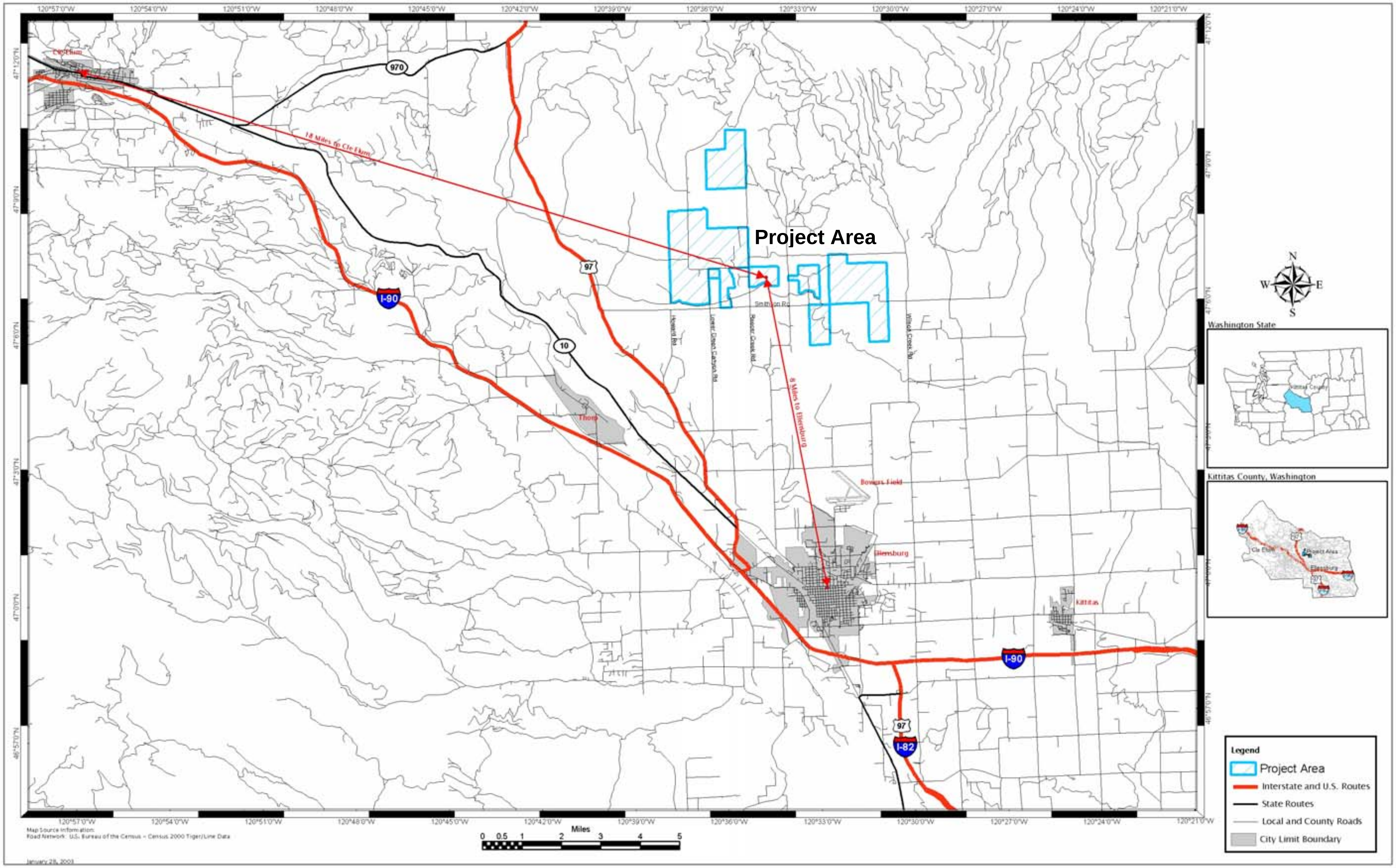
1.1 INTRODUCTION

Chapter 1 provides a summary of the Final Environmental Impact Statement (Final EIS) for the Desert Claim Wind Power Project proposed by Desert Claim Wind Power LLC. It briefly describes the background for the proposed wind energy development and the regulatory framework for the actions under consideration by Kittitas County (**Section 1.2**), the applicant's objectives for the proposal (**Section 1.3**), Kittitas County's objectives for the review of the proposal (**Section 1.4**), and the applicant's proposal and the alternatives to the proposal that are evaluated in the EIS (**Section 1.5**). **Chapter 1** also includes a comparative overview of the proposal and two alternatives, summarizing their expected environmental impacts, potential cumulative impacts, potential mitigation measures that would address the identified impacts and significant unavoidable adverse impacts (**Sections 1.6** through **1.9**). This summary is not a substitute for the comprehensive analysis contained in the EIS document and technical appendices. Readers should consult the full EIS and the technical appendices for detailed information about the proposal, impacts and mitigation measures.

Chapter 2 of the EIS provides a more detailed description of the proposed wind power project and the alternatives that are evaluated in the EIS. **Chapter 3** documents the affected environment applicable to the project, the expected environmental impacts of the proposal and the alternatives, and the proposed or possible mitigation measures that would address those impacts. **Chapter 4** provides a complete discussion of potential cumulative impacts associated with the Desert Claim project. **Chapter 5** provides responses to issues identified in the review comments on the Draft EIS. **Chapter 6** reviews the consultation and coordination activities related to the preparation of the EIS. **Chapter 7** lists the references cited in the text of the EIS and **Chapter 8** lists the agencies, organizations and individuals receiving copies of the EIS. A second volume of the EIS contains detailed technical documentation supporting several of the environmental impact analyses.

1.2 REGULATORY FRAMEWORK

Desert Claim Wind Power LLC, a wholly owned and managed subsidiary of *en*X*co*, Inc., submitted an application dated January 28, 2003 to Kittitas County Community Development Services for permits necessary to construct and operate a wind energy facility. The proposed project would be located within a project area of 5,237 acres approximately 8 miles north of the City of Ellensburg, the county seat for Kittitas County (see **Figure 1-1**). The project would consist of up to 120 wind turbine generators with a total nameplate capacity of at least 180 megawatts (MW). Construction of the project would also require construction and placement of access roads, control cables and power collection cables. The project would include one or more substations (to convert project-generated electricity to the higher voltage required for transmission) and an operations, maintenance, storage and repair area to be co-located with the substation. The operating life for the proposed project is assumed to be approximately 30 years.



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 1-1** **Location Map**

1.2.1 Environmental Review

The proposed approval of the Desert Claim Wind Power Project by Kittitas County is subject to review under the Washington State Environmental Policy Act (SEPA). Kittitas County Community Development Services is the lead agency for the environmental review of the project under SEPA. Kittitas County issued a Determination of Significance (DS) for the proposed project on April 23, 2003 and announced its intent to prepare a SEPA environmental impact statement (EIS). In conjunction with the DS, Kittitas County requested public and agency comments on the scope of the Desert Claim Wind Power Project EIS. Kittitas County responded to the scoping comments with the development of a Draft EIS for the project. Kittitas County provided a 30-day comment period to receive scoping comments on the EIS. The Draft EIS was available for review by agencies and the public for a 45-day comment period. During this period, Kittitas County held a public meeting to receive comments on the Draft EIS. After the formal review period for the Draft EIS closed, Kittitas County revised the Draft EIS as necessary in response to comments and issued this Final EIS. As specified in the SEPA rules (WAC 197-11-460 [5]), Kittitas County may not take action on the proposal sooner than 7 days after the Final EIS has been issued. SEPA rules provide for a period of 10 working days after the issuance of a Final EIS during which an appeal of that EIS may be filed.

1.2.2 Kittitas County Comprehensive Plan and Zoning

The Kittitas County Code (KCC), Chapter 17.61A, sets forth the requirements for approval of a wind energy project in the County. These include: (1) securing a Wind Farm Resource Development Permit from the County; (2) executing a development agreement with the County; (3) County adoption of a site-specific amendment to the Comprehensive Plan land use designation map, changing the designation for the project area to Wind Farm Resource overlay district; and (4) County adoption of a site-specific rezone of the project area to Wind Farm Resource Overlay Zoning District. In conjunction with preparation of the Final EIS, the Planning Division of Kittitas County Community Development Services will prepare a staff report on the proposed action pending before the County and will forward that report to the Planning Commission and the Board of County Commissioners for their consideration. The Planning Division also will prepare a draft Development Agreement for the project pursuant to Kittitas County Code Chapter 17.61A. The Planning Division will forward the draft Development Agreement and the proposed site-specific rezone and Comprehensive Plan amendment for the project to the Planning Commission for its review. The Planning Commission will forward a recommendation on the site-specific rezone to the Board of County Commissioners. The Planning Commission will also review the draft Development Agreement and make a recommendation to the Board of County Commissioners to either approve or reject it. The Board of County Commissioners will make the final permit decision for the project and will make the final decision regarding the Development Agreement.

1.2.3 Development Agreements

State law (RCW 36.70B.170) permits local governments to enter into "development agreements" with property owners as a means of documenting development standards and mitigating conditions that will be applicable to a proposal. The agreement must be adopted by ordinance or resolution after a public hearing. The agreement must set forth the "standards" and other provisions that will apply to and govern a proposed use. Pursuant to KCC Chapter 17.61A, Desert Claim Wind Power LLC, the project proponent, is required to execute a development agreement with Kittitas County. The development agreement may include standards for densities, number, size, setback, and location of turbines; mitigation measures; and other development conditions necessary to protect surrounding properties, the local neighborhood, or Kittitas County as a whole. Among other things, the agreement would provide a vehicle for compiling all

SEPA mitigating conditions and conditions of approval and ensuring that they are legally enforceable. The agreement would provide a means of documenting and tracking project assumptions (about existing or future conditions), and environmental monitoring or additional study requirements applied to the project.

1.3 APPLICANT'S OBJECTIVES FOR PROPOSAL

In the Development Activities Application submitted to Kittitas County (Desert Claim Wind Power LLC, 2003), Desert Claim Wind Power LLC identified the objective for the proposed action as the development of a commercially viable wind energy facility with a total nameplate capacity of at least 180 megawatts (MW) and a maximum of 120 wind turbine generators, plus necessary project support facilities. The application also indicated that the site-specific criteria needed to support such a facility included: (1) sufficient wind resource to support the generating capacity objective; (2) ready access to sufficient available capacity on an existing electric transmission system; (3) lack of significant constraints posed by environmentally sensitive resources or parks/recreation areas; (4) relatively large tracts of open land; and (5) a sufficient number of willing land owners interested in participating in a wind energy project.

enXco develops, builds, operates and manages wind energy projects throughout the United States and in other countries. The company focuses its efforts on the wind energy sector, and is not active in developing electric production capacity using other types of generating technology. *enXco's* project development activities respond in general to the demand for electric power and to federal and state policies supporting wind and other types of renewable energy resources. The Desert Claim Wind Power Project proposal also responds to projected future demand for electricity within the Pacific Northwest, policies that encourage electric utilities to obtain a portion of their electricity supply from renewable energy resources, and specific actions by utility organizations to acquire wind energy resources. The Bonneville Power Administration, for example, has entered into power supply agreements with some existing wind energy projects in the Northwest. Puget Sound Energy (2003) recently issued a request for proposals to prospective respondents who could supply 150 MW of electric capacity from wind resources; the proposed acquisition of this wind-based generation would help PSE meet established objectives for developing a diversified electric resource portfolio and meeting 10 percent of PSE customers' energy needs through renewable resources. Avista and PacifiCorp, two other investor-owned utilities that serve retail customers in Washington, have issued similar requests for proposals from suppliers of wind energy resources.

1.4 KITTITAS COUNTY OBJECTIVES

As discussed in **Section 1.2**, Kittitas County must undertake several actions for the Desert Claim Wind Power Project to be approved and constructed. Those actions include: (1) granting a Wind Farm Resource Development Permit; (2) executing a development agreement; (3) adopting a site-specific amendment to the Comprehensive Plan land use designation map; and (4) adopting a site-specific rezone of the project area to Wind Farm Resource Overlay Zoning District. The County's criteria with respect to making a decision on these proposed actions are as follows:

- The project is essential or desirable to the public convenience;
- The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood; and
- The project will not be unreasonably detrimental to the economic welfare of the county and will not create excessive public cost for public facilities and services.

1.5 SUMMARY OF THE PROPOSAL AND ALTERNATIVES

The Desert Claim Wind Power Project EIS evaluates four alternatives in detail. These include the wind energy development proposed by the applicant; generic plans for developing a comparable wind energy facility at two alternative sites, identified as the Wild Horse and Springwood Ranch sites, to provide comparative information about potential environmental impacts; and a no-action alternative. The proposed Desert Claim Wind Power Project and the three alternatives to the proposal are summarized briefly in **Sections 1.5.1** through **1.5.4** below, and are described in more detail in **Sections 2.2** and **2.3** of the EIS.

1.5.1 Proposed Action

The applicant's objective is to develop a commercially viable wind energy facility with a nameplate capacity of at least 180 MW that would deliver renewable energy to the Pacific Northwest. The facilities, construction process and operation and maintenance for the proposed project are summarized below.

1.5.1.1 Project Facilities

Wind energy production includes five basic functions of electricity generation, energy transfer, power collection, substation and transmission. The specific facilities proposed to accomplish these functions for the Desert Claim project include:

- a maximum of 120 wind turbines, each with a capacity to generate 1.5 megawatts (MW) of electricity, for a total project nameplate generation capacity of at least 180 MW;
- each turbine would include a freestanding, tubular-steel tower up to 212 feet high, supporting a nacelle housing the generator, gear box and three-bladed rotor;
- each rotor blade would be up to 126.5 feet in length, for a maximum total rotor diameter of 253 feet;
- the maximum total height for the turbines would be 340 feet;
- towers would be anchored to steel and concrete foundations extending from 8 to 42 feet below the ground surface;
- the generator in each turbine nacelle would produce electricity at 575 volts;
- a transformer mounted on a concrete pad near the base of each turbine would raise the voltage from 575 volts to 34.5 kilovolts (kV);
- approximately 28 lineal miles of 34.5-kV underground power collection cables in the project area, primarily buried within the project road system, connecting all of the turbines;
- approximately 3 lineal miles of 34.5-kV of right-of-way underground power collection cables, connecting all project areas with the project substation,
- a fenced substation (or possibly two) occupying up to 2 acres, with transformers to step the voltage up from 34.5 kV to 115 or 230 kV for transmission;
- up to 300 feet of 115- or 230-kV transmission line, on wood pole structures, from the substation to the regional transmission system;
- five free-standing, lattice-steel meteorological towers up to 212 feet in height at various locations within the project area;
- a network of project roads totaling approximately 27.5 lineal miles, with a graveled travel surface of 15 to approximately 20 feet (on curves) in width, to provide vehicle access to the base of each tower; and
- an operations, storage, and repair facility occupying up to 2 acres that may be located adjacent to the project substation.

1.5.1.2 Construction Process

Construction of the proposed project is estimated to require approximately 9 months. Approximately 120 to 150 workers would likely be employed at the project site at some time during the construction period. A Temporary Erosion and Sedimentation Control Plan would guide ground-disturbing activities and stormwater management during construction, and disturbed areas would be revegetated following construction. A Construction Traffic Management Plan would address transportation and access concerns during the construction period.

1.5.1.3 Operation and Maintenance

Desert Claim Wind Power LLC would operate and maintain the wind energy facility throughout the project life, which is assumed to be 30 years. Electricity generated by the project would be sold to power marketing entities, such as the Bonneville Power Administration; local and regional public utilities, such as the Kittitas County PUD and the Grant County PUD; and/or regional investor-owned utilities, such as Puget Sound Energy and Avista. Power from the project would ultimately be distributed by utilities to their customers. The project would employ approximately 10 full-time staff for operations and maintenance. Long-term operation and maintenance activities would include the following functions:

- round-the-clock monitoring of project output and performance;
- controlling turbine operations as necessary to meet scheduled power deliveries and implement scheduled outages for scheduled turbine maintenance;
- performing periodic, routine testing and maintenance of the turbines;
- conducting on-site repairs of project equipment in response to malfunctions or scheduled maintenance;
- patrolling the project area to ensure security and monitor on-site conditions;
- periodic maintenance of project access roads; and
- implementing the project noxious weed control plan.

1.5.2 Alternative 1: Wild Horse Site

Alternative 1 consists of a comparable wind power project development on an alternative site in eastern Kittitas County, termed the Wild Horse site. This alternative is included in the evaluation to provide a benchmark for comparison of the potential levels of environmental impact from wind power development. The SEPA rules require consideration of an off-site alternative for private rezone proposals. The conceptual plan for this alternative is based on the wind energy facility proposed for this site by Zilkha Renewable Energy, which has requested the Washington Energy Facility Site Evaluation Council (EFSEC) to evaluate the proposed Wild Horse Wind Power Project. The Wild Horse site is not available to *enXco*.

The Wild Horse Wind Power Project is proposed on an approximately 5,000-acre site located about 10 miles east of the town of Kittitas, on the eastern slopes of Whiskey Dick Mountain. The proposed configuration of wind turbines on the Wild Horse site is shown in **Figure 2-15**. The proposal would be comprised of approximately 158wind turbines (each of 1.5 MW nameplate capacity) and associated facilities. Facilities and construction techniques would generally be as described in **Section 2.2** for the Proposed Action. The project would interconnect to either the existing BPA transmission line located approximately 4 miles west of the site, or to the existing PSE transmission line located approximately 5 miles southwest of the site. Zilkha anticipates that construction for the proposed Wild Horse project would occur over a 9-12-month period and would be completed by the end of 2005. The total area occupied by the permanent facilities would be approximately 104 acres. The total area cleared/temporarily disturbed by construction activities would be approximately 294 acres. Once construction was completed, an estimated 10 to 14 workers would be employed to operate and maintain the facility.

1.5.3 Alternative 2: Springwood Ranch Site

A second off-site alternative is included in the EIS to provide another benchmark for comparing the impacts of the proposed wind power project. The SEPA rules require consideration of an off-site alternative for private rezone proposals. Based on readily available information, and after initial screening of several additional sites, Kittitas County identified a property that it considers a location to represent an off-site wind project alternative. This property is known as the Springwood Ranch, which is located in central Kittitas County just northwest of the unincorporated community of Thorp. This site lies between I-90 and the Yakima River and is approximately 7 miles northwest of Ellensburg. The property includes approximately 3,600 acres of land that currently supports ranching and farming, and some rural residential uses.

The project plan for the Springwood Ranch is intended as a reasonable approximation of a plausible wind facility layout on the site to permit comparative environmental evaluation, not as an actual proposal for development on the site. A conceptual plan for a hypothetical wind energy facility of 60 to 65 MW on the Springwood Ranch property is presented in **Figure 2-16**. This plan is highly schematic in nature. It was developed based on existing, readily available information, without extensive on-site study or comprehensive meteorological (wind) data. Based on site size, known meteorological conditions and topography, and assuming the same size turbines and approximate spacing between turbines as for the Proposed Action, the Springwood Ranch site could accommodate approximately 40 to 45 turbines; **Figure 2-16** shows locations for 43 turbines. A smaller or greater number of turbines could potentially be accommodated based on micro-siting. Characteristics of other project facilities, construction techniques, and operation and maintenance plans for Alternative 2 would be the same as described for the Proposed Action.

1.5.4 No Action Alternative

The no action alternative in an EIS is intended to represent the most likely future condition if the lead agency decides not to undertake the proposed action or a reasonable alternative course of action. For the Desert Claim Wind Power Project EIS, Kittitas County has defined the no action alternative to mean that no wind energy facility would be developed in the proposed project area at this time. Existing land uses in the area, which are primarily agricultural but include low-density rural residential development, would continue for an indefinite time.

Based on the applicable existing zoning provisions, the project area could be segregated into as many as 400 residential lots with no discretionary action required by Kittitas County to approve the segregations. These are the conditions assumed to exist under the no action alternative. Under differing scenarios, such as use of the formal subdivision process or clustering bonus provisions available under existing zoning, it might be possible to create significantly more lots in the area. Such actions would require environmental review and discretionary approval by the County, however, and are not hypothesized as part of the no action alternative.

1.6 SUMMARY COMPARISON OF ENVIRONMENTAL IMPACTS

Sections 1.6 through **1.9** provide a summary of the key findings of the EIS for the proposed action and the alternatives. **Section 1.6** highlights the environmental impacts that were identified for the respective elements of the environment that were addressed in the EIS. Cumulative impacts, mitigation measures and significant unavoidable adverse impacts are addressed in **Sections 1.7**, **1.8** and **1.9**, respectively.

Table 1-1 displays the expected impacts of the proposed action and the alternatives in highly summarized form. The entries in the table highlight the conclusions of the impact analyses presented in **Chapter 3** of the Final EIS. The specific entries in the table provide capsule descriptions of the impact conclusions for the key issues addressed in the impact analysis for the respective elements of the environment. Some additional issues are discussed only in **Chapter 3** and are not noted in the table, while detailed results for all issues are documented in **Chapter 3**.

Consistent with Kittitas County's objectives for including evaluation of alternative sites in this EIS, the entries in **Table 1-1** for Alternatives 1 and 2 are generally stated in comparative terms to the impacts of the proposed action.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
EARTH			
Most of project area classified as low or moderate erosion hazard. High hazard areas are limited to steep slopes in drainages along edge of Thorp Gravel terrace, and bedrock outcrops. Short-term erosion risk from clearing and grading activities on approximately 340 acres during construction. Potential erosion impacts expected to be insignificant with implementation of BMPs, even in high erosion hazard areas. During project operation, the risk of erosion would be negligible. Three turbine locations are near area of high landslide hazard, and would require site-specific geotechnical studies and measures if not moved. Potential landslide impacts expected to be mitigated to insignificant levels through stabilization measures, even in high hazard areas. Project development would have no influence on the level of seismic hazard in the project vicinity, and would not result in potential seismic-related impacts on adjacent uses or properties.	Impacts from Alternative 1 to earth resources in the area would be similar to those described for the proposed action. Erosion and landslide impacts are expected to be insignificant with implementation of standard erosion control measures. Development would have no influence on the level of seismic hazard in the project vicinity.	Impacts would be similar to the proposal, but less extensive due to the smaller number of turbines and smaller project footprint. Given the use of standard erosion control and stormwater management BMPs, erosion impacts would be localized and temporary, and therefore insignificant. Approximately 10 to 15 turbines could be located near areas of high and moderate landslide potential, requiring setbacks and/or engineered protective measures. Development would have no influence on the level of seismic hazard in the project vicinity.	The no action alternative would result in no change to the baseline land use pattern. Ongoing impacts relative to erosion, landslide and seismic hazards would generally continue or increase in response to future human activity within the area. Agricultural or construction activity could potentially occur in all erosion and landslide hazard zones. Erosion risks could be increased from existing conditions and localized areas of significant erosion could occur. Existing seismic risk conditions would continue.
AIR QUALITY			
Construction and decomissioning activities would create fugitive dust. Emissions would be dispersed among multiple locations temporarily and, with standard control practices, would not likely reach significant concentrations at off-site locations.	Air quality impacts would be essentially the same as for the proposed action, but would occur in a different part of Kittitas County. Construction impacts would be virtually the same as for the proposal, based on area of construction disturbance.	Air quality impacts would be of the same type as for the proposed action, but would occur in a different part of Kittitas County. The smaller site size, reduced number of turbines and lower levels of construction activity would generate lower air quality impacts that would likewise be insignificant.	Potential impacts include typical emissions associated with low-density residential development and agricultural activities . Depending on their type, construction of alternative energy facilities to meet future demand could generate air pollutants.

Table 1-1
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Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
Emissions during operation of the project would be limited to exhaust and fugitive dust generated by maintenance vehicles, with negligible impact on air quality. Turbine operation would not increase the normal dispersion of dust and pollen, and would not result in dust-related impacts for residents near the project area.	Operation and maintenance impacts would be negligible.	Operation and maintenance impacts would be negligible.	
WATER RESOURCES			
Surface Water The temporary disturbance zone associated with project construction would overlap with 16 stream segments, resulting in temporary disturbance along 3,700 linear feet of streams and in 3 acres of riparian area. Five of the affected streams would be Type 3 waters; the other 11 would be Type 4 or 5 waters that are dry much of the year. With use of required BMPs and restoration after construction, impacts to streams would be temporary and insignificant. Project facilities would permanently occupy approximately 1,200 linear feet of streams, mostly at road crossings, and less than 1 acre of riparian area. With possible avoidance through micro-siting, and restoration or compensatory enhancement, long-term impacts would be insignificant. Required use of spill prevention, containment and control plan would minimize potential for adverse water quality impacts from spills of hazardous materials. Surface water withdrawals or diversions not required for construction or operation.	**Surface Water** Impacts on surface water would be similar to those described for the proposed action. Impacts to surface waters in the project area are expected to be minimal, due to the relative distances between project facility locations and existing surface water sources. Project operation is not expected to result in any discharges to surface water. Water for construction uses would be delivered from off-site and would not cause an impact to nearby surface waters.	**Surface Water** Potential impacts on surface water would be of the same type as those described for the proposed action, but would occur within a smaller area. The possibility of construction stormwater discharge entering surface waters would be small. Six to eight turbine locations (and their associated access roads) would be within approximately one-quarter mile of the Yakima River and are near slopes mapped as high erosion and landslide hazard areas, representing potential impact concerns during construction. Operation would not result in significant impacts to surface water resources.	**Surface Water** No new impacts to surface water resources would occur. Past and current effects to streams from existing land uses would continue. Additional land use conversion and low-intensity residential development would, over the long term, result in additional direct and indirect impacts to streams.

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Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
Overall, potential impacts to surface water quantity and quality would be minor and temporary and would not be likely to result in noticeable changes in down stream areas.			
Ground Water	**Ground Water**	**Ground Water**	**Ground Water**
Impervious surfaces associated with the project would be limited in extent and have minimal impact on ground water recharge. Because of the depth to aquifers, distance to existing wells, relatively small amount of shaking resulting from potential blasting, and compliance with regulations governing blasting, significant impacts to ground water flow or well operation are unlikely. Vibration generated by operating turbines would dissipate quickly beneath the ground surface and is not expected to affect ground water flow or well operation. A limited amount of ground water would be needed for long-term operation, with no quantifiable impacts to ground water supply. Localized impacts to ground water quality from product spills would be minimized through required use of spill prevention, containment and control plan. Overall, the project is not expected to result in the potential for significant adverse impacts to ground water recharge, ground water supply or ground water quality.	The tower foundations and other facilities would be sufficiently above the water table depth to avoid any significant construction impacts to subsurface hydrology. Operation of the project would have negligible impacts to groundwater.	Ground water impacts from project construction and operation would be similar to those of the proposed action, but less in scope and extent.	Up to 400 developed parcels could result from future development of the project area, based on existing zoning provisions. It is unlikely that this development density would result in a quantifiable impact to ground water recharge for the site. Water supply for future development of individual parcels under the no action alternative would be provided using exempt domestic wells. Potential impacts to aquifers would be minimal.

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Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
PLANTS AND ANIMALS			
Vegetation An estimated 88 acres of existing vegetation would be permanently occupied by project facilities and 342 acres would be temporarily disturbed. The area of permanent impact would include an estimated 47 acres of shrub steppe, 30 acres of grassland, 5 acres of agricultural lands, 1 acre of riparian shrub, 1 acre of riparian forest and 3 acres of wet meadow. Based on the limited extent of vegetation loss and the effect on specific communities, the project is not expected to have significant impacts to the vegetation. No impacts are anticipated to rare plant species. All areas disturbed by the project are potential habitat for noxious and invasive species, but control measures should prevent significant impacts.	**Vegetation** Impacts would be similar to the proposed action. A total of 104 acres of existing vegetation, including shrub-steppe (87 acres), grassland (17 acres), and talus (.4 acres) would be permanently displaced. 294 acres would be temporarily disturbed, (240 acres) mostly in shrub-steppe. No significant project-related impacts are anticipated to any endangered, threatened, or sensitive plant species, or in conjunction with noxious weeds.	**Vegetation** Vegetation impacts would be similar in type to those described for the proposed action, but less in extent. Grasslands (generally used for grazing now) and shrublands currently dominate the site and would be the vegetation communities most affected. Alternative 2 would not result in significant impacts to rare plants, or in relation to the introduction or spread of noxious weeds.	**Vegetation** Existing vegetation conditions would remain generally as they are, and subject to influences from current land uses. Existing threats to rare plant species (i.e., from agricultural practices or rural residential development) would continue. Noxious weeds could be introduced or spread through existing land use practices (e.g., agriculture, housing development, road maintenance etc).
Wetlands Construction would temporarily disturb approximately 17 acres of wetlands. Project facilities would overlap 3.2 acres of wetland area, which would be permanently displaced based on the modified project configuration, but subject to compensatory mitigation.	**Wetlands** No identified wetlands occur in areas that would be occupied by project facilities or a 164-foot (50 meter) buffer around each facility. Therefore, no wetland impacts would be expected.	**Wetlands** Five wetlands in the northern and western portions of the site could be subject to temporary disturbance by construction activity or displacement by permanent project facilities. The areas of likely disturbance and displacement have not been estimated.	**Wetlands** Past and current effects to wetlands from existing land uses would continue for the foreseeable future. Additional land use conversion and low-intensity residential development could result in additional direct and indirect impacts to wetlands.

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Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
<u>Wildlife</u>			
Birds Collision-related impacts (fatalities) would not be expected to exceed what has been observed at other wind plants in the Northwest, and would represent insignificant impacts. Waterfowl mortality anticipated to be low, and likely to consist mostly of mallards. Passerines would comprise the largest share of fatalities, with common species such as European starling, western meadowlark and American robin most at risk. Compared to other wind plants that have been studied, raptor use for the Desert Claim site is above average. A range of approximately 3 to 4 raptor fatalities per year could occur. Potential raptor nesting impact is considered low. The overall bird mortality rate for the proposed project is expected to be in the middle of the range, approximately 1.2 to 1.8 birds per turbine per year, or approximately 140 to 220 total birds per year. Passerine fatalities are expected to comprise the majority of the avian mortality.	**Birds** Potential mortality from construction equipment on site is expected to be quite low and similar to other recent wind projects. Overall, impacts to birds would be very similar to those for the proposed action, because of the similar vegetation types and avian species at the two sites. No disturbance or displacement impacts to raptor nests are anticipated, since no active raptor nests were identified within ½ mile (0.80km) of the proposed WHWP facilities. No impacts to federal endangered, threatened or sensitive status bird species are anticipated.	**Birds** Potential impacts to bird populations by this alternative would be similar in type to those from the proposed action, but smaller in magnitude because of the smaller project. Some displacement or disturbance effects to grassland avian species might occur.	**Birds** There would be no impact on bird populations, associated with wind power development.
Other Wildlife Impacts to small mammals are expected to be low and not significant. Migratory bat species are likely at some risk of collision with wind turbines, primarily during the fall season. The estimated mortality range is similar to, or lower than	**Other Wildlife** Impacts on mammals are expected to be very low and not significant. Some mortality of migratory bats, in particular hoary and silver-haired bats, is anticipated during operation.	**Other Wildlife** Wildlife species displacement or disturbance would be similar in type to those from the proposed action, but smaller in magnitude because of the smaller project footprint. Forest wildlife species would be affected to a greater degree than under the proposed action, while grassland wildlife	**Other Wildlife** There would be no impact on reptile, amphibian or mammal populations from a wind power facility. Land conversion in the area for residential development could have significant impacts in the form of habitat loss and

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that for birds; non-migratory and migratory resident bat populations do not appear to be negatively impacted by wind turbines. Impacts to amphibians and reptiles are expected to be low and not significant. The study area is within habitats designated by WDFW as winter range for mule deer. The Quilomene elk migration corridor is an important spring pathway that encroaches upon the project's north boundary. Temporary loss of big game habitat from project construction is considered a minor impact due to vegetation reclamation and the vast expanse of suitable habitat for mule deer in the region. Once construction is complete, it is expected that deer would become habituated to wind turbines and again occupy areas on-site. Elk could shift their path to the north without migratory hindrance due to the large size of the corridor. Most of the listed threatened and endangered species identified as potentially occurring are not likely to actually use the project are and would not be affected. The level of risk for the five species documented on or near the site would be low. Any mortality to bald eagles would be at a very low level and would not have a measurable effect on the bald eagle population; there have been no documented bald eagle fatalities at U.S. wind plants.	Construction impacts to reptiles and amphibians on site would be loss of habitat and direct mortality of some individuals occurring in construction zones. Operation impacts would be limited. Impacts to big game would be similar to those for the proposed action.	would be affected to a similar extent. Alternative 2 would have little impact on elk. Impacts on deer would be similar to the proposed action, due to similar types of suitable deer habitat and disturbance from development. Increased disturbance of winter concentrations of bald eagles could occur along the Yakima River; bald eagles in the area would be subjected to similar risk factors as the Desert Claim site. Habitat loss could affect sensitive species such as loggerhead shrikes, western bluebirds and sage thrashers. Most other endangered, threatened or sensitive wildlife species are unlikely to occur on the site and would not be affected.	displacement of wildlife, especially big game from important wintering areas.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
Fish None of the streams in the project area are known to contain fish communities, although juvenile steelhead could possibly be diverted to some project-area waters. Potential adverse impacts to fish are expected to be minor, and limited to possible minor downstream impacts. With required mitigation, the proposed project is expected to have only temporary impacts on stream resources. The federally threatened summer steelhead is located in lower Reecer Creek and in the Yakima River downstream, and juvenile steelhead could be present in some project-area waters. With use of Best Management Practices (BMPs) for construction and appropriate site management practices, impacts to streams and waterways would be minimized or avoided. The effect on fish, including special-status species, would likely be in significant because of required protective measures.	**Fish** 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. No fish-bearing streams are located in the Wild Horse project area.	**Fish** Alternative 2 could pose a higher risk of adverse impact to fish-bearing waters than the proposed action, because the Yakima River and Taneum Creek support important fish habitat. There would be some potential for greater construction-related impacts, primarily delivery of sediment to fish habitat Site-specific evaluation and BMPs might be required to address potential effects on habitat in the Yakima River and Taneum Creek used by species of concern, bull trout and steelhead trout.	**Fish** The No-Action Alternative would result in no foreseeable new impacts to wetlands or streams. Existing and future land uses, would continue to have direct and indirect effects on fish habitat in the project vicinity.
ENERGY AND NATURAL RESOURCES			
Energy consumption during project construction or decommissioning would not require large volumes of fuel or electricity and would not significantly affect locally available energy resources. Use of sand, gravel, steel, water and concrete would not have a significant effect on their supply in the area. Project operation would have minimal demand for energy and natural resources.	Impacts on energy and natural resources from construction and operation of Alternative 1 would likely be the same as those described for the proposed action. Average annual generation would be about 60 MW; marketing and delivery would be as described for the proposed action.	Impacts on energy and natural resources from construction and operation would generally be of the same type as those described for the proposed action but would be of lesser magnitude (less than 40 percent of the corresponding requirements for a 120-turbine project). Average annual generation of about 20 to 25 MW; marketing and delivery would be as described for the proposed action.	No energy would be consumed or generated by wind power facilities. No natural resources would be consumed or conserved in construction or operation. The broader energy impacts of the no-action alternative would depend on how and where alternative electricity supplies might be developed.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
Power produced by the project, expected to average 60 MW, would be delivered to regional electric suppliers. Project would have little or no impact on supply and price of electricity available to local consumers.			
CULTURAL RESOUCES			
Ground-disturbing activities could destroy the relationships among artifacts and features and their contexts. Five identified cultural resource sites would experience direct impacts from construction, based on modified project layout. Direct impacts to some or all sites might be avoided through micro-siting. Mitigation would be required for sites that could not be avoided.	Direct construction impacts on cultural resources would likely be minimal or non-existent. No project facilities coincide with the locations of inventoried cultural sites.	Types of potential impacts under Alternative 2 would be similar to those identified for the proposed action. It is not known how many of the seven identified resources would be subject to direct impacts from project construction.	Cultural resources in the project vicinity would continue to physically deteriorate naturally, primarily as a result of low-level ongoing surface erosion and weathering.
Indirect impacts from development activities can include increased opportunities for removal of artifacts due to increased visibility of the artifacts or awareness of their existence. The proposed project is not expected to cause access-related indirect impacts to cultural resources. Existing cultural sites in the general vicinity of the project would be subject to possible changes to their visual setting. This would primarily be limited to historic sites, and would depend on the visibility of project facilities from those sites. Development of the project would not affect access to or the ability to use traditional cultural properties (TCPs) in the vicinity. TCPs in the general area might be subject to indirect effects through visibility of project facilities.	Operations and maintenance activities would not likely result in direct impacts to cultural resources or increase the potential for disturbance and/or removal of artifacts from cultural resource sites. The visual setting for a cultural site on the National Register would be modified by the presence of project facilities.	Indirect impacts to cultural resources would likely be similar to those for the proposed action, and would primarily involve changes to the visual context of the sites.	

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
LAND AND SHORELINE USE			
Land Use Patterns During construction approximately 341 acres of land would be temporarily disturbed. Construction and decommissioning activities could temporarily reduce or interfere with some existing agricultural activities. Direct impacts to land use would consist of the long-term conversion of approximately 90 acres (1.5 percent of project area) from existing agricultural/range uses to use for energy production. Existing residential uses would not be directly displaced, but would be located proximate to wind turbines and other facilities. The presence of these project facilities is not expected to significantly impact the ability to carry out existing activities. Wind turbines would be significantly greater in scale than nearby rural residential uses, and some degree of incompatibility or conflict would exist. Although turbines would be larger and more visible than typical rural uses, wind farm operations are not inherently more intensive than other resource activities in terms of noise and associated land use impacts. The project's overall direct effect on land use patterns is not seen as significant. Wind energy production is seen as generally compatible with rural resource uses and with ongoing agricultural operations.	**Land Use Patterns** Direct land use impacts from construction and decommissioning of a wind power project at the Wild Horse site would be similar to those for proposed action. Construction activities would temporarily disturb approximately 310 acres of the site. Long-term operation would result in the conversion of approximately 104 acres from grazing use to energy production use. The existing use would continue on the remainder of the site not contained within the footprint of the permanent project facilities. No residential uses would be displaced or otherwise directly affected. The proposed use would be generally compatible with typical rural uses and with the ongoing agricultural activity that predominates in the area. No significant conflicts with existing land use patterns would occur. Indirect impacts on existing land uses from Alternative 1 would likely be negligible or non-existent.	**Land Use Patterns** Direct and indirect land use impacts would generally be the same in type as those described for the proposed action, but less in magnitude. Approximately 30 acres of (primarily) grasslands would be converted to wind energy facility use while existing grazing activity would be temporarily displaced or disturbed on approximately 125 acres. Impacts with respect to effects on existing uses, land use patterns and supporting or spin-off development would be similar to those of the proposed action, and would not be significant.	**Land Use Patterns** On-site agricultural and rural residential activities would continue for the foreseeable future. The potential for residential development in the project area, as permitted by existing zoning, and the potential for conflicts with existing agricultural activities, would continue.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
The proposal would not attract supporting land uses, generate secondary or spin-off development, significantly increase traffic, or increase demand for commercial or industrial uses nearby. Similarly, the proposal would not attract significant numbers of non-resident workers and would not result in significant demand for housing or services. **<u>Plans and Policies</u>** The proposed project would be consistent with the land use and utilities policies of the Kittitas County Comprehensive Plan. The proposal would not be characterized as "urban growth" as defined in the Washington Growth Management Act; therefore, with implementation of project-specific mitigation and development conditions, compliance with the GMA rural policies would be achieved.	Alternative 1 would not attract supporting land uses, generate secondary or spin-off development, significantly increase traffic, or increase demand for commercial or industrial uses nearby. Similarly, the proposal would not attract significant numbers of non-resident workers and would not result in significant demand for housing or services. **<u>Plans and Policies</u>** The proposed project would be consistent with the land use and utilities policies of the Kittitas County Comprehensive Plan. Project consistency with the GMA would be as described for the proposed action.	**<u>Plans and Policies</u>** Consistency with the Kittitas County Comprehensive Plan and the GMA would be as described for the proposed action.	
HEALTH AND SAFETY			
<u>Mechanical Hazards</u> Collapse of a turbine tower constructed in accordance with international standards and local building codes is an extremely remote possibility. Similarly, the potential for blade or blade fragment throw is extremely remote. Sound engineering design and quality control are the most effective means for minimizing the risk of such events in project operation. Under certain conditions there is the possibility of "ice throw." Studies have shown that no ice fragments have been thrown distances of over 100 meters, and	**<u>Mechanical Hazards</u>** Mechanical and related hazards applicable to Alternative 1 would be of the same type as those described for the proposal. There are no residential uses or public roadways within or immediately adjacent to the Wild Horse site. Consequently, the numbers of residents and visitors to the site who would be subject to hazards such as tower collapse, blade throw and ice throw would likely be considerably less under Alternative 1.	**<u>Mechanical Hazards</u>** Mechanical and related hazards applicable to Alternative 2 would be of the same type as those described for the proposal. The residential density level for the Springwood Ranch site is somewhat less than for the Desert Claim project area, so the number of residents and visitors who might be subject to these hazards would be less overall. However, some residents of the Sunlight Waters community would likely be within 500 feet of some turbines.	**<u>Mechanical Hazards</u>** The proposed action would not be implemented and the potential mechanical hazards associated with a utility-scale wind energy project would not occur. The project area would retain a high fire hazard.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
there have been no reported injuries resulting from ice throw. Hazards associated with tower collapse, blade throw and ice throw for the proposed GEWE 15.sl turbine can be adequately mitigated by establishing exclusion zones or setbacks around turbines ranging from approximately 416 feet to 487 feet.			
Project construction activity would pose some temporary increase in the level of fire hazard locally. The Kittitas County Fire Marshal has identified appropriate mitigation measures for this hazard, including contracting with Fire District 2 for fire protection services and establishment of fire prevention and control plans. The project would likely have little long-term effect on the level of fire hazard. Operation of the turbines would not be likely to materially affect the behavior of a fire, wind turbine machinery is designed with fire safety in mind and the project facilities would be continually monitored.	Construction and operation impacts with respect to fire hazards, and applicable mitigation, would be essentially the same as for the proposed action.		
<u>Electrical Hazards</u> Electrical safety precautions would be required in areas near the project power collection cables and transmission line; these areas would not be accessible to the general public.	**<u>Electrical Hazards</u>** Alternative 1 would require construction and operation of the same types and voltages of electrical facilities as the proposed action, and involve the same types of electrical safety, electric and magnetic fields and electromagnetic interference issues.	**<u>Electrical Hazards</u>** Impacts with respect to potential electrical effects would be essentially the same as those for the proposed action and Alternative 1, and would not be significant.	**<u>Electrical Hazards</u>** Existing electric and magnetic field levels in the project area would continue. No change in public health and safety impacts for residents in the project vicinity would be expected.
Electric and magnetic fields associated with the project would be comparable to those already present on the site. Incremental changes in exposures to electric and	Electric and magnetic fields associated with Alternative 1 would be comparable to those already present near the transmission lines that exist in the vicinity of the site.		

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
magnetic fields would be small to non-existent for the public, and impacts associated with possible long-term health effects are highly unlikely. Project electric facilities would be highly unlikely to cause short-term electric or magnetic field effects, such as nuisance shocks or interference with computer monitors, because the facilities would be located away from human activity and/or would produce fields of low strength. The project electrical system would be separate from the local electric distribution system and would not create stray voltage effects for nearby properties. Lightning-related faults or surges would not increase lightning hazards for nearby residents. Cable and satellite television systems are not affected by electromagnetic interference. Wind turbines would be located 1000 feet from the nearest residence and should not interfere with broadcast signals.	Incremental changes in public exposure to electric and magnetic fields would be small to non-existent.		
Shadow Flicker The distance threshold for shadow flicker impacts is approximately 2,000 feet. 65 receptors in the project vicinity could be exposed to shadow flicker for some time during the year. Maximum duration of shadow flicker in a day for any receptor would range from 6 minutes to 2 hours. The highest shadow-flicker exposure modeled for any receptor would be about 50 hours per year. Most (56 percent) of the receptors would experience less than 5 hours	**Shadow Flicker** Because there are no residences closer than 2 miles from a proposed wind turbine location on the Wild Horse site, no permanent receptor locations would be affected by shadow flicker.	**Shadow Flicker** Based on a 2,000-foot distance threshold, it is likely that some residences near the site would be exposed to shadow flicker under Alternative 2; this would primarily affect some residences on the eastern edge of Sunlight Waters. The frequency and duration of shadow flicker conditions at these locations might be similar to the analysis results for the Desert Claim site.	**Shadow Flicker** Potential shadow flicker impacts associated with a utility-scale wind energy project would not occur.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
of shadow flicker per year, only 7 would experience more than 20 hours per year. Several simple, practical options exist for controlling or preventing these impacts. Shadow-flicker frequencies are sufficiently low as to be considered harmless with respect to possible adverse human health consequences. Significant impacts to off-site outdoor uses are not expected.			
NOISE			
There would be temporary increases in sound levels near active areas of project construction and along roadways. Noise levels 1,000 feet from active construction areas would often fall within the daytime noise limits for residential receivers and would meet limits for agricultural/industrial receivers. Construction noise is exempt from the state noise limits from 7 a.m. to 10 p.m. Predicted operational noise levels at all receptor locations at wind speeds of 4 m/s and 8 m/s would meet applicable noise limits. Highest sound level increase at any receptor would be 7 dBA; increase would be 1 to 4 dBA for 26 of 34 receptors. Based on noise levels and/or increase over ambient levels, project noise impacts would be rated either low or medium, and would not be significant. Based on wind patterns, turbines would produce audible noise about 22 percent of the time. Low-frequency noise impacts are not anticipated due to "upwind" design and streamlined turbine design. Tonal noise from turbine operation is possible, but the potential for significant impacts is low.	Construction noise impacts for Alternative 2 would be very similar to those described for the proposed action. Based on the minimal existing development within 2 miles of the Wild Horse site, few if any local residents would experience construction noise; no significant impacts would occur. Modeling results indicate operation would comply with the applicable noise requirements. No long-tern noise impacts would be expected.	Construction noise impacts would be similar to those described for the proposed action. On-site sources of those impacts would be confined to a smaller area. Operational noise levels at any receptors within 1,000 feet of the Springwood Ranch site would likely meet the nighttime noise limit applied to Class A receivers, and predicted sound level increases at such locations would likely be no more than 5 to 7 dBA. Several residences along the eastern edge of Sunlight Waters could be subject to noise in excess of the 50-dBA limit and/or increase in the vicinity of 10 dBA.	Existing sound levels from the site include agricultural and livestock production activities, which would continue in the future with or without the proposed action. No known noise impacts currently occur from these agricultural activities, and none would be anticipated to occur in the future.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
AESTHETICS/LIGHT AND GLARE			
Aesthetics Visual changes associated with construction and decommissioning activities would have a temporary but moderate visual impact on views from nearby residences and roads, primarily in the Northwest Valley and Northeast Valley Visual Assessment Units. The construction-related visual impact from more distant viewpoints would be low. Long-term impacts during project operation would vary with location in the region surrounding the project. Among 19 key views selected as representative of the visual assessment units, 4 were determined to have impacts rated as high, based on the degree of change from existing visual quality. Views showing the greatest degree of visual impact were 1A, 1E, 1F and 1G in the Northwest Valley Visual Assessment Unit. The level of impact was considered to be moderate for 6 of the 19 key views. These views tend to be from high points at moderate distances from the project (1 to 4 miles). Impacts to the remaining 9 views would be "low"; visual quality at these locations would not be changed significantly. **Light and Glare** 48 wind turbines marking the perimeter of the project would have dual lighting systems to meet FAA safety requirements. The daytime white flashing lights would be visible, but not very intrusive. Nighttime flashing red lights would contrast	**Aesthetics** The visual changes associated with the construction activities would have a moderate level of visual impact in close-at-hand areas, limited to nearby segments of the Vantage Highway. The impact in views from middle ground areas, with the greatest numbers of viewers (i.e. to the south and west), would be low. Turbines would be clearly visible along the ridgeline of Whiskey Dick Mountain, on the mountain's southern slopes, and on the ridge lands to the mountain's north. The aesthetic impacts of visual changes would be less than significant. The greatest visual change would be in views of the site from lands to the immediate west, north, and east, where up to 100 turbines would be visible on the high-elevation plateau north of Whiskey Dick Mountain. The overall visual impact in these areas would be moderate. Moderate impacts would also occur in views toward the site from the Vantage Highway and areas in the eastern end of the Kittitas Valley. **Light and Glare** The lighting system employed to comply with FAA safety requirements and the impacts of those lights would generally be the same as for the proposed action.	**Aesthetics** Visual impacts from construction and decommissioning would be of the same type as those described for the proposed action and Alternative 1. Visual changes during construction would have a temporary, but moderate visual impact on views from nearby residences and roads in the Thorp Prairie area. Alternative 2 would have significant visual impacts during operation. In views from I-90, many of the turbines would be quite noticeable because they would be visible in the middle ground and would break the skyline. There would be similar impacts on views from SR 10 and the Thorp Highway. Overall, development of Alternative 2 would significantly change the aesthetic character of the local landscape, especially as viewed from I-90. **Light and Glare** Aviation marking lights would result in significant additional impacts on nearby residents and passing motorists. Flashing red lights at night would be visible from I-90, the Thorp Highway, and SR 10, as well as from residences in the immediate	**Aesthetics** Under the No Action Alternative, the visual quality of the surrounding environment would not be influenced by wind power facilities. Visual character in and near the project area would continue to be influenced by existing land uses. **Light and Glare** Light and glare in the surrounding environment would not be influenced by the proposed project.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
significantly with the nighttime sky and be very noticeable for residents around the Northwest Valley and Table Mountain Slope Visual Assessment Units. Project safety lighting would not impede local stargazing activity. Impacts associated with other project lighting would be minimal. Blade glare or glint can be noticed over distances of 6 to 9 miles and could be an occasional occurrence, but would be limited to a minor nuisance effect.	The O&M facility and substation(s) would create sources of light in areas where there are currently no nighttime sources of light. However, impacts would not be substantial.	vicinity and in Thorp. Security lighting at the operations and maintenance facility and the project substation would have minimal impact on the nighttime visual environment. Blade glint or glare from sunlight reflecting off moving blades could be an annoyance to eastbound drivers on I-90 late in the day.	
RECREATION			
Direct impacts to existing recreation resources and opportunities (which are quite limited) from construction would be very low or negligible. After construction was completed, most recreational activities that are currently possible would be able to resume at current levels. With the possible exception of hunting, all recreational activities previously allowed by permission of project-area landowners would be allowed to continue during operations. No USFS, BLM, DNR, State Parks, WDFW or private recreational facilities would experience direct impacts from the project. Indirect impacts would be limited to minor audible and visual intrusion into nearby recreational areas and congestion along roads. Neither would disrupt recreational opportunities on nearby federal, state, and private lands and facilities.	Construction activities would not directly affect any existing recreation facilities, as there are no such facilities in or adjacent to the project area. Recreational visitors using the nearby WDFW wildlife areas or the Ginkgo State Park facilities might notice construction activities on the site or project-related construction traffic and might be subject to occasional traffic delays or detours. Existing recreational use of the project area is limited to hunting with the specific permission of the current landowner, and would presumably be displaced to the extent that the construction period coincided with hunting seasons. Some hunting activity could be allowed during the operating period. If hunting were displaced, it would constitute a minor loss of recreational opportunity.	Impacts would be of the same type as those described for the proposed action, primarily involving temporary displacement of any existing recreational activities during construction and probable limitations on selected types of recreation during long-term operation. Recreational users of the Iron Horse State Park/John Wayne Trail and the Yakima River would experience noise, views of construction equipment and activities, and possibly blowing dust during the construction period. During operations, users of these resources would be exposed to views of wind turbines and other project facilities at some specific locations.	There would be no impacts on the current recreational opportunities within the project area or in nearby off-site areas.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
Operation of the project would not change the existing access conditions along public roads that are currently used to reach recreational opportunities, or on adjacent private properties. The project would likely provide some degree of attraction for tourists. It would not have a significant effect on the baseline level of recreation and tourism use in the County.			
GROUND TRANSPORTATION			
Additional trips during periods of peak construction activity would be well within the capacity of the local road network and would not noticeably or significantly affect existing levels of service. Potential short-term impacts from construction activities for project access roads include potential delays or detours on or adjacent to county roads. Construction activities could require temporary road modifications to accommodate trucks transporting tower components; damage to road surfaces from transport of components or construction materials; and potential interruptions to general traffic flow from detours or delays. Project operation would generate a negligible volume of traffic that would not affect existing levels of service on public roads. The level of future tourist activity and traffic cannot be specifically predicted, but could be safely accommodated with signage, off-road parking and viewing opportunities, and vehicle maneuvering space.	Construction impacts would generally be the same as the proposed action. Alternative 1 would not have a significant impact on existing levels of service. Potential impacts include degradation of the road surface caused by trucks delivering tower components. Traffic generated by project operation would not affect local traffic operations or change the existing levels of service. Because Alternative 1 would be further from I-90 it is anticipated that relatively few travelers would leave the freeway to take a close look at the facility.	Potential impacts of construction would generally be the same as for the proposed action. The delivery of turbine components might be more difficult due to the physical constrictions of the Elk Heights interchange and the adjacent intersection of Elk Heights Road and Thorp Prairie Road. Trips generated by project operations would be proportionally less than the proposed action and would not affect the existing level of service at local intersections. Wind turbines would be closer to I-90 than with the proposed action and some travelers on I-90 could leave the freeway to take a closer look at the facility. Similar provisions to accommodate tourists would likely be needed.	Existing land uses would remain and there would likely be a modest growth in the number of rural residences within the project area. This would result in an equally modest growth in average daily traffic volumes, but would not significantly affect existing traffic operations.

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
AIR TRANSPORTATION			
Desert Claim turbines would exceed the minimum structure height (200 ft.) for which the Federal Aviation Administration (FAA) requires notification and would prompt the FAA to conduct a study of potential airspace impacts. Proposed wind turbines would be in accordance with FAA criteria regarding obstructions and would not be in conflict with arriving aircraft operating under existing or potential future instrument approaches to Bowers Field. Similarly, the project would have no impact on operations using the instrument departure procedure. 10 turbines would exceed the maximum allowable structure height relative to the existing VFR traffic pattern and would likely be considered hazards to air navigation and a potential adverse impact on air traffic operations by large aircraft in the traffic pattern. This conflict could be resolved either through further modification of project plans or adoption of an increased traffic pattern altitude for large/jet-powered aircraft using Bowers Field. The project would include dual lighting systems on 48 turbines to comply with FAA standards for marking and lighting tall structures.	Based on the distance between the Wild Horse site and Bowers Field, it is anticipated that turbines at this site would not be considered obstructions to air navigation. It is unlikely that Alternative 1 would result in adverse impacts to air traffic operations. FAA standards for marking and lighting tall structures would apply.	A detailed, site-specific evaluation of potential airspace conflicts has not been undertaken. However, based on the distances from the Springwood Ranch site to both Bowers Field and the Cle Elum Municipal Airport, it does not appear that a wind energy project at the Springwood Ranch site would interfere with protected airspace or air traffic operations associated with either facility. FAA standards for marking and lighting tall structures would apply.	There would be no changes to current air traffic operations, and no conflicts that are foreseeable at this time.
PUBLIC SERVICES AND UTILITIES			
Fire and Emergency Medical Services Construction activities could result in increased calls for fire and emergency medical services. Depending on the number of calls (if any), there could be an impact on	**Fire and Emergency Medical Services** The impacts of Alternative 1 on public services and utilities would be similar to those described for the proposed action.	**Fire and Emergency Medical Services** The impacts of Alternative 2 on public services and utilities would be very similar to those described for the proposed action. Potential service demands during	Under No Action, the level of public services and utilities in the project vicinity would not likely change significantly in the foreseeable future. No new impacts to public services and utilities are anticipated

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
Fire District 2 service demand; a specific service contract would be appropriate to manage potential impacts. During operations, impacts to fire and emergency medical services would not be significant. Current Fire District No. 2 resources, combined with project resources, would be sufficient to provide fire suppression services to the project area, although staff are not trained for high-angle rescues. Project safety, control and response systems would serve to minimize the risk of fire and limit damage from any potential fires. **<u>Police Service</u>** The potential project demand for law enforcement services is not likely to require additional personnel or have an adverse impact on existing service levels. **<u>Schools</u>** No significant impacts on local schools are anticipated during construction or operation. **<u>Water Supply, Stormwater, and Sewer</u>** Impacts to public water supply, stormwater, and sewer services are not anticipated, as none of these utilities are or would be available on-site. **<u>Solid Waste, Energy, Communications</u>** No significant or adverse impacts are likely to occur during construction or operation.	Potential needs for fire service during construction and operation would likely result in the execution of a service contract with a rural fire district (either Fire District 2, based in Ellensburg, or Fire District 4 in Vantage). **<u>Police Service</u>** Project-related demands for police would be minimal and no significant adverse impacts on existing services would be expected. **<u>Schools</u>** No significant impacts on local schools are anticipated during construction or operation. **<u>Water Supply, Stormwater, and Sewer</u>** No significant impacts would occur. **<u>Solid Waste, Energy, Communications</u>** No significant impacts are anticipated	construction might be less due to the smaller scale of the project. A service contract with Fire District 1, based in Thorp, would likely be executed. **<u>Police Service</u>** Project-related demands for police would be minimal and no significant adverse impacts on existing services would be expected. **<u>Schools</u>** No significant impacts on local schools are anticipated during construction or operation. **<u>Water Supply, Stormwater, and Sewer</u>** No significant impacts would occur. **<u>Solid Waste, Energy, Communications</u>** No significant impacts are anticipated	under this alternative. .

Table 1-1
Summary of Environmental Impacts by Alternative

Proposed Action: Desert Claim Wind Power Project	Alternative 1: Wild Horse Site	Alternative 2: Springwood Ranch Site	No Action Alternative
POPULATION, HOUSING AND EMPLOYMENT			
The project would employ an estimated 150 workers during construction and 10 during operations. There would not be a noticeable impact on the population in Ellensburg or Kittitas County. No housing units would be destroyed or displaced by the project and, therefore, there would be no direct impacts on housing. Non-local workers could seek temporary housing during construction. Based on supply and vacancy rates, impacts are not expected to be significant. Spending on labor and materials would indirectly result in an additional 40 full and part-time jobs during the construction phase. Total labor income during construction would be over $3.8 million. The amount of other value added (corporate profits, property rents and net interest) is estimated at over $1.5 million. Economic impacts during operation would include about $0.9 million in labor income and $2 million in other value added per year. Current research has generally found that wind farms have either no effect on tourism or a positive effect.	Impacts from construction and operation of Alternative 1 on population, housing and employment would be similar to those described for the proposed action. Alternative 1 would have no direct impacts on housing. Temporary housing would be needed for non-local workers during construction of the project. The impact to the local housing market is not expected to be significant. Economic impacts (direct and indirect) during construction and operation would be similar to those estimated for the proposed action.	Impacts from construction and operation of Alternative 2 on population, housing and employment would be similar to but smaller than those described for the proposed action. The total economic impact of Alternative 2 would likely be 35 to 40 percent of the level estimated for the proposed action.	Countywide population, housing and employment trends would generally be expected to continue as in recent years, pending other significant actions not associated with the Desert Claim proposal.

Table 1-1
Summary of Environmental Impacts by Alternative

FISCAL CONDITIONS			
The purchase and installation of machinery and equipment for wind generation facilities are exempt from State sales tax. Project construction would indirectly generate minor amounts of sales tax revenue. The completed project would have an initial assessed value estimated at about $92 million, equivalent to 3.6 percent of total assessed valuation in Kittitas County. Potential property tax revenues from the project are estimated at a maximum of nearly $1.1 million for the first year of operation. Tax revenues in subsequent years would be based on depreciated value of the personal-property component of the project and would decline over time. Potential public service costs attributable to the project are expected to be minimal for both construction and operation. Therefore, net fiscal effects are expected to be positive.	The fiscal impacts associated with the construction and long-term operation of Alternative 1 would be very similar to those described for the proposed action. The capital value of Alternative 1 would have a large proportionate impact on the existing tax base for the Kittitas School District. Net fiscal effects are expected to be positive.	Alternative 2 would involve considerably smaller construction values and would result in a lower total assessed valuation for the project (approximately 37 percent of the value of Desert Claim). The capital value of Alternative 2 would have a large proportionate impact on the existing tax base for the Thorp School District. Net fiscal effects are expected to be positive.	The Kittitas County tax base would not increase as a result of Desert Claim wind power facilities. Tax revenue and service cost trends associated with the project area would likely continue similar to those of past years, at least with respect to the project area.

1.7 CUMULATIVE IMPACTS

Cumulative impacts are the incremental impacts of a proposal when considered in the context of other past, present and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.

In the context of the proposed Desert Claim Wind Power Project, cumulative impacts are identified largely on the basis of significant proposed and reasonably foreseeable future developments. These include, primarily, the Kittitas Valley and Wild Horse wind power projects proposed by Zilkha Renewable Energy; pending approval from EFSEC and Kittitas County, Zilkha would develop these two projects in other areas of Kittitas County according to their respective plans and schedules. Applications filed by Zilkha with EFSEC and SEPA documents released by EFSEC provide the primary sources of information concerning the potentialimpacts of these two wind power projects. Past and ongoing activities in the project area and background growth, in both urban and rural areas, are also considered in the cumulative impact assessment.

Cumulative impacts of the Desert Claim proposal alone, apart from those impacts associated with other wind power proposals in Kittitas County, would be essentially the same as the direct and indirect impacts summarized in **Table 1-1**. **Chapter 4** provides a complete discussion of potential cumulative impacts for all elements of the environment, considering the Desert Claim project alone and in conjunction with the other proposed wind power projects. **Section 1.7** includes excerpts from the **Chapter 4** discussion that summarize the cumulative impacts associated with the three proposed wind power projects.

1.7.1 <u>Earth Resources</u>

Ground disturbance during construction or decommissioning of the Desert Claim project would result in minor, localized soil erosion impacts. These impacts would occur within the context of erosion associated with current and expected future land uses in the project vicinity (primarily agricultural activities and scattered rural residential development). Widespread or significant erosion problems in the project vicinity have not been identified. Based on the magnitude, extent and timing of possible erosion impacts from the Desert Claim project, these impacts would not result in the potential for significant cumulative erosion impacts in the local area. Similarly, construction and operation of the Desert Claim project would not increase the existing landslide hazards, provided appropriate mitigation measures were implemented, and would have no effect on the degree of seismic hazard applicable to other existing or future uses in the project vicinity. Therefore, direct and indirect effects from the project would not add to the ongoing effects of other activities in the local area and would not create the potential for cumulative impacts related to landslide or seismic hazards.

Impacts to earth resources from development of the Kittitas Valley and/or Wild Horse wind power projects would be similar to those described for the Desert Claim project, and would generally be confined to localized, temporary erosion impacts from ground disturbance during construction. The Kittitas Valley and Wild Horse project areas are not characterized by extensive areas of high geologic hazards, or by widespread or significant existing impacts to earth resources. The earth resource impacts of each project would occur within the construction footprint for the respective project and would not be overlapping in geographic extent. 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 in the vicinity of the Kittitas Valley project and vice-versa), and the impacts of the respective projects would not represent the potential for significant cumulative impacts to earth resources.

1.7.2 Air Quality

Development of the Desert Claim project would result in vehicle exhaust and fugitive dust emissions during the construction period, and in similar impacts during decommissioning. Because these emissions would be temporary, would typically occur within only a portion of the project area at a given time, and would not be noticeable in extensive off-site areas, they would represent insignificant air quality impacts. These impacts would occur within the context of air emissions associated with existing and expected future land uses in the project vicinity and elsewhere in the Kittitas Valley. The Kittitas Valley is a predominantly agricultural area in which operation of agricultural equipment in cultivated fields and vehicle traffic on gravel and dirt roads are common sources of exhaust and dust emissions. Kittitas County is not designated as a non-attainment area for air pollutants of concern, and current air quality problems are not known to exist. The additive effect of the temporary exhaust and dust emissions associated with the Desert Claim project would not constitute the potential for significant cumulative air quality impacts.

The Desert Claim project is one of three wind power facilities proposed for different locations in the Kittitas Valley. The baseline conditions and expected impacts to air quality from the construction and operation of the Kittitas Valley and/or Wild Horse wind power projects would be similar to those described for the Desert Claim project. Vehicle exhaust from construction equipment and fugitive dust from construction activities would be the primary air emissions, and the air quality impacts from these emissions would be temporary and localized. Air quality impacts from project operation would be negligible for all three projects.

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, it is not anticipated that the incremental impact of the aggregate 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. Consequently, there does not appear to be a potential for significant cumulative air quality impacts from the development of multiple wind power projects in the Kittitas Valley, even if all three projects were constructed during approximately the same period.

1.7.3 Water Resources

The Desert Claim project's effects on water resources (described in **Section 3.3.2**) would be additive to other effects from past, present, and reasonably foreseeable actions in the project vicinity. The water resource impacts of the project, however, would be localized to the immediate area of specific project facilities and would primarily be temporary effects limited to the project construction period. Direct and indirect impacts to streams and riparian areas in the project area would be minor, and could be reduced or avoided through micro-siting of individual turbines and related project facilities. The project would have minimal ongoing demands for water consumption, and re-establishment of pre-construction contours and vegetation would allow surface waters to infiltrate back into existing ground water recharge areas. Consequently, the project would have negligible effects on water quantity conditions for surface water or ground water resources. Existing regulations to protect water quality are expected to be sufficient to avoid significant adverse impacts from project activities.

The incremental effects of the Desert Claim project would not substantially change baseline water resource conditions in the project vicinity, and would have a negligible effect on conditions in the Upper Yakima watershed. Therefore, the potential water resource impacts of the Desert Claim project would not result in significant cumulative impacts at the local level or on a watershed basis.

Three utility-scale wind power projects are currently proposed for Kittitas Valley locations within 13 miles of Ellensburg. Two of the three projects are located within the Upper Yakima drainage basin and near streams that drain to the Yakima River near Ellensburg (Desert Claim and Kittitas Valley), while one is primarily within the drainage basin of the middle Columbia River (Wild Horse). As mentioned in **Section 3.3.1**, the Yakima River is currently on Washington State's Clean Water Act 303(d) list of impaired water bodies, based on reported high concentrations of copper (Ecology 1998).

The water resource impacts of the Kittitas Valley and Wild Horse projects are expected to be similar to those described for the Desert Claim project. All of the projects would involve the same types of construction activities and project features, relatively similar areas of ground disturbance, similar restoration and mitigation actions, and similar water demands. 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 be likely to result in noticeable changes in downstream areas.

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.

1.7.4 Plants and Animals

1.7.4.1 Vegetation

Development of the Desert Claim project would result in both temporary and permanent loss of vegetation within the project area, with corresponding impacts to several types of plant communities present. These impacts would occur within the context of disturbance and vegetation change associated with current and expected future land uses in the project vicinity (primarily agricultural activities and rural residential development). While much of the project area appears to have been converted from native vegetation to grasslands or agricultural crops, more than half of the project area remains in shrub-steppe vegetation dominated by native species. Construction of Desert Claim project facilities would result in the permanent loss of 88 acres of existing vegetative cover, including approximately 47 acres of shrub-steppe and 4 acres of grassland lithosol. Based on the limited extent of vegetation loss resulting from the Desert Claim project, in the aggregate for the 5,237-acre project area and with respect to specific communities, these impacts would not result in the potential for significant cumulative vegetation impacts in the local area.

Impacts to vegetation from development of the Kittitas Valley and/or Wild Horse wind power projects would be similar to those described for the Desert Claim project, and would generally consist of localized impacts to the same types of vegetation communities. The permanent footprint for the Kittitas Valley project would displace approximately 93 acres of existing vegetation, including approximately 41 acres of shrub-steppe and 29 acres of lithosol. Corresponding figures for the Wild Horse project include 165 total acres displaced, including 87 acres of shrub-steppe habitat; lithosol habitats are also present on the Wild Horse site, but have not been quantified. For each project, the area of existing vegetation permanently displaced by the project facilities amounts to a small portion (approximately 2 percent or less) of the respective project area. The combined figures for the three projects amount to approximately 297 total acres of existing vegetation lost, including 177 acres of shrub-steppe and at least 35 (and no more than 100, based on a conservative estimate for Wild Horse) acres of lithosol habitat. Based on the limited incremental loss of native vegetation relative to the local distribution of these communities, the combined effects of the three projects would not represent a significant cumulative impact on vegetation.

No federally-listed rare plants were identified at either the Kittitas Valley or Wild Horse project sites. The minimal potential impacts of the proposed wind projects on rare plants would not represent a significant cumulative impact to any species.

Past and ongoing development and agricultural activities create the potential for the introduction of new noxious weeds or the spread of existing noxious species, with potential negative consequences for both native and cultivated vegetation communities. The development of multiple wind energy projects would result in equivalent (and possibly lesser) opportunities for similar types of noxious weed impacts. The degree of collective impact associated with the proposed projects would be minimized or reduced through control measures implemented or required by Kittitas County, EFSEC, individual landowners (which would include the WDNR) in each project area, and each project's developer and owner. In addition, the three projects are all located in areas where past and existing human activity has already created some opportunity for noxious weed infestation, and where existing control programs are active. Therefore, it is unlikely that there would be a significant increase in the risk of noxious weed infestation from the development of multiple wind energy projects in the Kittitas Valley.

1.7.4.2 Wetlands

The effects of the Desert Claim project on wetlands would be additive to other effects from past, present, and reasonably foreseeable actions. As discussed in **Section 3.3.4**, existing environmental conditions in the project area have been influenced by past and present activities. Significant changes to the project area have resulted from activities related to crop cultivation, grazing, water diversion for irrigation, and residential development in and near the project area. The incremental contribution from the project would not substantially change the condition of wetland resources in the project area. The majority of the wetlands in the project area are marginal-quality wetlands dependent on artificial hydrology (i.e., irrigation return flows and leakage from canals). Based on the current plans for the project, construction activities would temporarily disturb approximately 17 acres of wetland area, while the permanent project footprint would overlap with an area estimated at 3 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 was not feasible, mitigation would be developed to enhance or replace wetland areas. Existing regulations to protect water quality are expected to be sufficient to avoid significant indirect effects to project area wetlands through stormwater runoff, and thus the potential for hydrologic changes to wetlands would be minimal. With mitigation, the disturbance effects of Desert Claim project construction would not constitute a significant cumulative impact on wetlands in the local area.

Wetlands are rare in the project areas for both the Kittitas Valley and Wild Horse wind power projects, and these projects would have negligible to nonexistent impacts to wetlands. The collective effects of the three proposed projects would essentially be the same as the effects identified for the Desert Claim project. As discussed above, 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, there would not be a potential for significant cumulative effects on wetland resources.

1.7.4.3 Wildlife

Birds

Using mortality estimates from existing wind plants with similar habitat and bird use, combined mortality of passerines (bird of the order Passeriforme, which includes perching birds and songbirds such as finches, warblers, sparrows blackbirds and jays) for the three projects would range from 430 to 740 fatalities per year. This level of mortality would not exceed that which has been reported at other, newer-generation wind plants in the Pacific Northwest and is not expected to have any population-level consequences for individual species. This conclusion is based on the expected low fatality rates for most species and the high population sizes of the locally-occurring common passerine species such as European starling, American robin, horned lark, American pipit, and western meadowlark.

Potential impacts to raptors from the Proposed Action or from all three projects combined is expected to be similar to other new-generation wind plants in the U.S. Some individual breeding raptors might use both the Kittitas Valley and Desert Claim project areas. Because the Wild Horse project is at least 13 miles distant from either of the other projects, individual breeding raptors using the Wild Horse area are not expected to also use the Kittitas Valley and/or Desert Claim areas. Based on levels of raptor use within the study areas, raptor mortality is expected to be slightly higher than other new generation wind projects with similar turbine types. For all three proposed Kittitas County projects combined, 14 to 15 raptor fatalities per year could occur.

Cumulative impacts to bald eagles conceivably could be loss of winter habitat and a very low number of potential (near zero) fatalities. 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). To date, no bald eagle fatalities have been reported from wind plants in the U.S. 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. Based on low use of the proposed project areas by bald eagles, and the lack of any reported fatalities at any operating wind plant in the U.S., fatalities at all three projects are expected to be nearly zero. However, due to nearby roosting and foraging areas, bald eagles might regularly move through the project areas of the three projects and thereby increase their exposure. Assuming risk of collision is proportional to use, 1 bald eagle fatality across all three projects might occur every 2 to 3 years. The 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.

Mammals

Temporary displacement of wintering mule deer and elk would be anticipated if construction occurred during the winter, and this impact might be greater if two or more of the projects were under construction simultaneously during winter. While human-related activity at wind turbines during regular maintenance would be less than during the construction period, it is not known if human activity associated with regular maintenance activity would exceed tolerance thresholds for wintering mule deer or elk. For all three projects, operational impacts to wintering mule deer and elk are expected to be low due to the current level of disturbance associated with existing residential development and roads in the vicinity of the projects.

Based on experience at other wind plants, bat fatalities are likely to occur at all three Kittitas County projects, but no loss of key bat habitat is expected. Most bat fatalities found at wind plants occur during the fall and have been tree-dwelling migratory bats, with hoary and silver-haired bats being the most prevalent. Using mortality estimates from other wind plants, total annual bat fatalities for all three projects would range from 361 to 782. 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. Some studies suggest, however, that resident bats do not appear to be significantly affected by wind projects because nearly all observed mortality has occurred during the fall migration period (Johnson et al., 2003; Gruver, 2002). On that basis, significant adverse impacts to resident bat populations are not expected.

1.7.4.4 Fish

Past and existing human activities have affected fishery resources in the Desert Claim project area. Development of the Desert Claim project would result in minor disturbance or displacement impacts to streams and riparian zones in the project area; because none of the affected streams are known to contain fish communities, direct impacts to fish resources are expected to be negligible or nonexistent. Similarly, the potential indirect effects of the project on water quality and quantity would have a negligible effect on downstream water resources or the fish habitat they provide. Therefore, the Desert Claim project would not result in significant cumulative impacts on fisheries resources.

Studies conducted for the Kittitas Valley wind power project did not identify any fish-bearing habitat within 0.5 miles of proposed facility or construction locations, and no impacts to fish habitat or fish species resulting from construction and operation of the Kittitas Valley project are expected (EFSEC, 2003). Similarly, no fish are known to occur in the Wild Horse project area, and the nearest fish habitat is located along Quilomene Creek approximately 1 mile north of the project. Assuming best management practices were employed for erosion and sediment control (as would be required permit conditions for all three projects), the Wild Horse project would not result in adverse impacts to fish or fish habitat on-site or in downstream areas.

The collective effects of the three proposed 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, there would not be a potential for significant cumulative effects on fishery resources.

1.7.5 Energy and Natural Resources

Incremental increases in the consumption of energy and other natural resources attributable to construction of the project, either relative to the supply of resources available locally or within the context of the total baseline use of energy and natural resources in the County, would be small and temporary. Energy and natural resource consumption for the operation of the project would be negligible. Electrical energy produced by the operation of the project would represent a significant addition to the local production of energy.

The impacts of construction of the Kittitas Valley and Wild Horse projects on energy and natural resources would be very similar to those described for the Desert Claim project. The combined demands of the three projects for fuel and construction materials would add measurably to the local and regional consumption of these non-renewable resources on a temporary basis, but is not expected to have a noticeable effect on the supply or availability of these resources. The single largest demand would be for sand and gravel resources, which are abundant in the local area and might, in at least two cases, be obtained from sources within the project area. Overall, based on timing considerations and the incremental resource demands associated with the projects, the development of multiple wind energy projects in Kittitas County would not represent the potential for significant cumulative adverse impacts on energy and natural resources.

The three proposed wind power projects would provide a combined nameplate capacity of approximately 560 to 565 MW of electricity (under the "middle scenario" for development of the Kittitas Valley project). Assuming long-term operation of the three projects at a typical plant factor of 33 percent, the Kittitas Valley, Desert Claim and Wild Horse projects would produce approximately 180 average MW of electricity on a long-term basis. Operation of the three projects would add substantially to the capacity, production and availability of renewable energy sources in Washington and the Pacific Northwest. Energy produced by the three wind power projects would provide a sustainable, renewable source of electric power supply to supplement the region's existing hydroelectric and thermal (nuclear, coal-fired and gas-fired) power sources, 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 Puget Sound Energy.

1.7.6 Cultural Resources

Direct and indirect impacts to cultural resources within the Desert Claim project area would occur within the context of comparable impacts from past and ongoing land uses in the vicinity. Agricultural activities, irrigation development, construction of roads and power transmission lines, and rural residential development have no doubt disturbed or destroyed cultural resources that existed in the project vicinity at one time, and have altered the historic setting for the resources that remain. Based on the results of the field survey of the Desert Claim project area, however, numerous identifiable artifacts remain in the area. Given the relatively small area of temporary disturbance associated with development of the project, it is unlikely that the additional impacts to remaining cultural resources would represent a significant cumulative change compared to impacts from past and ongoing activities.

The Kittitas Valley and Wild Horse wind power projects would likewise create the potential for adverse impacts to cultural resources through ground disturbance, increased opportunity for removal of artifacts or vandalism of cultural sites, and/or changes to the settings of cultural sites. The direct and indirect effects of each project on cultural resources are not yet known with precision, as avoidance of identified cultural resource sites can be taken into account in final micro-siting of project facilities. Therefore, the combined cultural resource impacts of the three projects are uncertain. Nevertheless, the combined effects of the three proposed 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 approximately 35 to 40 cultural sites. Based on the incremental nature of the unregulated setting changes ongoing in the Kittitas Valley and the uncertain historical significance of the identified cultural sites, it is unlikely that the combined effects of the project would represent a significant cumulative impact on the cultural resources of the region.

1.7.7 Land and Shoreline Use

Cumulatively, the three wind power projects would be located in an area of approximately 18,000 acres. These lands are currently used primarily for agricultural activities (grazing and rangeland). Based on adopted Comprehensive Plan (Rural, in all three cases) and zoning designations (Forest and Range for Wild Horse, and a mixture of Forest and Range and Ag-20 for Kittitas Valley and Desert Claim), agriculture is the intended long-term use of the majority of this land. Together, the areas potentially affected by the proposals represents approximately 4 percent of the total lands in Kittitas County zoned

Ag-20 and Forest and Range. (In addition, extensive areas of forest and range land in Kittitas County are in federal ownership and are not zoned.) Some dispersed rural residential uses are located adjacent to the Desert Claim and Kittitas Valley sites, and at further distances (approximately 3 miles) from the Wild Horse site. These areas are also characterized by the presence of electric transmission facilities.

Existing uses and activities would not be displaced by proposed wind power facilities. Collectively, the 3 proposals would result in the long-term (i.e., 30 year) conversion of an estimated 350 acres of agricultural land as a result of construction of wind power facilities. This represents less than 2 percent of the total site area of the 3 proposals. Agricultural activities would continue unaffected on the remainder of the affected sites.

Kittitas County considers wind farms to be a "utility" use, which, depending on site-specific conditions, is potentially compatible with ongoing agricultural activities. The proposed wind energy facilities would not collectively disrupt or change the underlying land use pattern of this portion of the county. Wind facilities are not inherently more intensive than many other agricultural, energy or utility uses that occur in rural areas in terms of their potential external impacts (e.g., off-site noise, land use conflicts). While some localized land use conflicts could occur based on the location of specific turbines, these are seen as site-specific and not indicative of conflict with the broader, underlying rural land use pattern.

Individually and collectively, the proposals would not be likely to attract supporting uses or generate spin-off development. The combined number of operational full-time employees (30-42) is modest and the wind power facilities would be widely dispersed. They would not create a cumulative demand for supporting commercial or industrial uses and would not create pressure to change or convert existing land uses.

Proposed wind turbines (approximately 370 cumulatively) would be significantly larger in scale than nearby rural and agricultural uses and structures, would be dispersed over a large area, and would result in some degree of visual discord or intrusion with existing uses. Viewers would be able to see both the Desert Claim and Kittitas Valley proposals from some view locations within certain visual assessment units. However, these cumulative visual impacts are not indicative of a conflict with the underlying land use pattern. Cumulative visual impacts are considered in detail in **Section 3.10** of this EIS.

It is possible that the proximate Desert Claim and Kittitas Valley proposals (together more than 12,000 acres) could cumulatively discourage residential uses to some degree in their general locations. (The location and topography of the Wild Horse site generally makes it less susceptible to residential development.) This could have the effect of reducing pressure for the conversion of agricultural lands to residential uses, which could be seen as positive, and would be consistent with Kittitas County's policies to preserve agricultural uses. Some nearby residential users might seek to relocate if they felt that wind facilities, individually or collectively, conflicted with elements of their lifestyles.

Cumulatively, proposed wind energy facilities would be consistent with Growth Management Act goals and policies for rural areas, and with relevant Growth Management Hearings Board decisions. Turbines would not be defined as "urban growth" (RCW 36.70A.030(17): they would not make intensive use of the land for buildings and structures (330 acres collectively, or 2 percent of the combined site areas), and they would not be incompatible with the primary use of rural lands for agricultural activities. Please refer to the discussion in **Section 3.7.2.2**.

1.7.8 Health and Safety

Construction and operation of the Desert Claim project would add to the existing health and safety risks that currently exist in the project vicinity, and would introduce some new types of risks. Existing mechanical hazards for humans primarily include those associated with operating motor vehicles, lawn and garden equipment (e.g., mowers, snow blowers, string trimmers), agricultural machinery, and other types of equipment typically used in rural areas (e.g., portable generators, chain saws). At many locations in the project area people must be aware of the risks of living and working around low- and high-voltage electric lines. Wildland and structure fires can occur, and the project is considered to be in a high-hazard are for wildland fires. While the existing risks are diverse, the possibilities of serious adverse consequences for a given individual or location are small or remote. The Desert Claim project would introduce new hazards, such as blade throw and ice throw, which would likewise have remote probabilities of occurrence. Given the distance separation from human use areas and other safety features incorporated into project plans, as well as the mitigation measures included in the modified Desert Claim proposal, it is anticipated that the Desert Claim project would add to the existing health and safety risks in the project area to a very small degree.

Development of the Kittitas Valley and/or Wild Horse wind power projects would involve the same types of hazards associated with the Desert Claim project. With respect to the health and safety risks specific to wind energy projects, including mechanical hazards and shadow flicker, the potential impacts of the three projects would be localized to the respective project areas and are not expected to be cumulatively significant. While the probability of any specific hazard occurring would be essentially the same for each project (based on very similar numbers and sizes of wind turbines), the risk of exposure to those hazards would vary with the level of human activity in the near vicinity of each project. In general, the risk of exposure would be greatest (although still low, in probability terms) for turbines that are in close proximity to residences or public roads; turbines in such circumstances are also the focus of the mitigation measures that have been identified for this issue. 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, which could result in exposure to ice throw or similar mechanical risks associated with elements of both projects. Based on the low probability associated with these hazards and the mitigation measures available to reduce the risks, this situation is not anticipated to involve a significant cumulative increase in health and safety risks.

Development of two or more wind energy projects in Kittitas County could result in a cumulative increase in the risk of wildfire in the central and eastern portions of the County. 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. While wind energy project construction would introduce additional human activity, machinery and fuels into the affected environment for each project, it would also result in higher levels of watchful presence in and around each project site, the use of stringent fire protection measures, and the presence of trained personnel who could respond to fire hazards. In addition, the construction program for each project would include contracted fire protection services from the respective local rural fire district, which would facilitate prompt response to any incidents that might occur. Based on the heightened level of fire prevention and protection that would exist during project construction, it is unlikely that the cumulative increased risk of fire during this period would be significant.

As discussed in **Section 3.8.2**, certain fire risks specific to wind energy projects would also exist during the operating period for each project. Similar to the construction process, 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 serve to minimize the spread of fire around the facilities. In addition, the project facilities would be continually monitored, the project areas would be regularly patrolled and access to the projects areas would be limited. Because the level of fire prevention and protection that would exist within the respective project areas would be greater than what presently exists or what would occur in adjacent areas, it is possible that the net impact of project operation would be a reduction in the existing fire hazard level within the project areas. In any event, it is unlikely that the cumulative increased risk of fire during the operating period for multiple wind energy projects would be significant.

The electric and magnetic fields associated with the Desert Claim, Kittitas Valley and/or Wild Horse 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, the wind project facilities would not add to the strength or extent of electric and magnetic field exposure that might already occur, and there would not be cumulative exposure impacts from development of multiple wind energy projects. Similar conclusions apply to concerns involving electrical safety (inadvertent contact with energized electrical facilities), stray voltage and lightning.

Potential shadow flicker impacts from the three proposed projects would be limited to the immediate vicinity (approximately 2,000 feet) of the wind turbines within each respective project area. There are no permanent receptor locations within this distance of the Wild Horse project, and shadow flicker impacts from this project would be minimal or nonexistent. 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.

1.7.9 Noise

The proposed Desert Claim project would not be expected to induce additional development in the project vicinity beyond the proposed wind turbine generators and associated equipment. Therefore, the potential for cumulative impacts would be restricted to the construction and operation effects of the project on the existing environment and their relation to past, present and expected future noise conditions. Cumulative impacts from the project are inherently considered in **Section 3.9.3.2**, where the cumulative sound levels (i.e., the existing sound levels plus the projects sound levels) are displayed in **Table 3.9-6**. While the project would result in incremental increases in typical noise levels at a small number of selected locations, the additive effect of the project would not represent a significant cumulative impact to existing noise conditions in the project vicinity.

The noise impacts of the Desert Claim, Kittitas Valley and/or Wild Horse wind power projects would be localized to the vicinity of each project. Residences near a portion of the Kittitas Valley project area could experience a noticeable change in the ambient sound level relative to baseline noise conditions, similar to the case for selected noise receptors near the Desert Claim project. 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 experience noticeable increases in noise levels as a combined effect of the projects. The Wild Horse project would not affect noise levels at any residences or other permanent receptors. 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.

1.7.10 Aesthetics, Light and Glare

Aesthetic and related impacts of the Desert Claim project would occur within the context of landscape modifications associated with past, current and expected future uses in the project vicinity. As discussed in **Section 3.10.1**, the local landscape shows evidence of changes resulting from agricultural practices, land management activities (such as timber harvest and road construction), rural residential development, and construction of infrastructure facilities such as electric transmission lines and irrigation canals. While the existing landscape in the vicinity of the project and elsewhere in the Kittitas Valley has been substantially modified, the additive visual effect of the Desert Claim project facilities would represent a significant change from the baseline aesthetic condition in areas where those facilities were visible and prominent.

The aesthetic impacts of the Kittitas Valley and Wild Horse projects would be similar to those described for the Desert Claim project, although there would be differences with respect to viewer location and viewer groups affected. In addressing the potential adverse cumulative impacts of multiple wind power projects, it is most important to consider the Desert Claim and Kittitas Valley projects together because of their proximity. Viewers exposed to wind projects tend to react more negatively to longer lines of turbines than to isolated smaller clusters (Righter, 2002). This finding suggests that the combined effects from two projects developed near each other (within 2 miles) might be greater than the sum of their individual impacts. 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.

Based on the analysis provided in **Section 3.10.2**, the most significant cumulative visual impacts would be from the Northwest Valley Visual Assessment Unit, especially in views to the west from residences and roads in this unit. For viewers in this unit, the wind turbines from the two projects might appear to surround the valley. Views from the Hayward Hill, Dry Creek Slope, Yakima River, and Southwest Valley Visual Assessment Units would also experience significant cumulative visual impacts because turbines in the ridgetop configuration of the Kittitas Valley project would be prominent in their views. In addition, motorists on I-90, the Thorp Highway, U.S. Highway 97, State Route 10 and some local roads would have longer-duration wind turbine views because they would be passing two nearly adjacent projects.

The Wild Horse Wind Power Project would be located a considerable distance from the other two projects and in a different portion of the local landscape, creating a limited potential for this project to be evident in the same view as the Desert Claim and/or Kittitas Valley projects. Nevertheless, there are likely to be some locations near the Kittitas Valley or Desert Claim project areas from which there is a clear view toward the Wild Horse site on Whiskey Dick Mountain, which is prominent at the eastern edge of the valley. The Wild Horse turbines would be quite distant in such views (up to 21 miles from the Kittitas Valley area and 14 miles from the Desert Claim area), however, and would have minimal additional effect on these views. There may also be some viewpoints in or near the valley from which all three projects would be visible.

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 another important 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). These repeated views of relatively large numbers of wind turbines would all be at background distances and would be intermittent, rather than continuous for this portion of the trip. Nevertheless, the viewers could recall seeing extensive wind energy development in the Kittitas Valley area. Similarly, 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 numbers 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.

1.7.11 Recreation

As documented in **Section 3.11.2**, little recreation activity occurs in or near the Desert Claim project area and impacts from the project on recreation would be low. Given the applicable baseline recreation conditions, the impacts of the project would not constitute significant cumulative impacts within the context of other past, present and foreseeable future actions.

Baseline conditions and expected impacts for the Kittitas Valley and Wild Horse wind power projects would be similar to those identified for the Desert Claim project. The other two projects are roughly the same size as the Desert Claim project and would be located primarily on private property. Existing recreational activities within these project areas, with the possible exception of hunting, would generally continue to be available on privately-owned lands with the permission of the landowners. Based on the minor nature of the expected impacts and the negligible potential for interaction among two or more projects, development of multiple wind power projects would not result in significant cumulative impacts to recreation.

1.7.12 Ground Transportation

Cumulative construction impacts from the proposed Desert Claim, Kittitas Valley and Wild Horse wind power projects would include increases in traffic volumes generated by construction workers and the delivery of construction supplies and materials. The concrete and gravel production and delivery capacity of local suppliers would not likely be sufficient to supply all three projects at the same time. This situation would likely require the use of concrete batch plants on one or more project sites in order to maintain a dependable supply of concrete, or use of revised construction schedules to reduce or avoid overlap among projects. If batch plants were utilized extensively, there would be fewer collective concrete-truck trips on county roads.

Zilkha Renewable Energy, the applicant for the Kittitas Valley and Wild Horse wind power projects, prepared an analysis of the combined effects of the construction traffic for those two projects. This analysis is summarized below, followed by a discussion of the possible construction schedule overlap and additive construction traffic effects of the Desert Claim project.

1.7.12.1 Combined Kittitas Valley and Wild Horse Traffic Effects

Transporter routes for the delivery of turbine components have been defined for both the Kittitas Valley and Wild Horse projects. The single transporter route for the Kittitas Valley project begins in Seattle and continues east on I-90 to Exit 106, the interchange with US 97 west of Ellensburg. Both transporter routes for the Wild Horse project also begin in Seattle and continue east on I-90, overlapping with the entire I-90 segment of the Kittitas Valley transporter route. One of the Wild Horse routes continues eastward on I-90 to Exit 115, just south of the towns of Kittitas, while the other continues on I-90 to Exit 136 at Vantage.

The Kittitas Valley segment of I-90 is classified as a rural-interstate, according to the Washington State Department of Transportation (WSDOT) road classification system. The average daily traffic (ADT) volume (in both directions) on I-90 immediately west of Exit 106 is estimated at 22,000 vehicles, with an estimated truck percentage of 21 percent (WSDOT 2001). If construction were to occur simultaneously for both the Kittitas Valley and Wild Horse projects, the segment of I-90 west of Exit 106 would temporarily carry construction traffic for both projects. This is the only roadway that would potentially be affected by combined construction traffic from the two Zilkha projects.

The estimated construction traffic volumes for the Kittitas Valley and Wild Horse projects were added to the 2004 background traffic volumes to achieve a combined peak-hour directional volume with the projects. As a worst case, the Kittitas Valley project is conservatively estimated (i.e., the actual number would likely be lower, but would not be higher) to generate 149 heavy construction trips and 20 light-duty delivery truck trips traveling on I-90 during the peak hour, for a total of 169 peak-hour trips (for the medium project scenario). The corresponding trips for the Wild Horse project are conservatively estimated at 143 heavy construction trips and 15 light-duty delivery truck trips, for a total of 158 peak-hour trips traveling on Transporter Route 1 (to Exit 115). Transporter Route 2 for the Wild Horse project is estimated to carry 6 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. Based on the most current Highway Capacity Manual guidance for freeway segments, with the conservative estimates of combined baseline and construction traffic volumes during the PM peak hour this segment of I-90 would 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 two wind power projects proposed by Zilkha could result in a temporary decrease in the LOS on I-90, the resulting LOS would still exceed state standards, and thus there would not be a significant impact to traffic operations.

1.7.12.2 Additive Desert Claim Project Construction Traffic Effects

If it is assumed 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, the total peak-hour trips indicated above 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 in the vicinity of 1,750 trips. This would correspond 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 additive effect of the potential Desert Claim construction traffic would still not result in a significant cumulative impact on the operating condition for I-90 during the construction period.

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 SR-97, and would be associated primarily with the Desert Claim and Kittitas Valley projects. Given existing daily volumes and the design capacity of these highway facilities, it is not likely that the addition of project-related trips generated by construction workers and the delivery of general construction materials (e.g., sand, gravel, concrete) would be noticeable. However, if turbine components were being 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. Additional vehicle delay could affect segments of SR-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. WSDOT and/or Kittitas County could also condition the required oversize vehicle permits to limit the number of deliveries per day per project.

1.7.12.3 Potential Project-Related Tourist Traffic

As discussed in **Section 3.12.2**, it is possible that the Desert Claim project by itself (or the Kittitas Valley or Wild Horse project) would generate some amount of tourist interest, and local traffic associated with tourists wanting to get closer views of the project facilities. It is not possible at this time to estimate how much tourist traffic would likely occur, or how much of the activity would be new traffic rather than additional activity by visitors already in the area for other purposes.

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, with the geographic separation of the proposed projects, it is not likely that roads adjacent to the Desert Claim project (for example) would experience substantially more tourist traffic because one or two other projects were also developed. In fact, the presence of additional wind farms 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. In any event, 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 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).

1.7.13 Air Transportation

Aircraft operations in the Kittitas Valley area, and specifically in the vicinity of Bowers Field, are already constrained to some degree by natural and human-caused factors. The wind turbines installed for the Desert Claim project would represent a cumulative addition to the existing natural and constructed features that need to be acknowledged and accounted for in safe aircraft operation near the Kittitas Valley. As discussed in **Section 3.13.2**, development of the Desert Claim project would create a potential conflict with the protected airspace associated with the visual flight rule (VFR) traffic pattern for Bowers Field, as 10 of the proposed turbines would intrude on that protected airspace. Multiple mitigation measures that would resolve that potential conflict have been identified. Available information for the Kittitas Valley and Wild Horse wind power projects does not indicate that the turbines and other structures for those projects would present potential conflicts with air traffic operations at Bowers Field or other facilities, and there would be no apparent adverse impacts on air transportation resulting from development of those projects. Therefore, development of multiple wind power projects in the Kittitas Valley would not result in cumulative significant impacts on air transportation.

1.7.14 Public Services and Utilities

Development of the Desert Claim project in conjunction with similar projects in the County (Kittitas Valley Wind Power Project and the Wild Horse project) could contribute to cumulative impacts on area public services. The development and operation (to a lesser extent) of three projects could create additional demand for fire protection, emergency medical services, and police support. The level of impact would depend on the occurrence of simultaneous construction activities and the availability of emergency response resources at the time of an incident. Expected conditions for the major service categories are summarized below.

1.7.14.1 Fire Protection & Emergency Medical Service

The three proposed projects would increase the risk of fire, and the potential need for emergency medical services due to accidents, during construction and operation. Impacts for each project would generally be the same as identified in **Section 3.14** for the Desert Claim project, although differing provider jurisdictions might be affected. 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. Most of the Kittitas Valley project area is outside of existing fire district boundaries, although Fire District 1 serves a portion of the site. None of the Wild Horse site is within a rural fire district. The project proponents would need 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. In the event that a fire service contract did not cover the actual costs of extending service to a project, there could be a gap between the time of occurrence of impacts prior to realization of project-generated property tax revenues.

1.7.14.2 Law Enforcement

Calls for service could increase, primarily during the construction phase, as a result 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. Both wind power project applicants would provide on-site 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 cumulatively significant.

1.7.14.3 Schools

The proposed wind power projects would not generate a cumulative impact to the permanent population of the local area or to student enrollment, as a result of the construction work force and scheduling characteristics described in the population, housing and employment analysis. The combined operations work force of the three projects would be approximately 30 to 42 workers. If all of these workers were hired from outside the local area and all or most of those in-migrants located in a school district with capacity limitations, there could be adverse impacts to school services. These circumstances are considered highly unlikely, however, as 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 adverse impacts to schools are anticipated from project construction or operation.

1.7.14.4 Water Supply and Sewer Service

Water would be used for dust suppression during construction at all three projects, and would be acquired from off-site sources. Small amounts of potable water, likely supplied from exempt on-site wells, would be used during operations. None of the projects would be connected to public sanitary sewer systems. Consequently, none of the projects would result in impacts on delivery systems for these utility services, and the combined effects of the three projects would not result in a significant cumulative impact.

1.7.14.5 Solid Waste, Energy and Communications

The collective impacts of the three projects on solid waste, energy and communications services would be the same as the individual impacts identified for each proposal. The energy and communications demands of the projects would be minimal. Based on the distances between residences and the respective project facilities, there does not appear to be a potential for significant interference with radio and television reception in the areas near the proposed projects. The cumulative increase in demand for solid waste disposal services would essentially be limited to the period of project construction and is not anticipated to be significant with respect to either collection capability or the capacity of the construction and demolition waste disposal site.

1.7.15 <u>Population, Housing and Employment</u>

1.7.15.1 Construction

For purposes of analysis, and to identify potential worst-case impacts, it is assumed that all three projects could be under construction concurrently. Peak construction of each project could employ between 150 and 250 workers, or a combined total of 450 to 650 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. Based on the experience of the Stateline wind power project (personal communication, C. Taylor, Zilkha Renewable Energy, Portland, Oregon, 2003), and for purposes of analysis, it is assumed that approximately one-half of all workers would be local (i.e., already residing within Kittitas County or within reasonable commuting distance, such as in Yakima County) and one-half would come from outside that area (Benton County, King County, etc.). If one-half of wind facility workers are assumed to be local, approximately 75 to 80 non-local workers would be employed by each project, or a cumulative total of 225 to 240. 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 (e.g., MountainStar Resort).

Local/resident workers already have housing and are part of the existing county population; any impact to population and housing associated with these workers has already occurred. Some non-resident construction workers could require temporary housing, which could potentially affect the local housing market; some portion of non-resident workers would commute to the project sites daily. According to 2000 census data, Kittitas County contained more than 1,900 housing units categorized as seasonal and recreational. In addition, more than 40 percent of the County's total housing stock is rental housing, with a vacancy rate (per 2000 census data) of almost 7 percent. There are also close to 50 motels/hotels, RV parks and other lodging establishments in the Ellensburg and Cle Elum/Roslyn area, which could provide temporary lodging for wind project construction workers. It is anticipated that cumulative non-resident workers would be able to find temporary housing over the 9-12 month construction period and that there would not be a significant impact to local housing markets. Vacancy rates for temporary housing could decrease for a period of a few months, however.

1.7.15.2 Operation

Over their life times, each wind power project is estimated to employ 10 to 14 full time 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. If all operations workers were hired from the local area, there would be no impact on population or housing. Experience at other wind power projects suggests that about half of the operations workers might be local residents. Even if all were assumed to be in-migrants, however, the cumulative housing impact from a population increase of this size would not be considered significant.

1.7.15.3 Economic Impacts

The following information is provided for general information purposes. It does not address "environmental impacts" as defined by SEPA and is not considered to be part of the EIS, based on the direction in WAC 197-11-448.

Direct, indirect and induced income generated by the three wind power proposals was estimated for the construction and operation phases. These estimates area based on analyses of jobs, income, wages and similar economic impacts prepared for each proposal and included in the corresponding EISs or application materials. Basic assumptions and methodology used for the Desert Claim analysis are described in **Section 3.15** of this EIS. This methodology differs in some respects from the approach used for the Kittitas Valley and Wild Horse projects, as indicated by the differences among the projects for a given measure of economic impact.

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. 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 purchases of local construction inputs and the re-spending of those dollars within the local economy. The direct impacts for the operations phase include local labor income to operations employees and annual lease payments to landowners (which have been estimated at $4,500 per turbine per year).

1.7.16 Fiscal Conditions

The Desert Claim, Kittitas Valley and Wild Horse proposals have each prepared analyses which 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. The studies were performed at different points in time 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 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. 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 percent over the current assessed valuation for all real and personal property in Kittitas County of approximately $2.5 billion.

The current property tax levy rate for all taxing jurisdictions in Kittitas County is 1.18 percent. If this levy rate were to be applied to the tax base associated with the projects, the estimated potential property tax revenues in the first operational year would be approximately $3.8 million in total, and more than $1 million for each project. (Revenues for Wild Horse are assumed to be the same as for the medium scenario for the Kittitas Valley proposal [121 turbines], as reported in the Draft EIS for the Kittitas Valley project [EFSEC, 2003]. As was noted in the discussion of economic impacts, differences in methodology [in this case, primarily the applied tax levy rate] result in different revenue estimates for projects with very similar capital characteristics.)

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. However, the effects of straight-line depreciation and reduction in property taxes were estimated for the Final EIS.

Current statewide legal limitations on property taxes would likely result in actual tax revenues lower than those indicated above. Initiative 747 limits the growth of local government property tax revenues to 1 percent 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 percent) 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 above, although all 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.

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.

1.8 MITIGATION MEASURES

Mitigation measures for each element of the environment are addressed in full in **Chapter 3** of the Final EIS. Several categories of mitigation measures are considered. A number of planning, design, construction, operation and management measures have been incorporated as part of the proposal for the Desert Claim Wind Power Project. Other mitigation measures are identified in the EIS based on specific Kittitas County, State of Washington or other jurisdictional regulations, and are therefore considered as "required" mitigation measures. The EIS also identifies other "possible" or "potential" mitigation measures, which are additional measures that would address impacts identified in the document and that could either be incorporated as part of the proposal or required at the discretion of Kittitas County. Discussion of mitigation measures in the EIS is phrased to indicate that proposed or required measures "would" occur and that possible or potential mitigation measures "could" or "should" occur or be considered.

WAC 197-11-655(3)(b) notes that mitigation measures legally adopted by the lead agency "need not be identical to those discussed in the environmental document." This allows the lead agency flexibility to revise or expand the mitigation measures presented in the EIS. It is often not possible to anticipate in an EIS every mitigation measure that will ultimately be required by the responsible jurisdiction.

1.8.1 <u>Earth Resources</u>

1.8.1.1 Erosion

To mitigate and reduce the sheet and channel erosion potential on the project site, the Desert Claim Wind Power Project would employ Best Management Practices (BMPs) outlined in Ecology's *Stormwater Management Manual for Eastern Washington*. These BMPs would be needed to meet the terms of the construction stormwater discharge permit, and would include the following measures:

- Source-control BMPs for cleared areas would be applied. Surface water runoff would be directed away from exposed subgrades or into approved stormwater conveyance systems.
- Protective measures for stockpiled soils.
- Temporary sedimentation traps or ponds.
- Rock check dams along roadways and within drainage ditches
- Silt fences would be established along wetlands, stream and river corridors, open space areas and other sensitive areas.
- Erosion control measures for stormwater discharge points.
- Construction runoff would be collected and treated by sediment ponds, turf-covered sand filters, temporary filtration or other approved methods.
- Clean water entering construction areas would not be allowed to mix with construction water.
- A temporary erosion and sediment control plan (TESCP) would be established.
- TESCP measures would be in place and operating properly prior to beginning major clearing and earthwork activities.
- Disturbed areas beyond the permanent project footprint would be revegetated, using an appropriate seed mix, by the close of the construction period.

In addition to the above BMPs that are outlined in the Ecology manual and previously incorporated into the proposal, the applicant has committed to implement the following erosion mitigation measures during the design and development of the project:

- Surface water and domestic discharge would not be directed onto sloping areas or randomly daylight on the site.
- Clearing, excavation and grading should be limited to the minimum areas necessary for construction and original vegetation should be retained as much as possible, including buffer strips between construction disturbance zones and potential receiving waters.
- A geotechnical engineer should review the grading, erosion, and drainage plans prior to final plan design to further assist in mitigating erosion hazards during and after development. Additional erosion mitigation measures might be offered at that time to address site-specific issues.

1.8.1.2 Landslides

Construction of the proposed wind energy facility would not increase the existing landslide hazard risks, provided appropriate mitigation measures were implemented. To mitigate potential landslide hazards as a result of construction, the following setback distances for structures, infiltration systems, and detention ponds should be incorporated into the design plans, where appropriate. The setback distances are based on professional experience and standard practice with slopes of similar gradient, geology, and ground water conditions as those observed on the project area. As a result, the setback distances in this technical report are more stringent than that recommended in the 1997 *Uniform Building Code* (UBC). However, as mentioned below, the enclosed setback distances could be reduced in some instances depending on detailed design plans and additional, site-specific geologic hazard studies.

- Landslide Hazard Zone 1 is considered to possess a high risk of landslide hazards under existing conditions. Therefore, a minimum setback distance of 125 feet should be maintained for turbines and roads proposed on lands within Landslide Hazard Zone 1. Based on the modified project configuration, three turbines and associated access road and underground cable would be located within the setback area of Landslide Hazard Zone 1 in Section 9. The turbines could be relocated outside of the buffer. Site-specific geotechnical studies designed to evaluate landslide hazards and stabilization needs would be required if these turbines were not relocated.
- Landslide Hazard Zone 2 is considered to possess a moderate risk of slope instability under existing conditions. A minimum setback distance of 50 feet should be maintained for structures.

In addition to the above setback distances, the mitigation measures outlined below should be implemented.

- Stormwater from the construction site should be collected and tightlined away from the top of Landslide Hazard Zones 1 and 2. Erosion control measures as outlined above would also apply for all discharge points.
- No fill, topsoil, or other debris should be placed over the top of areas within Landslide Hazard Zone 1. Any fill planned for slopes steeper than 5H:1V (Horizontal:Vertical) should be benched and compacted into the hillside as per the geotechnical engineer's recommendations. Site-specific studies and the use of retaining or erosion control structures might be required where filling is planned in Landslide Hazard Zone 2.
- No cuts should be made on or at the toe of areas within Landslide Hazard Zone 1 unless approved by the geotechnical engineer. The geotechnical engineer should review any proposed cuts into Landslide Hazard Zone 2 areas to evaluate the risk of slope instability and provide specific mitigation recommendations designed to minimize landslide hazard potential.
- No vegetation should be removed from areas within Landslide Hazard Zone 1, with the exception of dead or diseased trees, unless approved by the geotechnical engineer. Vegetation removed from Landslide Hazard Zone 2 areas should be limited to the immediate vicinity of construction.
- A geotechnical engineer should be given the opportunity to review all grading, erosion, and drainage control plans prior to construction to assist in reducing the landslide risks from and to the development.

1.8.1.3 Seismic Activity

Appropriate 1997 UBC guidelines would be followed for siting and design of the proposed Desert Claim Wind Power Project. Following this guidance, turbines and buildings should be designed to be able to sustain some damage from ground motion during the design seismic event without causing life safety concerns. The appropriate design for each turbine location would be selected by a Washington State-licensed engineer during the design phase of the project.

The provisions for seismic hazards in the 1997 UBC will continue to be updated in the future, and it is possible that the 1997 UBC will be replaced by the *International Building Code* 2000 (IBC 2000). The IBC 2000 requires seismic design to evaluate ground motions for a longer earthquake recurrence interval (lower probability event) than currently used in the 1997 UBC. Kittitas County may choose to adopt the seismic provisions of the IBC 2000 code as part of the County's building codes.

1.8.2 Air Quality

The applicant could implement the following standard practices to reduce the air emissions from construction activity:

- Emissions from construction equipment and trucks would be reduced by using well-maintained equipment. Avoiding prolonged periods of vehicle idling and engine-powered equipment would also reduce emissions.
- Dust produced by construction would be reduced by several techniques. Areas of exposed soils such as storage yards and construction roadways would be sprayed with water or other dust suppressants. Roads and other areas that might be exposed for prolonged periods would be paved, planted with a vegetation ground cover, or covered with gravel. The amount of soils carried out of the construction area by trucks would be reduced by wheel washing and covering dusty truck loads. Finally, soil that did escape the construction area on exiting vehicles would be reduced with an effective road-cleaning effort.
- A possible additional measure identified through review of the Draft EIS is the application of dust palliatives, such as calcium chloride, to road surfaces to reduce the amount of dust created by vehicle traffic on unpaved roads. Use of dust palliatives might obviate the need for repeated watering of project access roads. Conversely, some resource agencies have expressed concern over possible ecological impacts from dust-palliative compounds transported in stormwater runoff; this issue would need to be addressed before use of dust palliatives could be recommended.

1.8.3 Water Resources

1.8.3.1 Surface Water

The applicant proposes to conduct further micro-site analyses of turbine locations and project access road locations during the Critical Areas review process to avoid and/or minimize impacts to water bodies and/or wetlandsidentified in **Section 3.3.2.1**. In addition, in some locations it might be possible to shift the temporary disturbance zone, which has been calculated as a 100-ft. radius buffer around each turbine, to avoid placing these directly in surface water or riparian areas or reduce the extent of overlap. Project construction and access roads would be designed to avoid stream crossings wherever possible.

If temporary and/or permanent access roads must be constructed across streams and drainage ways for the project, these roads would be designed so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. Erosion control measures would be installed prior to construction and maintained throughout construction until disturbed areas have been successfully revegetated.

Any creek crossings or work adjacent to creeks and wetlands would adhere to applicable federal and state regulations that would be addressed in the State Stormwater Construction Discharge Permit, Surface Water Pollution Prevention Plan (SWPPP), and Temporary Erosion and Sedimentation Control Plan (TESCP). Other measures to reduce or control impacts include compliance with applicable requirements of Kittitas County Critical Areas regulations (KCC Title 17A), the State Water Code (RCW chapter 90.03), and the State Water Pollution Control Act (RCW chapter 90.48).

A NPDES Construction Stormwater permit would be obtained prior to the construction of the wind turbines and project access roads. On-site erosion control measures as outlined in the State NPDES Construction Stormwater Permit, SWPPP, and TESCP would be implemented to control project-related surface water runoff. Best Management Practices (BMPs) would be incorporated into the NPDES Construction Stormwater permit, SWPPP and TESCP, including:

- Appropriate sized culverts would be installed at stream crossings;
- Sedimentation fences, certified weed-free straw bales or other control devices would be placed in areas of bare excavated soil, and in roadside drainage ditches and streams downstream of the work sites, to reduce surface runoff velocities and to protect stream channels;
- Erosion control measures would be implemented and would employ the use of water bars, slope breakers (silt fence, staked hay or straw bales, or sand bags), and mulch (straw, hay, erosion control fabric, or some functional equivalent) as necessary; and
- Project staging areas would be not be located within 100 feet of drainages or any other body of water, or wetland or riparian areas, to reduce the potential contamination from spills.

It is not anticipated that waste materials would enter ground or surface waters. BMPs would be used to control the use and disposal of waste materials during and following project construction, including implementation of a spill prevention, containment and control plan. Waste materials from construction equipment would be minimal and are not expected to impact ground or surface waters. Hazardous materials, such as lubricants, would be stored in approved containers and storage facilities. Use of hazardous materials would follow prescribed procedures intended to prevent accidents and spills, and to control and limit the consequences of any spills that might occur.

1.8.3.2 Ground Water

Mitigation measures to minimize potential adverse impacts to ground water recharge include the following.

- Infiltrate water within or as close as possible to facilities that would generate surface water runoff from the impervious surfaces.
- Use biofiltration swales, surface dispersion and infiltration through roadside ditches.

Mitigation measures to minimize potential adverse impacts of vibration on ground water flow to wells or to operation of water wells due to blasting includes the following:

- Verification of water well locations in the vicinity of blasting sites
- Compliance with existing regulations in regard to blasting design, including allowable distances to existing protected structures, including wells, and allowable explosive weights

Mitigation measures to minimize potential adverse impacts to ground water quality include the following.

- Control all pollutants on-site, including removal and legal disposal of construction waste or soils contaminated by construction activity or accidental spills.
- Prepare and maintain accidental spill response plans, on-site clean-up materials storage, and worker training.
- Inspect and maintain on-site septic systems annually.

1.8.4 Plants and Animals

1.8.4.1 Vegetation

During project construction, BMPs would be employed to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint. In addition, the project proponent would coordinate with the WDFW to mitigate for impacts to shrub steppe and grassland habitat. Mitigation is expected to consist of acquisition of replacement habitat at a 2:1 ratio for shrub steppe and 1:1 ratio for grassland to the extent possible mitigation for shrub steppe and grassland impacts would occur on site. The project proponent would also follow the management recommendations listed above for roads and utility crossings of riparian habitat to the greatest extent possible

WDFW also identified several site reclamation or restoration measures that might further reduce vegetation impacts. A detailed reclamation and site restoration plan would be developed in consultation with the TAC and incorporated into the overall mitigation plan. The following measures could be incorporated into the mitigation plan to facilitate restoration of temporarily disturbed areas in the project:

- To the extent possible, construction should be timed to correspond with the late spring through fall period when soil moisture is lowest to prevent damage to soils and plants in temporary disturbance areas and thus facilitating reclamation efforts in these areas.
- Standards for site restoration should be established to evaluate success of reclamation measures and site restoration. The standards should be based on undisturbed reference areas of the different vegetation types within the project boundaries. The post-construction restoration or reclamation plan for the temporarily disturbed areas should include provisions for continuing active restoration until site stability or the reference standards are achieved.
- Site reclamation and reseeding should occur during the time of year when seed germination and establishment is most likely to be successful, or the next suitable planting period following disturbance. Temporary erosion control measures should be incorporated during reseeding to facilitate establishment of new seedlings.

Due to the absence of known populations of rare plant species within the project area, no impacts are likely to occur and no mitigation measures are warranted.

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

- The contractor should be required to clean construction vehicles prior to bringing them in to the project area from outside areas.
- Disturbed areas should be revegetated as quickly as possible with native species.
- Revegetation seed mixes and monitoring should be developed in consultation with WDFW, Kittitas County Weed Control Board, and other interested agencies.
- If hay is used for sediment control or other purposes, hay bales should be certified weed free.
- Noxious weeds that have established themselves as a result of the project should be actively controlled in consultation with the Kittitas County Weed Control Board.

1.8.4.2 Wetlands

The applicant proposes to conduct a micro-site analysis for the turbines and project access roads during the JARPA and Critical Areas review process to avoid and/or minimize impacts to water bodies and/or wetlands located within the project area. In addition, the area of temporary construction disturbance, which has been calculated as a 130-foot radius around each turbine, would be shifted to the extent possible to avoid construction impacts in wetlands. The project access road system would be designed to use existing roads where possible.

Any work adjacent to wetlands would adhere to applicable federal and state regulations and would be addressed in the Washington Department of Ecology Stormwater Construction Discharge Permit, Stormwater Pollution Prevention Plan (SWPPP), and Temporary Erosion and Sedimentation Control Plan (TESCP). Other measures to reduce or control impacts include compliance with applicable requirements of KCCAO regulations (Title 17A), the State Water Code (RCW chapter 90.03), and the State Water Pollution Control Act (RCW chapter 90.48).

Furthermore, if wetland communities were disturbed during construction, the following measures would be implemented:

- Site conditions would be restored and disturbed areas revegetated, as appropriate.
- Areas requiring revegetation would be identified by a qualified restoration ecologist in conjunction with landowners and interested agencies; and
- If needed, a revegetation plan would be developed for wetland and riparian communities. The revegetation plan would include mitigation requirements, design specifications, an implementation plan, maintenance requirements, and a monitoring program.

Temporary impacts would be restored, and permanent impacts replaced through wetland creation or enhancement in accordance with the Kittitas County Critical Area Ordinance (KCCAO Section 17A.04.050, Ord. 94-22 (part), 1994). The Washington Department of Ecology provides wetland creation, restoration, and enhancement ratios based on the wetland categories. These ratios are general guidelines that are adjusted up or down based on the likelihood of success of the proposed mitigation and the expected length of time needed to for the wetlands to reach maturity.

1.8.4.3 Wildlife

Mitigation and monitoring measures that have been implemented at other, newer-generation wind plants, in particular those in Washington and Oregon, represent possible mitigation measures for the Desert Claim project.

A Technical Advisory Committee (TAC) could be formed to implement and evaluate a mitigation and monitoring program and determine the need for further studies or mitigation measures once the project is operational. The TAC would be composed of representatives from Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Kittitas County, landowners, and the project owner/developer, and other affected interests such as conservations groups (e.g., Kittitas Audubon Society

The primary impacts associated with the project are expected to be loss of shrub steppe habitat, fatalities of birds, and potential displacement effects on mule deer. The following are potential mitigation measures for these impacts:

- The overall design of the wind plant would minimize perching opportunities for raptors and other birds. For example, tubular towers would be used for the turbines and met towers and use of overhead power lines in the project would be minimized.

- Sensitive wildlife areas such as the riparian corridors and raptor nest sites could be mapped, flagged, and/or identified to all contractors working on-site and could be designated as no disturbance zones during the construction phase.
- During project construction, best management practices could be employed to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint.
- A site management plan could be developed to, at a minimum, identify sensitive wildlife areas (e.g., raptor nests), provide adequate on-site waste disposal, and establish fire management and erosion control procedures.
- Raptor nests within ½ mile of construction areas could be monitored for activity prior to construction to determine the need for construction timing restrictions around active nests.
- All power and communication lines on-site could be buried underground where feasible.
- All overhead power line poles could be equipped with anti perching devices.
- Permanent met towers on-site would be free-standing to minimize the potential for avian collisions with guy wires.
- The modified turbine layout does not have turbine locations within 50 meters from the rim edge of steep slopes within the E1/2 of Sections 26 and 35, T19N, R18E.
- Construction could take place primarily during the summer months, minimizing disturbance to wintering big game from construction activities.

In addition to the above measures, it is anticipated that other measures would be developed during consultation with the USFWS about potential impacts to bald eagles.

A post-construction monitoring study is typically implemented to quantify project impacts to avian and bat species and assess the need for additional mitigation measures, for example unanticipated big game issues. The post-construction monitoring plan would be developed in coordination with the TAC. The monitoring plan would, at a minimum, include a 1-year standardized fatality monitoring program and a standard procedure for O&M personnel to report bird fatalities and injuries over the life of the project.

In addition, consideration could be given to developing, in cooperation with other industry participants, a focused monitoring study that addresses a specific question regarding impacts from wind plants, such as:

- effects of different turbine lighting schemes on avian mortality;
- the impact of the facility on wintering mule deer;
- whether wind turbines attract migrating bats; or
- mechanisms for deterring migrating bats from turbines.

1.8.4.4 Fish

Mitigation measures discussed in **Section 3.3.5** for surface water could also be implemented to minimize impacts to fish resources. Turbine and project access road locations would be evaluated during the Critical Areas review process, and micro-site analysis would be conducted to identify opportunities to avoid and/or minimize impacts to water bodies and/or wetlands and associated fisheries resources downstream from the project area.

The project would use existing roads where possible. The current road layout was determined to have the least impact upon stream resources. All crossings would be created with appropriately-sized culverts. The optional use of oversized culverts below the normal water line would allow a natural stream bottom to form inside the culvert, further minimizing habitat effects. Any work adjacent to streams would adhere to applicable federal and state regulations and would be addressed in detailed project plans.

BMPs would be initiated to minimize impacts to fisheries resources located downstream from the project area, and appropriate mitigation measures would be developed to account for any potential impacts to fisheries resources. The construction footprint at all stream or water channel crossings should be strictly minimized to avoid peripheral impacts to stream habitat. BMPs would be initiated to retain sediment from disturbed areas and minimize areas of disturbance. In addition, most of the streams are intermittent and therefore are likely to be dry during construction. Mitigation measures would include replacement of any riparian or wetland areas impacted by the project.

Furthermore, if stream communities were disturbed during construction, the following measures would be implemented to avoid adverse impacts to downstream fish communities:

- Construction geotextile and sediment retention systems would be used for soils stabilization at road crossings, riparian areas, and within or along streambanks.
- Construction equipment refueling stations should be a minimum of 100 feet away from any drainage, stream, irrigation channel or riparian area.
- Appropriately sized culverts would be used at all stream crossings, and all stream and channel crossings should be designed to allow continual water flow and ensure fish passage under all conditions..
- Native trees, shrubs, and erosion control grasses would be used in all disturbed riparian areas.

NOAA Fisheries, USFWS, and WDFW would be consulted prior to project construction regarding the possible presence of juvenile steelhead in project-area waters. The consultation could result in additional mitigation measures beyond those listed above.

1.8.5 Energy and Natural Resources

No significant adverse impacts to energy and natural resources would occur and no necessary mitigation measures are required have been identified.

1.8.6 Cultural Resources

Avoidance of identified cultural resource sites is the primary mitigation measure available in any project development context. For wind energy projects in general and the Desert Claim project specifically, the prospects for avoiding cultural sites would be addressed in the final micro-siting of wind turbines and other project facilities, which would occur during final design and prior to construction. For facility locations identified as in conflict with cultural sites, project engineers would evaluate data on site-specific structural and wind characteristics to determine whether it would be feasible to relocate the facilities in question, and thereby avoid direct impact to cultural resources.

No additional mitigation would be necessary if all identified cultural resource sites were avoided in the final layout and construction of project facilities. If final placement of the project elements resulted in unavoidable adverse impacts to a significant resource, then mitigation would be required to retrieve the scientific and historical information that makes the site significant. Appropriate mitigation measures should be tailored to the specific circumstances of the resource and developed in consultation with the Washington State Historic Preservation Officer (SHPO). If the affected resource is prehistoric, then the SHPO would require consultation with the Yakama Indian Nation.

Project construction would potentially demolish or alter the setting and character of existing historic resources. Construction impacts would include out-of-character visual elements, change in use, structural vibration, and dust. Project operation would also change the historic character of the surrounding area. Historic buildings and structures subject to unavoidable adverse impacts would be documented in accordance with HABS/HAER guidelines and in consultation with OAHP.

At the larger landscape scale, the project would have a visual impact that could be mitigated by producing a cultural landscape history of the footslope region of the Kittitas Valley below the Wenatchee Mountains. As is typical of such studies, the historical narrative could be accompanied by photos showing the character of the historical landscape and how it has evolved into the existing landscape, so that the historical narrative and the photos would serve as a source for comparative historical studies after the project is completed.

The project cultural resources mitigation plan would also need to provide for monitoring of construction activities and evaluation and treatment of unanticipated archaeological resources that might be discovered during construction. In the event of an unanticipated discovery, ground-disturbing activity in the immediate area would cease and the resources discovered would be tested for significance, following protocols developed in coordination with OAHP and affected tribes. State regulations require permits from OAHP for any excavation of archaeological sites.

1.8.7 <u>Land and Shoreline Use</u>

Increasing turbine setbacks from the residences adjacent to the central portion of the site could reduce visual and proximity impacts to these residents. Other impacts discussed would not be significant and do not warrant mitigation.

1.8.8 <u>Health and Safety</u>

1.8.8.1 Mechanical Hazards

Wind turbine generators such as the GEWE 1.5s/sl are equipped with multiple safety systems as standard equipment. As examples: rotor speed is controlled by a redundant pitch control system and an automatic 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 or overspeed condition is detected. Lightning protection is standard.

<u>Tower Collapse</u>

The selected wind turbine generator/ tower combination, the GEWE 1.5sl, would be subjected to engineering review to assure that the design and construction standards are appropriate for the Kittitas County site. Even so, it is possible that during the life of the wind turbine it would be exposed to unanticipated load combinations that could cause failure. For this reason, even with a unit certified to IEC and building code standards, human access should be restricted and high-value facilities should not be built within a distance from each tower equal to 110 percent of the tower height plus half the rotor diameter. Based on the turbine model selected for this project, this would mean a “setback” of 416 feet from each tower. In response to direction from Kittitas County and comments on the Draft EIS, the applicant modified the project to include a 487-foot performance-based safety zone setback. That setback is large enough to provide a sufficient safety zone for potential tower collapse.

Location of wires, transformers, etc., under ground, as proposed, would also eliminate the possibility of certain indirect impacts described above.

Blade Throw

Certification of the wind turbine to the requirements of IEC 61400-1 would assure that the static, dynamic and defined-life fatigue stresses in the blade would not be exceeded under the combined load cases expected at the project site. Nevertheless, it is conceivable that that all or part of a blade could become detached from the turbine. For this reason, even with a unit certified to IEC standards, human access should be restricted, and high-value facilities should not be built, within a distance from each tower equal to 110 percent of the maximum calculated blade throw, which for this project would be 540 ft. for the maximum turbine envelope size. Based on the shorter turbine model preferred by the applicant, the maximum blade throw safety zone would be 487 feet. Consistent with direction from Kittitas County, the applicant modified the project to include this 487-foot performance-based safety zone setback, which is large enough to provide sufficient setback for potential blade throw from the GEWE 1.5sl.

Ice Throw

Ice throw over 100 m has not been documented as a hazard and an ice throw injury has not been reported. GEWE recommends an ice throw exclusion zone with a radius of 125 m on the downwind side of the tower, which they cite as 125% of the largest recorded throw distance (Pligavko, 2003). Note that for large wind turbines such as the GEWE 1.5s/sl, observance of the tower collapse hazard area or the blade throw hazard area restriction would keep unauthorized persons out of the ice throw hazard zone. The 487-foot performance-based safety zone setback, included in the modified proposal is large enough to provide sufficient setback for potential ice throw from the GEWE 1.5sl.

Also, in light of the few days of icing conditions expected at the Kittitas County site, it might be practical to shut down selected turbines when the danger of icing exists. Icing sensor systems are available and could be installed on specified turbines to accomplish this purpose.

Fire Hazards

The applicant's plans for the proposed project include a number of design and operational measures intended to prevent fires and minimize the consequences of any fires that might occur (see discussion in **Sections 2.2** and **3.8.2.1**). The Kittitas County Fire Marshal has established a list of requirements that would mitigate fire hazards associated with the project. Measures to address these requirements are summarized as follows (see also **Section 3.14.5**):

- During the construction period, it would 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 must be available to designated employees trained in its use.
- Use of mufflers and spark arrestors on all construction equipment.
- Required construction shutdowns consistent with area-wide industrial precautions, and limitations on "hot" work when necessary.
- In normal operation, regular maintenance, including review of real time and stored temperature sensor readings, would highlight developing problems and facilitate prevention of equipment-caused fire. Large wind generators such as the GEWE 1.5s/sl have such systems as standard equipment.
- Installation and maintenance of a fire suppression system in each turbine nacelle would supplement standard fire prevention measures and eliminate the possibility of burning objects falling to the ground.
- Location of transformers and electrical equipment below ground would harden them against tower collapse, blade throw and vandalism, thereby reducing the fire hazard.

- Establishment of a contract with a local fire district for fire protection service to the project.
- Development and adoption of fire prevention and fire control plans for the project.
- Maintenance of updated emergency contact information and coordination procedures.

1.8.8.2 Electrical Hazards

The following mitigating measures would help minimize potential health and safety risks associated with electrical hazards that might exist with the project:

- Prior to starting construction, the contractor would prepare and maintain a safety plan in compliance with Washington requirements. This plan would be kept on-site and would detail how to manage hazardous materials such as fuel, and how to respond to emergency situations.
- During construction, the contractors would also hold crew safety meetings at the start of each workday to go over potential safety issues and concerns related to working on electrical facilities.
- At the end of each workday, the contractor and subcontractors would secure the site to protect equipment and the general public.
- Employees would be trained, as necessary, in tower climbing, cardiopulmonary resuscitation, first aid, rescue techniques, and safety equipment inspection.
- If implosion bolts are used to connect the conductors, they should be installed in such a way as to minimize potential health and safety risks to workers.
- Project workers should stay on established access roads during routine operation and maintenance activities.
- Vegetation would be trimmed to avoid contact with collection and interconnection lines.
- The project would construct and operate the new collection and transmission lines to meet the National Electrical Safety Code.
- Installation crews would clearly mark the location of all buried collection cables.

Mitigating measures available to address potential telecommunications interference associated with electromagnetic or physical conditions that might exist with the project include the following:

- Conduct a study of potential microwave interference prior to final location of turbines, and move or eliminate turbines that would block microwave pathways.
- Conduct baseline monitoring of television reception quality in the near vicinity of the project and investigate claims of diminished signal quality as a result of the project. Means to accomplish this can range from contracted studies by qualified professionals to simple before-and-after videotaping.

1.8.8.3 Shadow Flicker

Several types of mitigation measures are available to address shadow flicker impacts. In general, they involve (1) potential changes to project operations or (2) physical modifications that could be undertaken at receptor locations.

Because shadow flicker can only occur when turbine blades are moving, shadow flicker could (in principle) be prevented by shutting down specific turbines at times when weather and sun conditions would otherwise result in shadow flicker at specific receptor locations. Implementing this measure in practice would likely be quite difficult, however. An operational measure discussed in the Draft EIS and identified in some comments on the Draft EIS would be to develop a telephone hotline system. The viability of this option with respect to project operational costs, logistical feasibility and flexibility appears to be uncertain at best. If such a system were to be included in the terms of a development agreement, Kittitas County would need to take responsibility as the initial point of contact for such calls. Given the short duration of most shadow flicker events and the early-morning and late-afternoon times at which they would occur, it is likely that the shadow flicker event would have ceased by the time an operational response could be made.

Several practical options exist for controlling or preventing shadow flicker at the receptor location, rather than at the source. Consequently, an alternative set of mitigation measure would be for the applicant to develop and implement a program including the following possible actions at affected receptor locations:

- distribute educational materials to potentially affected receptors with instructions on how to block or reduce shadow flicker, such as turning on lights in the affected room;
- provide curtains, blinds or shutters on windows at affected receptor locations; and/or
- plant trees at receptor locations where they could block or screen shadow flicker at affected windows.

1.8.9 Noise

Several noise mitigation measures were included in the project design. These measures include the following:

- Obtain and enforce a warranty from the selected turbine manufacturer that the maximum continuous sound power level produced by each turbine under all wind conditions would not exceed 104 dBA measured at the hub height.
- Establish minimum setbacks from individual wind turbines to nearby residences of 1,000 feet. This setback has been included in the project design.
- Provide sufficient spacing between wind turbine towers to minimize array and wake losses (i.e., energy losses created by turbulence between and among the turbines).
- Orient rotors on the “upwind” side of the turbine tower to avoid the low-frequency sounds associated with the passage of the blades through the tower’s wind shadow.

With these design features incorporated in the proposed action, no significant noise impacts were identified through the analysis of predicted sound levels at receptor locations. Because a number of local residents would experience some increased noise under some conditions and because there is a degree of uncertainty associated with the impact predictions, however, some additional noise mitigation measures would be appropriate for consideration. Specific applicable measures could include:

- Implement a noise-monitoring program under which baseline (pre-project) and with-project noise conditions would be determined and documented.
- Establish a process for responding to, evaluating and resolving noise complaints that might arise during project operation.

1.8.10 Aesthetics, Light and Glare

The following mitigation measures remain applicable to varying degrees for consideration on the proposed project (or Alternative 1 or 2):

Visual Integration:

- To the extent this has not already been accomplished, relocate selected turbines to create distinct visual units, breaking the project into distinct groupings of turbines and leaving some open space between these groups (Nielsen, 2002).
- Limit the number of turbines in each cluster to 10-15 turbines (Brittan, 2002).
- Relocate selected turbines to better follow and reinforce the natural topography. This approach is most appropriate for the turbines that occur near ridgetops, turbines 105-117 and 70-82.
- Relocate selected turbines to establish clear visual order through geometric arrangements with uniform spacing, This approach is most appropriate for the remaining turbines that occupy the very gradual slopes of the alluvial fans.
- Construct required ancillary structures of local materials and maximize their fit in the vernacular landscape by studying local building types and siting them sensitively.
- Use native shrub-steppe vegetation around buildings and equipment boxes to integrate the structures into surrounding landscape.
- Use existing roads to access turbines. Minimize or eliminate new road building. Consider use of all-terrain vehicles for maintenance.
- Do not piggyback advertising, cell antennas, or other clutter on the turbines. Do not prominently display the logo of the manufacturer on the nacelle.
- Sculpt natural landforms and plant foreground screening native vegetative along some nearby roads and around residences with expected significant visual impacts.
- Use low-reflectivity, neutral-color finishes for turbines, equipment boxes, substation equipments, and operations and management building. Earth-tone finish would blend in best with the surrounding landscape.
- Use only minimum required lighting on turbines (aviation warning lighting) required by the FAA, and minimize security lighting at the substation. Make any ground level security lighting motion-sensitive so that most of the time it does not impact the night landscape.
- Use lighting devices designed to be least visible from ground level.
- Synchronize blinking of aviation warning night lighting and maximize period in light off condition.

Ecological restoration and management of disturbed areas during and after construction:

- Keep construction time to a minimum.
- Remove construction debris.
- Locate construction staging and storage areas away from adjacent county roads.
- Replace native vegetation disturbed in non-road surface areas or non-turbine areas.
- Seed or cover temporarily stockpiled materials and disturbed sites to keep down dust and prevent soil erosion.

Equipment maintenance:

- Maintain uniform, high-quality turbine towers, nacelles, and blades. Any replacements should maintain uniform height, model, color, etc.
- Remove or promptly repair all parts of non-functioning turbines.
- Keep operation and maintenance area turbines clean.
- Keep vehicles and maintenance equipment on site away from residences and public access areas.
- Community outreach and education of local residents and visitors on wind energy:
- Work with the affected community to refine turbine siting and design.

- Build a facility for information displays in Ellensburg and near the project.
- In association with WSDOT and Kittitas County, provide signs and safe areas for public viewing with interpretation signs.
- Build an interpretive/recreational trail connection among the turbines to encourage public education and enjoyment and to achieve multiple public benefits from the project.

Information and education related to the project and wind energy:

- Notify the local community of the timing and duration of construction.
- Build a facility for information displays in Ellensburg or near the project.
- In association with WSDOT and Kittitas County, provide signs and safe areas for public viewing with interpretation signs.

1.8.11 Recreation

The impact analysis did not identify significant adverse impacts on recreation resources and no mitigation measures are required or identified for consideration.

1.8.12 Ground Transportation

1.8.12.1 Construction

Construction traffic impacts should be mitigated though the development and approval of a Construction Traffic Management Plan that would address transportation and access concerns during the construction period. The plan would be subject to review and acceptance by Kittitas County and would be incorporated in the development agreement required by Kittitas County's review process for wind power facilities. The review process for development agreement conditions would include other agencies with jurisdiction and expertise (such as WSDOT and the Kittitas County Sheriff's Department). The plan would define access routes and procedures to be used by various types of construction equipment and material shipments, approved hours of operation for construction traffic, safety provisions and other management requirements. It would identify any permanent or temporary improvements to road surfaces necessary to accommodate transporters with low clearances, and any needed temporary improvements to intersections to accommodate the turning radius of transporters.

Gates at project access roads should be set back far enough from the edge of the public road to accommodate the length of trucks entering or leaving the project area so they do not encroach upon the public road when gates are being opened or closed. In addition, the area between the gates and the public roads should be paved in order to keep gravel off of the public road and the pavement edges flared to provide an adequate turning radius for entering and exiting trucks.

The potential cumulative impact associated with turbine components being delivered to different project sites at the same time could be avoided by conditioning the required vehicle permits to limit the number of trips per day or require contractors to coordinate deliveries.

1.8.12.2 Operation

Wind farm operations would likely generate some number of tourist trips to the project area that would need to be accommodated and managed. Monitoring of tourist activity associated with the project would be desirable, since the magnitude of tourism is unknown.

Prior to the beginning of power generation, it is recommended that the applicant prepare a Tourism Management Plan that describes how tourists visiting the site would be accommodated. The goal of the plan would be to encourage and accommodate tourist activity while minimizing the impacts to safe vehicle circulation on constricted county roads. This plan should identify tourist routes, outline a directional and information signage plan, and establish the location and number of roadside interpretive sites that would be constructed and maintained by the applicant. The plan would be subject to review and acceptance by Kittitas County in conjunction with a development agreement. The review process for the development agreement would include other agencies with jurisdiction and expertise (such as WSDOT and the Kittitas County Sheriff's Department).

In review comments on the Draft EIS, Kittitas County Public Works suggested that a tourist kiosk should be located along the SR-97 corridor or along Smithson Road adjacent to the Desert Claim project area. Operation and maintenance of this facility would be a project responsibility, and plans should allow for increased capacity if warranted by increased tourism use.

1.8.13 Air Transportation

1.8.13.1 VFR Traffic Pattern

As discussed in **Section 3.13.2.1**, some of the proposed Desert Claim wind turbines would conflict with the current use of standard left-hand traffic patterns for VFR traffic at Bowers Field. Specifically, 27 of the proposed wind turbines would exceed the VFR traffic pattern maximum allowable obstruction height and would represent potential hazards to Category D VFR traffic near Bowers Field (see **Figure 3.13-2**). There are two general options to resolve this conflict. One would be to modify the proposed project in such a manner that no turbines would exceed the maximum allowable height in relation to VFR traffic. The other would be to consider modifications to the VFR traffic pattern that would direct the traffic away from the portion of the project at issue.

Project Modifications

Possible measures to eliminate the VFR traffic conflict by modifying the physical characteristics of the proposed project include the following:

1. remove the 10 turbine locations at issue from the proposed project layout, reducing the scope of the project to approximately 110 turbines and the project capacity to approximately 165 MW;
2. shift some or all of the 10 proposed turbine locations to other locations that would not be in conflict with the VFR traffic pattern; or
3. revise the capacity and height of the turbines to be installed at some or all of the 10 turbine locations, to result in structure elevations that did not exceed the VFR traffic pattern allowable height limits.

To a degree, the modified project configuration that is evaluated in the Final EIS reflects implementation of items 2 and 3 above. A number of turbine locations that were originally proposed for the southeastern part of the project area were shifted to other areas within the project boundary, reducing the potential for conflict with the VFR traffic pattern. The applicant also selected a turbine model with a lower total height of 340 feet (rather than the 393 feet analyzed in the Draft EIS). Both of these actions reduced the number of turbines exceeding the maximum allowable structure height from 27 (per the layout evaluated in the Draft EIS) to 10 in the modified layout.

Traffic Pattern Modification

An alternative approach to resolving the potential conflict between the 10 wind turbine locations and the existing VFR traffic pattern would be to modify the traffic pattern. As discussed in **Section 3.13.2.1**, a left-hand traffic pattern is now used for VFR traffic operating from all four Bowers Field runways. This results in the protected airspace for the VFR traffic patterns extending up to 4 miles north from Bowers Field and overlapping with the southeastern portion of the Desert Claim project area. The Draft EIS described a potential traffic pattern modification of prescribing right-hand traffic patterns for both Runways 7 and Runway 11, effectively shifting all visual traffic using these runways to the south and/or west of Bowers Field. However, comments on the Draft EIS maintained that a change to a right traffic pattern would have an unnecessary impact on the overwhelming majority of small aircraft that operate to and from Bowers Field.

Kittitas County and the EIS team subsequently investigated other options for procedural modifications that would resolve the potential project conflict with the VFR traffic pattern. This investigation indicated that existing procedures specified the same traffic pattern altitude (TPA), approximately 2,600 feet AMSL or 840 feet above the elevation of the airport, for all categories of aircraft in the Bowers Field VFR traffic pattern. This condition is contrary to typical practice used in many airports across the nation, in which one TPA is specified for small (piston-driven) aircraft and a higher-level TPA is established for turbojet and large aircraft. Consequently, raising the Bowers Field traffic pattern altitude for large/jet-powered aircraft would take into account the higher terrain north of the airport, would be consistent with standard practice at other airports and would improve safe operating conditions for large/jet-powered aircraft using Bowers Field (i.e., it would reduce noise impacts from such craft by raising their approach elevation), and would be a more logical solution to the VFR traffic pattern conflict.

In conjunction with adoption of its updated airport master plan, Kittitas County requested the FAA to raise the Traffic Pattern Altitude for large/jet-powered aircraft using Bowers Field to 3,300 feet AMSL (1,540 feet above the airport elevation), while retaining the TPA of 2,600 feet for smaller aircraft. Kittitas County did this for health and safety reasons (i.e., to provide a safer approach for jet-powered aircraft and to reduce the noise impacts from such aircraft). One benefit of this change, however, is that it places the few large/jet aircraft that might utilize a Category D VFR traffic pattern well above the obstructions created by the 10 wind turbines in question, thereby resolving this issue. This revised Traffic Pattern Altitude proposal is also consistent with current aviation safety practices nationwide

1.8.13.2 Marking and Lighting

Marking and/or lighting of the proposed wind turbines would be required to meet FAA safety requirements, as mitigation for the potential safety hazards represented by tall obstructions. Proposed measures to meet these requirements are incorporated into the project description, as indicated in **Section 2.2.2**. **Figure 3.13-4** shows the proposed lighting configuration for the Desert Claim project. Under this plan 48 of the total 120 wind turbines, or 40 percent, would be equipped with flashing, white medium-intensity lights for use during daylight hours and flashing red lights for evening/night hours. Experience with FAA reviews of prior lighting plans indicates this configuration should meet the FAA requirements and provide safe lighting for both daytime and nighttime use.

1.8.14 Public Services and Utilities

1.8.14.1 Fire Protection and Emergency Medical Services

In order to provide fire service coverage to the entire project area, the developer would contract with Kittitas County Fire District No. 2 or another jurisdiction to provide service to the area not currently served by a fire service entity. The Kittitas County Fire Marshal has indicated that this service contract should be executed prior to the start of construction. Water supplies for firefighting would be established at designated locations within the project area, the planning for which would occur in conjunction with Fire District No. 2.

During construction of the project, power equipment would be equipped with safety features that would reduce the potential for fire hazards, including spark arrestors and/or approved mufflers, fire extinguishers and shovels. Equipment shutdowns would be required during periods of general industrial fire precautions in the local area, and limitations regarding "hot" work with electrical equipment and facilities would be observed. In order to prevent fires caused by catalytic converters on vehicles, designated parking areas would be created for workers' vehicles. These areas would be free of combustibles. Designated worker smoking areas would also be established to reduce the potential for fire. In addition, development of a worker-oriented fire prevention program would provide additional knowledge of wildfire prevention and control practices to workers.

Any secured areas (i.e., buildings or gates) should require provision of a "knox box," a fire service access box containing master keys, which would facilitate access to the site by fire and emergency medical crews. In addition, the developer would provide fire, emergency medical, police agencies, and KITTCOM with emergency response information relating to:

- the design of the project, including the detailed maps of project access roads, on-site facilities, and wind turbines, and an addressing plan;
- emergency contact information; and
- procedures for rescue operations should an incident occur inside a turbine or nacelle (including available on-site emergency rescue equipment).

The Kittitas County Fire Marshal has also suggested that the applicant prepare a long-term plan to provide for fire risk reduction on the project site, to be approved by the Fire Marshal and the affected fire departments.

The applicant should execute an agreement with the Ellensburg Fire Department addressing training and equipment related to potential high-angle rescue needs at the project site, unless those needs are provided internally through project resources.

During both construction and operation of the project, refuse containers would be located in areas that would reduce the potential for on-site debris. With the exception of natural vegetation, no burning of debris would be allowed without written permits from issuing agencies (DNR and DOE). All flammable liquids would be stored according to 1997 Uniform Fire Code and inspected by the responsible agency.

1.8.14.2 Law Enforcement

The applicant would employ methods for on-site security (including private security patrols). This would meet the applicant's needs for operational security at the site, and would also reduce the potential for calls to local law enforcement services.

1.8.14.3 Other Services and Utilities

Mitigation measures for schools, water supply, sewer and stormwater, solid waste, energy and communications services are not necessary, given the insignificant impacts identified for these services and utilities.

1.8.15 Population, Housing and Employment

The Desert Claim Wind Power Project is not expected to create any adverse impacts on population, housing, or employment. Population and housing supply and cost typically follow changes in employment levels. According to this analysis, employment increases would be minimal in the context of the rest of the local labor market, and would not result in significant changes in either population or housing, Accordingly, no mitigation measure are necessary to offset impacts to employment, population, or housing.

1.8.16 Fiscal Conditions

No adverse fiscal impacts associated with the proposed project have been identified, and no mitigation measures are necessary.

1.9 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

The SEPA rules direct lead agencies to summarize significant adverse environmental impacts that cannot or will not be mitigated. Each section of **Chapter 3** of the Final EIS includes a discussion of significant unavoidable adverse impacts; these are summarized below.

1.9.1 Earth Resources

Unavoidable erosion impacts as a result of construction of the Desert Claim Wind Power Project would include some increase in soil loss during construction. Provided the mitigation measures offered in **Section 3.1.5.1** were properly followed, however, it is anticipated that erosion and sediment transport would be contained within the construction areas, and the resulting impacts would be insignificant. The risk of landslide activity in Landslide Hazard Zone 1 would remain high, but localized, regardless of whether the project were constructed. Construction of the project would not increase the existing landslide hazards on or immediately adjacent to the project area, however, provided that the mitigation measures presented in **Section 3.1.5.2** were implemented. With those mitigation measures, potential impacts associated with landslide hazards would be insignificant. Development of the project would have no influence on the level of seismic hazard applicable to the project vicinity. Based on project design features and standard measures for erosion control and stormwater management, no significant unavoidable adverse impacts to earth resources are expected.

1.9.2 Air Quality

Vehicle and fugitive dust emissions during construction are the only likely impacts to air quality associated with the proposed project. Both impacts would be temporary, limited to the expected 9-month construction schedule (or a longer construction schedule with multiple phases), and would be minor in the context of other rural-residential, industrial and agricultural activities in the Kittitas Valley. With application of the standard control measures typically used in large construction projects, air quality impacts during construction would be insignificant. Project operations and maintenance activities would produce minimal air pollutants and would result in insignificant impacts to air quality.

1.9.3 Water Resources

The analysis of surface water resources identified several types of potential impacts to surface water bodies and associated riparian areas from the modified project layout. The existence of these potential surface water impacts relates primarily to access road crossings of streams, and secondarily to several mapped turbine locations that are near streams. Ground disturbance at streams would be small in extent, and most of the disturbance would be temporary; disturbed stream bank areas would be restored with native vegetation. Permanent culverts of sufficient size would be installed at all stream crossings, resulting in no long-term changes to stream character, discharge capacity or flow patterns. Potential surface water impacts associated with erosion and sedimentation would be avoided or minimized through use of best management practices that are standard requirements for construction activities. With appropriate mitigation that would be required under the terms of the applicable permits, all of the potential temporary and permanent surface water impacts identified in **Section 3.3.2** would be avoided, counteracted through restoration, or offset through provision of compensatory stream enhancement or development. Similarly, there would be no significant, unavoidable adverse impacts to ground water recharge, discharge or supply from the project. Impervious surfaces resulting from construction of permanent facilities would be small in extent and would have a negligible effect on local runoff and ground water recharge patterns. Project construction and operation would not result in discharges that degraded ground water quality. If blasting were necessary in some locations for construction of project facilities, it would be conducted according to regulations that protect wells and structures from significant impacts. Therefore, no significant unavoidable adverse impacts to water resources are expected as a result of the proposed project.

1.9.4 Plants and Animals

1.9.4.1 Vegetation

There would be approximately 88 acres (less than 2 percent of the project area) of unavoidable displacement of existing vegetation in the project area. These impacts are not considered significant because they would not result in elimination of an entire vegetation type in the project area, loss of 10 percent or more of a priority habitat in the project area, or a decrease in species richness resulting from the loss of a plant population in the project area. No significant unavoidable adverse impacts to rare plants from construction, operation or decommissioning of the proposed project are expected. Similarly, the project is not expected to result in significant unavoidable adverse impacts related to potential introduction or spread of noxious weeds.

1.9.4.2 Wetlands

With appropriate mitigation, all potential temporary and permanent wetland impacts identified in **Section 3.4.2.2** would be avoided, counteracted through restoration, or offset through provision of compensatory wetland enhancement or development at the appropriate ratios. Therefore, no significant unavoidable adverse impacts to wetlands are expected as a result of the proposed project.

1.9.4.3 Wildlife

Due to the relative lack of knowledge regarding migratory routes, population levels and trends, and reproductive patterns, it is difficult to assess with certainty any large-scale adverse impacts of wind plants on bat species such as hoary and silver-haired bats. Fatalities of these species occur at existing wind plants and are likely at the proposed wind project, unless the cause of their vulnerability to turbines is identified and possibly mitigated for; fatalities are currently unavoidable. Bat mortality at the proposed project area is expected to be insignificant at the local scale. However, it is unknown if cumulative impacts of all three Kittitas wind projects, in synergy with other wind plants in the Pacific Northwest and North America, could be a significant population sink to species such as hoary and silver-haired bats.

1.9.4.4 Fish

With appropriate mitigation, as required by the existing regulatory framework, potential impacts to fish habitat and/or fish populations would be minor and temporary. The extent of temporary disturbance of stream beds and banks that represent possible fish habitat would be minimized during construction, best management practices would be used to control erosion and sedimentation from disturbed areas, and the disturbed areas would be restored following construction. Road crossings at streams would be designed to maintain stream flow and fish passage at all times, preventing possible flow-related impacts to fish over the long term. Therefore, no significant unavoidable adverse impacts to fish resources are expected as a result of the proposed project.

1.9.5 Energy and Natural Resources

No significant unavoidable adverse impacts to energy or natural resources would occur from the construction, operation or decommissioning of the project.

1.9.6 Cultural Resources

If the Desert Claim project were developed according to the current layout, five identified cultural resource sites would experience unavoidable adverse impacts associated with turbine, access road, and electrical collection system construction (see Table 3.6-2). Three of those sites are historic sites with structural remains and extensive debris scatters and concentrations and two are prehistoric sites that include high-density artifact concentrations and tools that provide valuable evidence for land use on the higher-elevation footslopes in the Yakima River basin. As indicated above, it might be possible to avoid the potential direct impacts to these sites through relocation of project facilities during final micro-siting; the applicant, in consultation with OAHP, has agreed to perform such micro-siting to eliminate these impacts. Any remaining direct impacts to significant cultural resources that cannot feasibly be avoided could be mitigated through a mitigation plan developed in consultation with the Washington SHPO. Significant indirect impacts to cultural resources in the project vicinity are not anticipated, although there could be changes in the visual setting associated with some of these sites. A cultural landscape history review could be implemented as mitigation for these changes. Because the potential significant adverse impacts that have been identified could be avoided or otherwise mitigated through data recovery and archiving, no significant unavoidable adverse impacts to cultural resources have been identified.

1.9.7 Land and Shoreline Use

The scale of the wind turbines would be significantly larger than other land uses; this contrast is unavoidable because of the nature of wind power facilities. Effects on overall land use patterns in the project area would not be significant. Impacts to residences located proximate to the turbines could be reduced, but not eliminated, through increased setbacks.

1.9.8 Health and Safety

All of the potential health and safety environmental impacts that derive from the electromechanical nature of a wind energy facility could be mitigated at the proposed site by prevention, establishment of safety zones and proper operating procedures. In particular, the potential health and safety impacts that derive from the possible mechanical hazards of a wind turbine (tower collapse, blade throw and ice throw) would be mitigated by incorporation of a 487-foot performance-based safety zone in the modified project layout. Therefore, the potential impacts could be mitigated to insignificant levels, and no significant unavoidable impacts would remain.

The potential health and safety impacts of the electrical facilities of the proposed project would be low, and similar to those from the existing electrical transmission and distribution lines in the project area. Nearby residents and other members of the public would be isolated from project electrical safety hazards, and would not experience elevated electric and magnetic fields associated with project facilities. Electromagnetic or physical interference with telecommunications is not expected to be significant, and could be resolved through mitigation if it occurred. Therefore, no significant adverse unavoidable impacts related to electrical systems would remain after mitigation.

The model analysis conducted for the shadow flicker issue indicated that the proposed project would be capable of causing shadow flicker for some time during the year at an estimated 65 residences near the project area. While these receptor locations would experience shadow flicker only under specific weather and wind conditions and for relatively limited daily durations, the affected individuals would likely consider these impacts to be significant. Shadow flicker impacts would represent a nuisance or annoyance effect; shadow flicker experienced in the vicinity of the project is not expected to result in adverse public health or safety consequences. Mitigation measures are available that would drastically reduce or eliminate the shadow flicker impacts. Therefore, with mitigation, the proposed project would not create significant unavoidable health and safety impacts associated with shadow flicker.

1.9.9 Noise

The analysis of predicted noise levels indicated that low noise impacts would occur at almost all receptor locations near the project at higher wind speeds (8 m/s). Medium noise impacts were identified at two of the agricultural residences in the project vicinity at higher wind speeds, either due to overall sound levels exceeding 50 dBA or due to projected sound level increases of 5 to less than 10 dBA. At lower wind speeds (4 m/s), all receptors would experience low impacts based solely on the with-project noise level, although impacts for almost one-fourth of the receptors (8 of 34) were characterized as medium due to the level of increase over the existing condition. No high (i.e., significant, for purposes of SEPA analysis) adverse impacts were identified for any receptor location under either wind condition. The analysis also concluded that low-frequency noise impacts were not anticipated and that the potential for significant impacts from tonal noise is low. Based on the above conclusions, the Desert Claim project would not result in significant unavoidable adverse noise impacts. Adoption of mitigation measures involving noise monitoring and a noise-complaint resolution process would provide additional assurance that noise impacts in operation would not exceed allowable levels.

1.9.10 Aesthetics, Light and Glare

Development of the project as proposed would result in significant unavoidable adverse impacts to the visual environment, especially for nearby rural residents in the northwest quadrant of the Kittitas Valley, including part of the Northwest Valley Visual Assessment Unit and the lower foothills of the Table Mountain Slope Visual Assessment Unit. Project facilities, primarily the wind turbines, would be a dominant element of the visual environment for residents and others within short-range viewing distance of the project. Wind turbines would be visible to varying degrees from portions of several other visual assessment units in the Kittitas Basin, although in these cases the views of the turbines would be more distant and the level of visual impact would generally be low. These impacts are summarized in **Section 3.10.2.2**. With considerable efforts to mitigate the project through visual integration, ecological restoration, sound maintenance, and community information from siting through operation, the visual impact has been or could be reduced to a degree. This mitigation process would not, however, lead to a project that would be invisible. On the contrary, it would yield a project that would be quite noticeable but that fit better with the landscape of the Kittitas Basin and the aesthetic values of the people who live there.

1.9.11 Recreation

The construction or operation of the proposed project is not expected to create any significant adverse impacts to recreation. The expected effects of the Desert Claim Wind Power Project on recreational activities and opportunities would be limited to possible ambient noise and congestion in some locations during construction, the potential elimination of the possible opportunity for permission-only hunting on project-area lands, possible minor distraction or annoyance effects on recreational users of adjacent lands, and the creation of a possible point of interest for tourists visiting the area. The possible increase in traffic due to the proposed project is discussed in more detail in **Section 3.12** (**Transportation**) of this document. While these impacts would be unavoidable, as discussed in **Section 3.11.2** they would not be significant and/or would not be adverse.

1.9.12 Ground Transportation

Development of the Desert Claim Wind Power Project would generate a relatively small increase in vehicle traffic on the local road system during the construction period. It is not likely that this increase in volumes would be noticeable to the average motorist, or would result in a decreased level of service. Physical impacts to roadways from construction disturbance and the transport of turbine components and construction equipment would be mitigated through required terms of the development agreement. Traffic volumes generated directly by project operations and maintenance activities would be negligible. Assuming that a tourism management plan is implemented, potential tourist traffic resulting from public interest in the project is not expected to generate large traffic volumes on local roads, and would not result in traffic interference or safety hazards. Therefore, no significant unavoidable adverse impacts to the local ground transportation system would result from the construction or operation of the project.

1.9.13 Air Transportation

Some of the proposed turbine locations within the Desert Claim project area would conflict with the protected airspace currently associated with the existing VFR traffic pattern. Specifically, 10 of the proposed turbines would exceed the maximum allowable height for structures within the traffic pattern airspace, and represent a potential adverse impact on those air traffic operations. The significance of the potential impact is unclear, because in practical terms the conflict involves operation by a category of aircraft that rarely use Bowers Field and which are not included in the critical family of aircraft identified in the County's current Airport Master Plan. The airspace conflict could be resolved and the potential operations impact could be avoided through several possible means. Those include further modifying the project plan to remove or relocate the remaining 10 turbines and/or to install smaller turbines in selected locations. Changes of this type are already reflected to a degree in the modified project configuration evaluated in the Final EIS, which relocated 17 of the 27 turbines that were identified in the Draft EIS as creating a conflict, and by selecting a smaller turbine as compared to the maximum turbine envelope. Another option for resolving the remaining conflict would be to raise the VFR Traffic Pattern Altitude (TPA) for large/jet-powered aircraft. The available mitigation measures are discussed in detail in **Section 3.13.5**. Because either set of mitigation measures would result in insignificant impacts, there are no significant unavoidable adverse impacts to air transportation associated with the project. Independent of this project, Kittitas County airport management has taken action to raise the TPA for large/jet-powered aircraft. Upon acceptance by the FAA, this action would result in satisfactory resolution of the potential penetration of the 10 wind turbines into the currently-defined Category D VFR traffic pattern, with no adverse effects on aircraft operations or the community.

1.9.14 Public Services and Utilities

Construction and operation of the Desert Claim project would result in negligible impacts for most types of public services and facilities. Some concerns with respect to the need for fire protection services were identified, as were mitigation measures that would resolve these concerns. Therefore, with mitigation, no significant unavoidable adverse impacts to public services and utilities would be expected.

1.9.15 Population, Housing and Employment

The population, housing and employment impacts of the Desert Claim Wind Power Project are not expected to be significant, and would not likely be viewed as adverse.

1.9.16 Fiscal Conditions

No significant unavoidable adverse impacts are expected. Anticipated local government revenues associated with the project are likely to be significantly higher than expected service costs.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter of the EIS describes the proposed action and the alternatives to the proposed action that are being considered. **Section 2.1** provides an updated summary of project background information. **Section 2.2** is a complete description of the proposed action, as modified in response to analysis contained in the Draft EIS and review comments on the Draft EIS. It addresses the existing site conditions, the modified proposed project facilities, the construction process, operation and maintenance considerations, and decommissioning. **Section 2.3** describes the alternatives to the proposed action, including no action, that are evaluated in the EIS. **Section 2.4** identifies the alternatives to the proposed action that were considered by Kittitas County but are not evaluated in detail in the EIS.

2.1 BACKGROUND

2.1.1 <u>Proposal History</u>

enXco, Inc., a developer and operator of wind energy projects, began evaluating the prospects for developing a commercial-scale wind energy project in Kittitas County early in 2001. *enXco* initially focused on identifying areas of the county with sufficient wind resource potential to support a commercially viable project. Indicators of potentially sufficient wind resource include topography, vegetation growth patterns, and public and proprietary wind resource data. Areas indicated as having sufficient wind resources were then screened against other site selection criteria standard to the industry, including access to existing electrical transmission facilities; the presence of known environmentally sensitive resources; and the existence of relatively large tracts of open land. After identifying areas of the county considered worthy of further study, *enXco* contacted landowners for the purposes of negotiating agreements to permit wind exploration and (pending the outcome of the exploration activity) potential project development on their properties. Through this prospecting and exploration process, *enXco* succeeded in obtaining landowner agreements for a project area in central Kittitas County and proceeded with development of a formal proposal to build and operate a wind energy project in that area.

Desert Claim Wind Power LLC, a Washington limited liability company wholly owned and managed by *en*X*co*, submitted an application dated January 28, 2003 to Kittitas County Community Development Services for permits necessary to construct and operate a wind energy facility. The proposed project would be located on leased lands within a project area of 5,237 acres approximately 8 miles north of the City of Ellensburg, the county seat for Kittitas County. The project would consist of up to 120 wind turbine generators with a total nameplate capacity of 180 megawatts (MW). Construction of the project would also require construction and placement of access roads, control and power collection cables, one or more substations (to convert project-generated electricity to the higher voltage required for transmission), a transmission interconnection, and an operations and maintenance facility.

The January 2003 Development Activities Application (application) for the project included an environmental checklist; a project narrative addressing project objectives, location, facilities, construction, operation, decommissioning, and permitting and environmental considerations; a variety of graphics depicting the proposed project layout and existing conditions in the area; documentation of landowners participating in the project; and identification of landowners of parcels contiguous to the proposed project area. Submittal of the application in January 2003 initiated a formal review process for the project by Kittitas County. On February 4, 2003, Kittitas County issued a Notice of Application, seeking pre-threshold determination comments on Desert Claim's application. Kittitas County accepted comments on the application until March 6, 2003. During this period, Kittitas County received nearly 70 comments on the application.

2.1.2 Kittitas County Review Process

The Kittitas County review process for the Desert Claim Wind Power Project includes two primary components. One is a review of the expected environmental impacts of the project under the provisions of SEPA. The other process involves the land use approvals that would be required to permit development of the project under Kittitas County planning and zoning provisions, KCC, Chapter 17.61A. The two processes applicable to this project are summarized below.

2.1.2.1 SEPA Process

Kittitas County Community Development Services is the lead agency for environmental review of the Desert Claim Wind Power Project under SEPA. Following review of the information in the Desert Claim application, including the environmental checklist, and review of the public comments received during the pre-threshold comment period for the application, Kittitas County issued a Determination of Significance (DS) for the proposed project on April 23, 2003. The DS documented Kittitas County's conclusion that the proposal would be likely to have a significant adverse impact on the environment, and that an environmental impact statement (EIS) is required pursuant to Kittitas County Code Chapter 15.04 and RCW 43.21C.030(2)(c). Pursuant to Kittitas County Code 15.04.140, Kittitas County Community Development Services prepared the EIS, using the services of a team of environmental consultants under contract to Kittitas County.

The SEPA statute and corresponding state and local regulations prescribe the process that agencies must follow in preparing an EIS. The key steps in the process with respect to this proposed action generally are as follows:

1. Determination of Significance (DS), documenting the finding that a project would likely have significant impacts;
2. Scoping, defining the alternatives and significant environmental impact issues that should be addressed in the EIS, through agency deliberations and public input;
3. Technical studies corresponding to the significant issues, including characterization of the elements of the environment likely to be affected by the proposal, analysis of the expected impacts, and identification of potential mitigation measures (actions that, if implemented, would reduce or eliminate expected significant impacts);
4. Preparation and distribution of a Draft EIS;
5. Public and agency review of and comment on the Draft EIS;
6. Preparation and distribution of a Final EIS, incorporating responses to comments on the Draft EIS, and which may include modifications to the proposal and supplementation, modification and updates to the analysis contained in the Draft EIS; and
7. Issuance of the Final EIS by the County's Responsible Official.

In conjunction with the DS, Kittitas County initiated a 30-day scoping process for the EIS. During this time, Kittitas County requested public and agency comments on the scope of the Desert Claim Wind Power Project EIS. The DS and request for scoping comments informed interested parties that comments on alternatives, probable significant adverse impacts and licenses and approvals that may be required were to be received by May 23, 2003. To facilitate public input in determining the scope of the EIS, Kittitas County held a public scoping meeting in Ellensburg on May 7, 2003.

Kittitas County received comments on the scope of the EIS in the form of letters (including letters transmitted by facsimile), electronic mail messages, written comments recorded on comment forms submitted at the scoping meeting, and verbal comments recorded at the meeting. Kittitas County's EIS consultant team reviewed the entire body of scoping comments, identified the comments with respect to the topic or environmental issue addressed, and grouped the comments by similar topic area. The EIS team prepared a summary of the scoping process, which Kittitas County made available in July 2003. Based on the input provided through the formal scoping process, Kittitas County Community Development Services determined the appropriate scope for the Desert Claim Wind Power Project EIS; that scope includes the direct, indirect and cumulative impacts and mitigation measures associated with the environmental elements indicated in the subheadings of **Chapter 3** of the EIS.

Kittitas County and its EIS consultants initiated technical studies for the Desert Claim EIS (Step 3 in the EIS process) in the late spring of 2003. This included incorporating certain technical studies conducted in the project area beginning in 2001 and continuing through 2002 and 2003. Following completion of the impact and mitigation assessments, the EIS team documented their findings and compiled the results into this published Draft EIS that addresses all elements identified in the scope for the EIS.

The fifth step in the SEPA process, public and agency review of and comment on the Draft EIS, began officially when Kittitas County filed the Draft EIS with the Washington Department of Ecology. Notices that the EIS was available for review were published in the SEPA Register and in local newspapers of general circulation on the same date. The SEPA rules provide for a minimum period of 30 days for the review of a Draft EIS. The SEPA rules also provide that this period may be extended to a maximum of 45 days in certain circumstances. Because the Desert Claim EIS is a lengthy and complex document, which includes a main body and multiple technical appendices, Kittitas County provided for the longer 45-day review period.

The County held a public meeting to receive comments and testimony on the Draft EIS on January 20, 2004. Thirty (30) people testified at the meeting, providing comments on the Draft EIS. Additionally, the County received 78 items with written comments on the Draft EIS during the formal review period.

The formal review period for the Draft EIS closed on January 30, 2004. The County's EIS team then processed and evaluated the public and agency comments on the Draft EIS, prepared responses to those comments, and revised the Draft EIS as necessary in response to the comments. This Final EIS is the result of that responsive process.

In response to comments received on the Draft EIS during the formal review period and the information contained in the Draft EIS, Kittitas County and the applicant, Desert Claim, decided to modify the project proposal to include additional mitigation measures, and to conduct additional and updated technical studies. The modifications to the project proposal—the proposed action—are described in **Section 2.2.2**, below, while the additional studies are detailed in **Chapter 3**.

The Final EIS is being prepared and distributed in a fashion similar to the Draft EIS. As specified in the SEPA rules (WAC 197-11-460 [5]), Kittitas County may not take action on the proposal sooner than 7 days after the Final EIS has been issued. Kittitas County SEPA procedures provide for a period of 10 working days after the issuance of a Final EIS during which an appeal of that EIS may be filed.

Subsequent decisions on the specific approvals requested for the project will follow adoption of the Final EIS and are discussed in **Section 2.1.2.2**.

2.1.2.2 Land Use Approval Process

The Kittitas County Code (KCC), Chapter 17.61A, sets forth the requirements for approval of a wind energy project in the County. These include: (1) securing a Wind Farm Resource Development Permit from the County; (2) executing a development agreement with the County; (3) County adoption of a site-specific amendment to the Comprehensive Plan land use designation map, changing the designation for the project area to Wind Farm Resource overlay district, which may be completed as a sub-area plan; and (4) County adoption of a site-specific rezone of the project area to Wind Farm Resource Overlay Zoning District. In conjunction with preparation of the Final EIS, the Planning Division of Kittitas County Community Development Services will prepare a staff report on the proposed action pending before the County and will forward that report to the Planning Commission and the Board of County Commissioners for their consideration. The Planning Division also will prepare the development agreement for the project pursuant to KCC, Chapter 17.61A. The Planning Commission will review the development agreement and make a recommendation to the Board of County Commissioners to either approve or reject the development agreement. In addition to reviewing the EIS and the staff report prepared by the Planning Division, the Board of County Commissioners will review and approve or reject the development agreement. The development agreement may include standards for densities, number, size, setback, and location of turbines; mitigation measures; and other development conditions necessary to protect surrounding properties, the local neighborhood, or Kittitas County as a whole.

The Board of County Commissioners will make the final land use approval decision for the project. The defined criteria for Board approval include adoption of findings that:

- The project is essential or desirable to the public convenience;
- The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood; and
- The project will not be unreasonably detrimental to the economic welfare of the county and will not create excessive public cost for public facilities and services.

2.1.3 Wind Generation Overview

This section provides a brief overview of how wind energy projects work and introduces some key terms used to describe proposed project elements in **Section 2.2**.

2.1.3.1 Wind Development History

Wind has been a source of power since 5000 B.C, when it was used to power sailboats along the Nile River, and more recently to pump water (China, 200 B.C.), or to grind grain in ancient Persia. Harnessing the wind for large-scale electricity generation is a relatively recent development. The first wind turbine used for electricity was invented in the 19th century. Major advances in wind generation technology have occurred since then, particularly in approximately the past two or three decades.

The level of investment in and development of wind energy has typically fluctuated with the price of fossil fuels. When fossil fuel prices fell after World War II, interest in wind turbines declined. When oil prices rose dramatically in the 1970s, worldwide interest in wind power rose as well. One of the most important events in the development of wind power as a legitimate electricity source was the oil crisis of 1973. The event boosted interest in large wind turbines and sparked several government-sponsored research programs in Germany, Sweden, Canada, the U.K., and the U.S.

The wind turbine technology research and development that followed the oil embargoes of the 1970s refined old ideas and introduced new ways of converting wind energy into useful power. Many of these approaches have been demonstrated in “wind farms” or wind power plants (groups of turbines that feed electricity into the utility grid). Because of these efforts, the unit cost of wind power dropped dramatically. Prices for wind-generated electricity in the early 1980s were approximately 38 cents per kWh. They are currently between 2 and 6 cents per kWh (Renewable Energy Policy Project, 2003).

Wind power is currently the world’s fastest-growing source of electricity. Installed generating capacity grew at an average annual rate of 25 percent between 1990 and 2000, exceeding annual growth rates of less than 2 percent each for nuclear, oil and natural gas sources and an annual decline of 1 percent in coal consumption over this period. Installed wind energy generating capacity in the United States now totals 4,685 MW and generates approximately 11.2 billion kWh of electricity, although representing less than 1 percent of total U.S. electrical generation (AWEA, 2003).

As of December 2002, Washington State had a production capacity of 228 MW of wind power. Two wind power projects, Stateline near Walla Walla and Nine Canyon south of Kennewick, are currently operating in the state (Stifler, 2003). Both projects have recently been expanded or are currently being expanded. Five additional proposed wind energy projects, including Desert Claim and two others in Kittitas County, are currently in the permitting process.

2.1.3.2 Energy Production and Transfer

Converting energy from the wind into electrical energy occurs through five basic steps or functions, including power generation, transfer, collection, substation and transmission. These functions are summarized below and are illustrated in **Figure 2-1**.

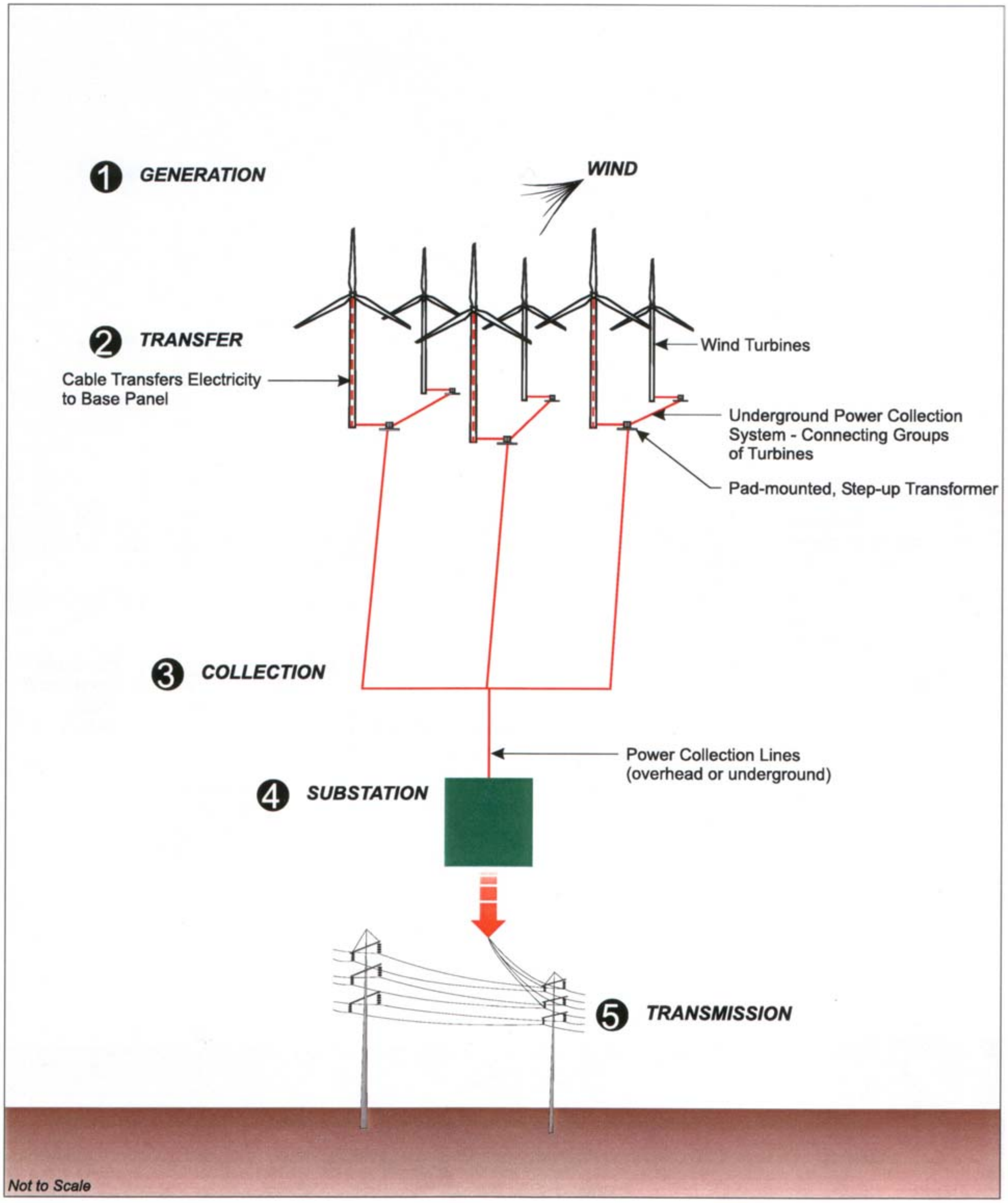
1. **Electrical Power Generation** – Electricity is generated by wind turbines, which consist of a tubular tower supporting a nacelle (the housing for an enclosed generator that is connected via a gear box to the rotor) and a three-bladed rotor. Wind blowing against the turbine blades causes them to rotate, which in turn rotates an electrical generator in the nacelle that produces an electrical current.

2. **Energy Transfer** – The generated electricity is carried down cables within the tower to a base panel at ground level inside the tower. The electricity then is fed to a pad-mounted transformer located adjacent to the tower that increases (steps up) the power to a higher voltage.

3. **Collection System –** The stepped-up power from the transformer then is fed into a power collection system. Power collection lines, most of which are typically underground, connect groups of wind turbines within the project to a project substation.

4. **Substation** – Substation equipment transforms or again steps up the voltage of the electricity from the project. It is also at the substation that the project’s energy is metered and controlled for safety and marketing.

5. **Transmission –** Energy is then fed by a transmission line connection from the substation to the regional electrical transmission system, through which it is conveyed to utility distribution systems for delivery to customers.



Source: Desert Claim, LLC, 2003

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-1** **How Wind Energy Works**

2.2 PROPOSED ACTION

The proposed action evaluated in the Final EIS reflects modifications to project elements presented in the Draft EIS. Under SEPA, the lead agency and the applicant may respond to comments received on a Draft EIS by modifying alternatives, including the proposed action, and may add mitigation measures to reduce and/or eliminate potential adverse environmental impacts (WAC 197-11-560). With approval and advice from Kittitas County, Desert Claim Wind Power LLC developed a modified project configuration that now represents the applicant's proposal for development of the project.

Section 2.2 describes the construction and operation of the proposed Desert Claim Wind Power Project, and how the proposal was modified subsequent to the distribution and review of the Draft EIS. Desert Claim Wind Power LLC developed the modified project proposal pursuant to the provisions of SEPA. The modifications are intended to respond to comments received on the Draft EIS and suggestions from Kittitas County. In general, the modifications incorporate additional mitigation measures designed to reduce potential adverse environmental impacts from the project.

Most notably, Desert Claim modified the project to include a performance-based safety zone setback of 487 feet from all project area boundaries and adjoining property lines, public roads, utility transmission corridors and the Kittitas Reclamation District (KRD) North Branch Canal. The 487-foot performance-based safety zone setback essentially doubles the 250-foot setback from these features originally proposed by Desert Claim, as represented in the Draft EIS. The proposal would provide the 487-foot safety zone setback while maintaining a 1,000-foot setback between turbines and residences. Based on hazard analysis documented in the Draft EIS, a 487-foot setback would provide sufficient protection to address potential mechanical hazards including tower collapse, blade throw and ice throw from the turbine model selected for the project—the GEWE 1.5sl.

In addition to providing the expanded safety zone setback, the modified project layout is designed to address other expected environmental constraints identified in the Draft EIS. Specifically, the modified project configuration is intended to incorporate mitigation of some visual impacts described in the Draft EIS, and to resolve potential conflict with air traffic associated with Bowers Field, the airport serving Ellensburg. Locations of sensitive environmental resources, including streams, wetlands and cultural resource sites, were also taken into account in developing the modified project configuration. **Section 2.2.2** provides more detailed discussion of the modifications to the project layout. The efficacy of these mitigation measures is discussed in the documentation of project impacts in **Chapter 3**.

The remainder of the section describes project construction and operation, based primarily upon the information provided in Desert Claim's January 2003 application to Kittitas County, supplemented in some instances with additional project planning information from the applicant. The project characteristics documented in **Section 2.2** provide the basis for the updated and supplemented impact analysis presented in **Chapter 3** of the EIS.

The description of the proposed action includes five separate components. **Section 2.2.1** identifies the proposed site for the wind energy project and summarizes the existing conditions at that site. **Section 2.2.2** describes the various types of facilities that will comprise the completed project, as modified pursuant to the SEPA objectives to incorporate mitigation measures designed to reduce potential adverse environmental impacts from the project. The construction process and operation and maintenance functions for the project are discussed in **Sections 2.2.3** and **2.2.4**, respectively. **Section 2.2.5** addresses provisions for future decommissioning of the project.

2.2.1 <u>Existing Project Site Conditions</u>

The location of the project area for the proposed Desert Claim Wind Power Project is indicated in **Figure 1-1**. This area has not changed or been modified since publication of the Draft EIS. Desert Claim Wind Power LLC has defined a project area boundary based on the property boundaries of the parcels for which Desert Claim has executed landowner agreements to permit development of the project. The project area contains approximately 5,237 acres held by eight landowners, all of whom signed agreements with *enXco* permitting it to seek permits to construct and operate the project on their lands. The southern edge of the project area is located approximately 8 miles north of the central part of Ellensburg. The project area extends approximately 5.5 miles from east to west and up to 5 miles in a north-to-south direction. The southwestern corner of the project area is over 1.5 miles east of U.S. Route 97 and can be accessed from U.S. Route 97 via Smithson Road. Access to the project area from Ellensburg can be via Wilson Creek Road, Robbins Road, Pheasant Lane, Reecer Creek Road or Lower Green Canyon Road.

2.2.1.1 Physical Setting

The project area is situated along the northern margin of the Kittitas Valley, which is the broad valley area of central Kittitas County on either side of the Yakima River between approximately Lookout Mountain and the Yakima Canyon. The terrain within the project area is relatively flat and open, with a gradual south-to-north rise in elevation totaling approximately 1,000 feet over a distance of approximately 5 miles. Surface elevations range from approximately 2,100 feet to 2,500 feet above sea level across most of the project area. The northernmost portion of the project area lies within the foothills of the Wenatchee Mountains (a portion of the Cascade mountain range), which rise to the north of the Kittitas Valley. The highest elevations and steepest slopes in the project area are in Township 19N, Range 18E, Sections 9 and 4, where the project area includes a foothill ridge rising from approximately 2,600 feet to approximately 3,100 feet in elevation.

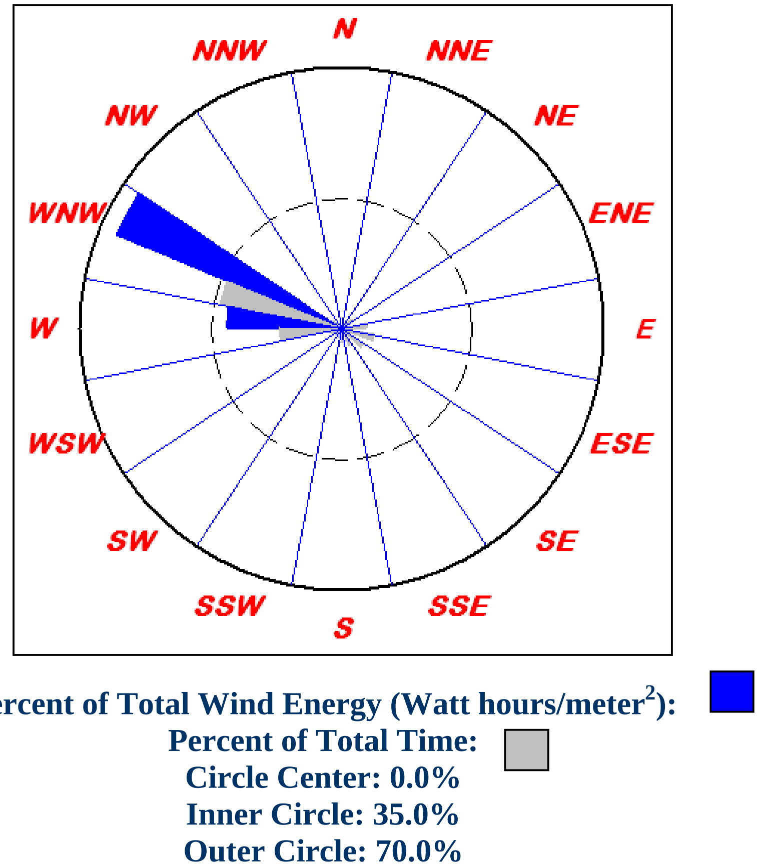
Geologically, the project area is located on a broad alluvial fan at the base of the mountains. The alluvial fan is a gently sloping area built up by soils carried down and deposited over millennia by water generated by receding glaciers that at one time covered the mountainous area to the north. Several small, gently sloping creeks flow generally north to south across the project area, forming shallow depressions across the otherwise even landscape.

The Kittitas Valley has an arid to semi-arid climate, with annual precipitation in Ellensburg averaging 8.5 inches per year (Kittitas County Conservation District 2003). Some patches of native shrub-steppe or grassland vegetation remain, particularly around the outer edges of the valley, while the existing vegetative cover in most of the valley is dominated by agricultural cultivation and landscape plantings.

2.2.1.2 Wind Resource

The climate of the Kittitas Valley is strongly influenced by surrounding mountainous terrain and air masses traveling east from the Pacific Ocean towards central and eastern Washington. The Cascade Mountains form a north-south topographic and climatic barrier influencing prevailing wind direction, temperatures and precipitation. Cooling and condensation occur as air rises over the western slope of the Cascades, producing heavy precipitation in the mountains; as the air masses descend along the eastern slope they become warmer and drier, however, producing lighter precipitation and consistent winds in the Kittitas Valley. Prevailing local winds are generally from the west to northwest and are strongest in the spring and summer. The wind speed in Ellensburg averages approximately 4.8 meters/second (m/s) (nearly 11 miles per hour [mph)for the year, with seasonal averages of over 6 m/s (13 mph) for the spring and nearly 7 m/s (16 mph) in the summer (NREL 2003). **Figure 2-2** illustrates prevailing wind patterns for the project area.

Figure 2-2
Wind Rose for Project Area



Publicly available wind resource maps characterize the project area and surrounding lands as an area of Class 4 (Good) wind resource, with typical wind speeds at a height of 164 feet (50 meters) averaging 15.7 to 16.8 mph (Northwest Sustainable Energy for Economic Development, 2003). Average wind speeds of at least 13 mph are generally considered to be the minimum requirement for utility-scale wind power plants (American Wind Energy Association 2003). *enXco* collected meteorological data at multiple sites within Kittitas County beginning in 2001 as part of its resource exploration studies. Temporary meteorological (met) towers were erected in several locations. Each tower was equipped with several anemometers to measure wind speed, a wind vane to measure wind direction and a temperature sensor. All of the instruments provided site data to loggers that recorded the observed data. The desired baseline criterion for feasible, utility-scale wind power production (depending on the model of turbine selected) is a wind speed of 13 to 15 miles per hour (mph) at least 30 percent of the time annually.

enXco and Desert Claim installed six 50-meter-high (164 feet) meteorological towers within the project area in 2001 and 2002. The meteorological data collected over the past 3 years confirm that there is a sufficient commercial wind resource for power generation in the proposed project area.

2.2.1.3 Land Ownership and Use

Land Ownership

Figure 2-3 identifies current land ownership within the project vicinity. The parcels included within the project comprise portions of:

- Township 19N, Range 18E, Sections 4, 9, 17, 20, 21, 24 to 29, and 35; and
- Township 19N, Range 19E, Sections 30 and 31.

The surface estates for the 5,237 acres of land within the project area are entirely within private ownership, distributed among eight landowners. One project parcel has a severed estate, in which a private party owns the surface and the Washington Department of Natural Resources (WDNR) controls the mineral rights. There are no publicly-owned lands in the project area. There are several rights-of-way easements crossing the project area, however, including the following:

- The Kittitas Reclamation District (KRD), a local irrigation district, owns and operates the North Branch Canal, which traverses the south portion of the project area;
- The Bonneville Power Administration (BPA), a federal power marketing agency, maintains six electrical transmission lines that cross the project area;
- Puget Sound Energy (PSE), an investor-owned utility, maintains one transmission line within the project area and another outside but near the project area;
- The Kittitas County Public Utility District (PUD) maintains the electrical distribution system that serves the project area and vicinity; and
- Kittitas County maintains the county roads within and adjacent to the project area.

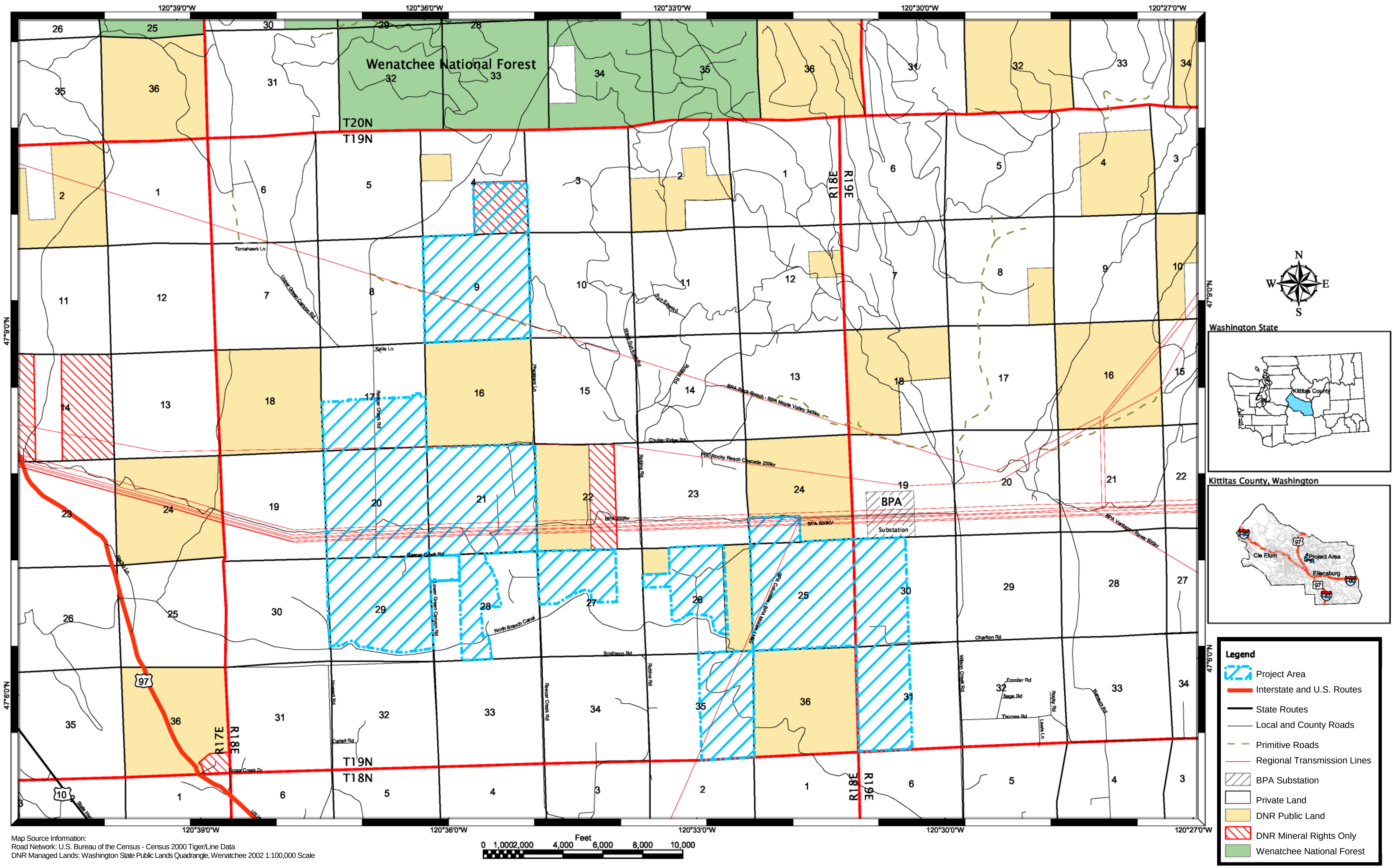
Other lands interspersed among the project parcels and in the surrounding area include the following:

- Several widely spaced sections and partial sections of State-owned land managed by WDNR;
- Federal land managed by the U.S. Forest Service (USFS) within the Cle Elum Ranger District of the Wenatchee National Forest, which begins one-half mile from the northernmost boundary of the project area; and
- Numerous parcels of varying size owned by other private parties not participating in the project.

Consistent with County regulations, Desert Claim's application provides the names and addresses of 56 landowners who at that time owned the 101 parcels located within 300 feet from and parallel to the boundaries of the proposed activities and such contiguous area under the legal control of the applicant.

Land Use

The project area is in a rural, relatively lightly populated section of Kittitas County and is characterized primarily by a variety of agricultural uses. Much of the land within and surrounding the project area is cultivated for feed crop production or pasture. There are extensive areas of rangeland used for grazing. Rural residential development occurs in a number of locations, including dwellings on farm or ranch properties, scattered residences on large lots, and a few small clusters of homes.



Source: Desert Claim, LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 2-3

Project Vicinity Land Ownership

In response to comments received on the Draft EIS, the applicant and the County's EIS team verified the number of residences that are within the project area or within 1,000 feet of the project area boundary. This field study, conducted in the spring of 2004, established that there are 32 residences that are within the project area or within 1,000 feet of the project area boundary. Maps indicating the locations of these residences are included in **Sections 3.7, 3.8** and **3.9**.

There are also several notable utility or infrastructure uses in and near the project area. The project area is within a major cross-state electrical transmission corridor linking hydroelectric dams on the Columbia River with the large power consumer market of western Washington. Eight high-voltage transmission lines either directly cross or are adjacent to the project area; six are owned and operated by the Bonneville Power Administration (BPA) and two by Puget Sound Energy (PSE). A BPA regional substation is located on a 133-acre parcel adjacent to the northeastern corner of the project area. The KRD North Branch Canal, providing irrigation water for much of the northern part of the Kittitas Valley, traverses east to west in the vicinity of Smithson Road, generally along or near the southern edge of the project area. Most irrigated agriculture occurs downhill and south of the canal and the Project Area.

Wenatchee National Forest lands north of the project area are used for recreation, grazing and commercial forestry. Recreational activities include camping, hiking, horseback riding, mountain biking, off-road vehicle (ORV) use, hunting, snowmobiling and cross-country skiing. Members of the Yakama Nation hunt, gather plants, and conduct other traditional activities in the vicinity of the project area, pursuant to reserved treaty rights applicable to ceded lands. The private lands of the project area itself are not open to general public access and use. Some low-intensity outdoor recreational uses, including hunting, horseback riding, and snowmobile and ORV use, occur within the project area with permission from individual landowners.

Most of the land within the project area is zoned Ag-20 (agricultural use, with a 20-acre minimum parcel size) under the Kittitas County Code (see Section 3.7 for more detailed discussion). The northwestern portion of the project area is within a foothill-area band zoned as Forest & Range (FR). Residential development at a maximum density of 20 acres per dwelling unit is allowed in this zone. The entire project area and the adjacent lands are within a large area designated as Rural in the Kittitas County Comprehensive Plan. Forested areas to the north are designated as Commercial Forest, and there are some areas several miles to the south designated as Commercial Agriculture.

2.2.2 Project Facilities

As indicated in **Section 2.1.3**, wind energy projects consist of several distinct types of project facilities. These include the wind turbines themselves, power collection, substation and transmission facilities, project access roads, and a project operations and maintenance facility. Each facility component is described below, based on the project planning information that is currently available.

2.2.2.1 Wind Turbines

The proposed action involves construction of a maximum of 120 individual wind turbines within the project area. In this document, the term *wind turbine*, or *turbine*, refers to the entire structure that produces electricity. Each turbine consists of three rotor blades connected at the rotor hub, a nacelle (the housing for the generator, which is connected via a gear box and rotor to the blades), and a tubular tower anchored to a tower foundation. Each of these turbine components is summarized below. **Figure 2-4** is a photograph of a typical wind turbine in current use.

Source: GE Wind Energy

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-4** **Photo of Typical Wind Turbine**

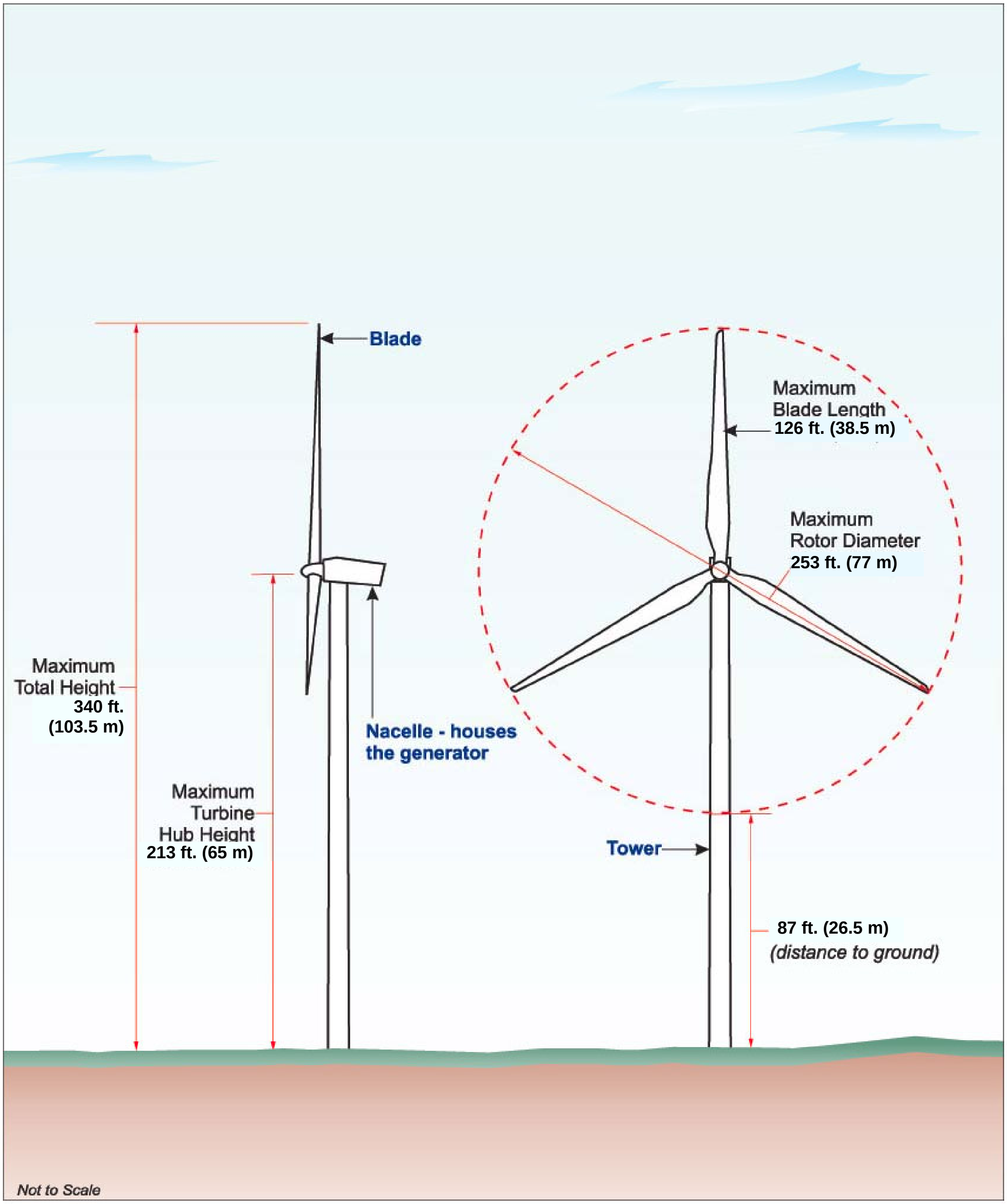
At the time the Draft EIS was published, Desert Claim had not selected the turbine model it would use in this project. Therefore, the Draft EIS included a list of potential turbine manufacturers and models shown in **Table 2-1**. The Draft EIS analyzed a "maximum turbine envelope" within which each wind turbine would fit, including the rotor blade (when pointing straight up). The maximum turbine envelope was 393 feet (120 meters) tall; each tower (measured to the rotor hub) within that maximum envelope was up to 262 feet (80 meters) tall, and the rotor blades would be up to 262 feet (80 meters) in diameter and would reach 131 feet (40 meters) above the ground when pointing straight down (although the blades could be closer to the ground if a different turbine configuration were used). **Figure 2-5** in the Draft EIS illustrated the maximum turbine envelope for a typical turbine that would be used for the Desert Claim project; this graphic has been modified for the Final EIS to show the dimensions of the GEWE 1.5sl turbine selected by the applicant.

Desert Claim selected the General Electric Wind Energy (GEWE) 1.5sl as the turbine to be used in this project. The GEWE 1.5sl has a nameplate generation capacity of 1.5 megawatts (MW) of electricity. The GEWE 1.5sl was listed in the Draft EIS table of potential turbines (**Table 2-1**) and fits within the maximum turbine envelope analyzed in the Draft EIS; the GEWE 1.5sl is actually smaller than the maximum turbine analyzed in the Draft EIS because it uses a 212-foot (65-meter) tall tower and a 253-foot (77-meter) diameter rotor.

Table 2-1
Potential Turbine Manufacturers and Models
for Desert Claim Project

Manufacturer Name	Rated Power (MW)	Hub Height (m)	Rotor Diameter (m)
GEWE*	1.5	65 & 80	70.5 & 77
Vestas	1.75	67 & 78	66
	1.8	67 & 78	80
	2.0	67 & 78	80
NEG Micon	1.5	70 & 80	72
	1.65	70 & 80	72

* Desert Claim proposes to use the GEWE 1.5sl model for the project, as described in **Section 2.2.2.1**.



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-5** **Diagram of Proposed Wind Turbine**

Towers

The Desert Claim project would employ tubular steel towers to support the nacelle, rotor and blades. The purpose of the tower is to position the turbine blades high enough to intercept winds that are stronger than those near the ground surface, and to avoid wind turbulence that might be created by nearby trees, buildings, terrain or other obstructions (National Wind Coordinating Committee, 2002). As indicated above, each tower would be a maximum of 212 feet (65 meters) in height. The tower would have a diameter of approximately 12 feet at the base, tapering to 9 feet at the top of the structure. When fully assembled, each tower would weigh approximately 100 tons. The heavy, rolled steel forming the tower structure would have a smooth exterior surface. The turbine towers may be painted a neutral color (such as light gray), to be selected based on analysis of the visibility of the project structures.

A locked steel door would provide secured access to the base of each tower. A locked, computerized control cabinet would be located inside the tower at the base. Cables and a steel ladder would extend within the hollow tower interior from the tower base to the nacelle, to provide access for turbine maintenance.

Foundations

The freestanding, tubular towers would sit atop steel and concrete foundations designed for the specific subsurface conditions at the individual turbine sites. There are two industry-standard foundation designs that could be applicable for use in the Desert Claim project, which are depicted in **Figures 2-6A** and **2-6B**. The first graphic illustrates an “inverted T” foundation, which employs a relatively shallow concrete base with a relatively large diameter. The maximum depth of the base would be about 8 feet below the ground surface, while the diameter would be approximately 42 feet. The turbine tower would be anchored to the foundation base by a baseplate ring consisting of long, steel bolts extending nearly to the bottom of the concrete base.

Figure 2-6B shows a cross-section view of the pile type foundation. In this case, a cylindrical culvert instead of a concrete foundation is used to anchor the tower base. Inner and outer sections of culvert pipe of slightly different diameter are sunk into an excavation that would range from 25 to 35 feet in depth, depending on specific subsurface conditions, and are backfilled with compacted soil. Two parallel rings of full-length steel anchor bolts extend from the tower base plate through the culvert section, which is filled with concrete after installation of the bolts.

A Washington-state licensed engineer would select the appropriate foundation design for each turbine location during the design phase of the project. The foundation selections would be based on site-specific information on geotechnical conditions present, advice on load-bearing capacities from a geotechnical engineer, and the design engineer’s recommendations. The foundation designs would conform to state and county requirements and standard industry practices. All foundation designs would be reviewed and approved by a Washington State-registered structural engineer.

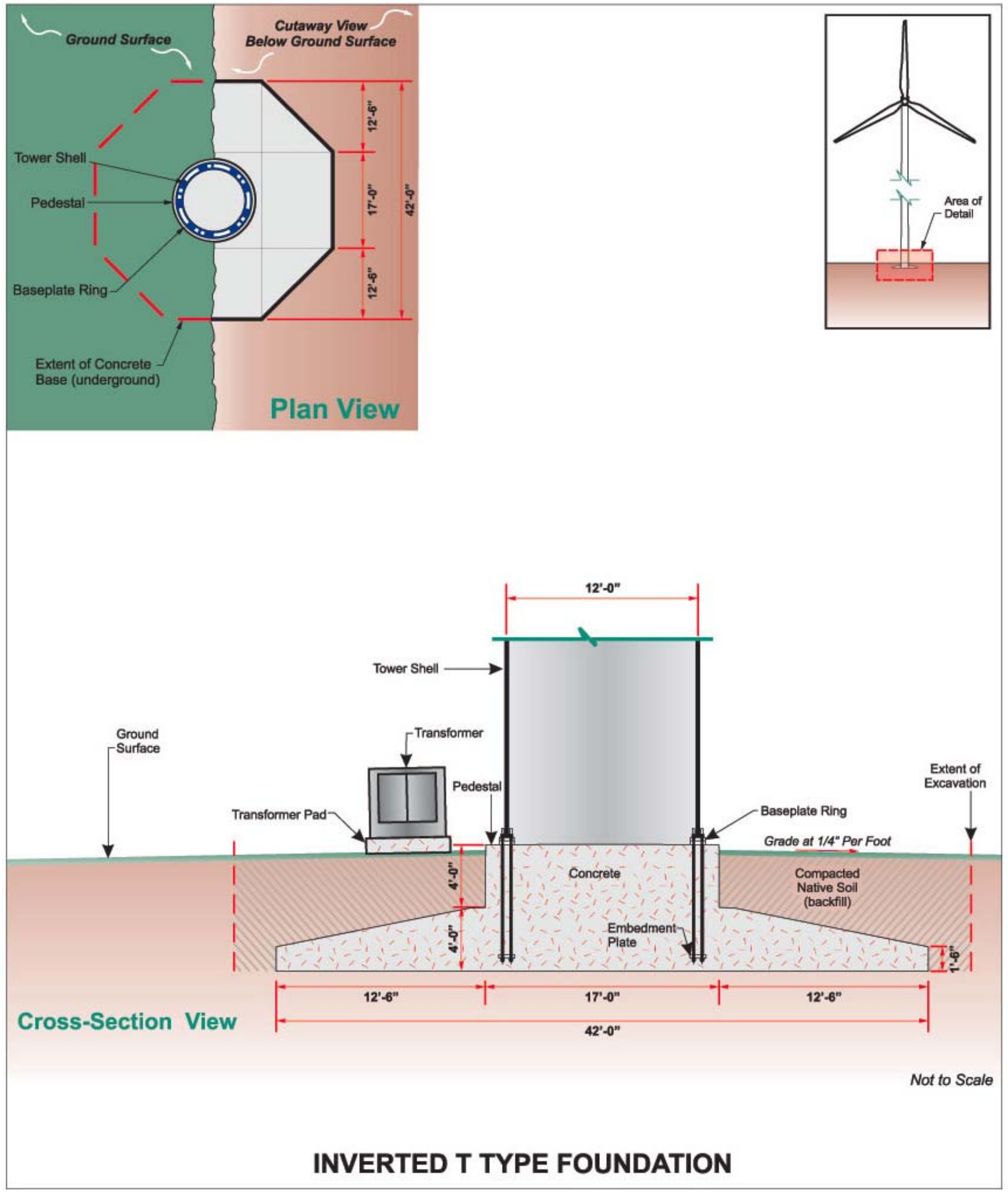


Figure 2-6A

Typical Turbine Foundation – Inverted T

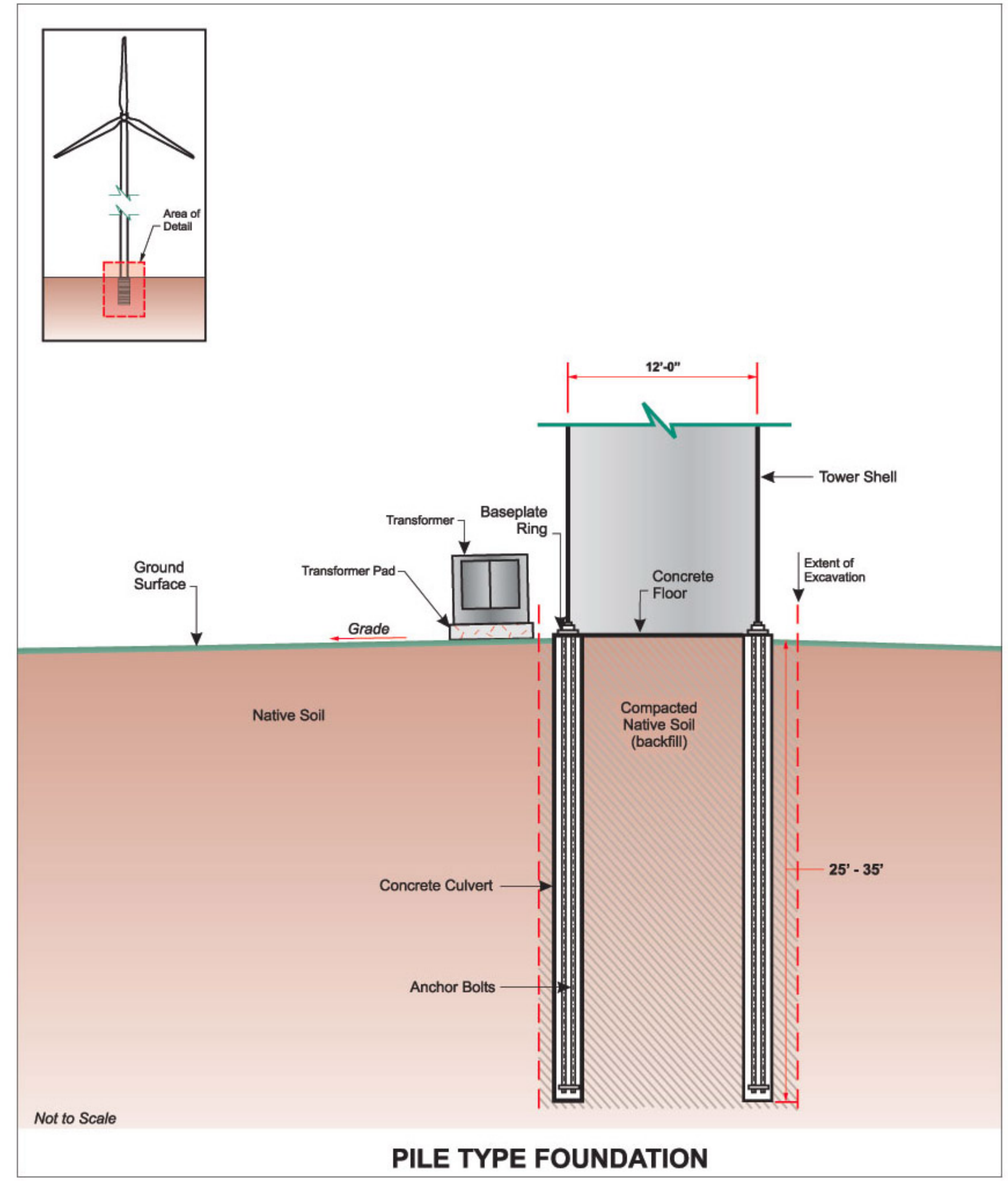


Figure 2-6B

Typical Turbine Foundation – Pile Type

Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA	**Kittitas County** **Desert Claim Wind Power Project EIS**	**Figure 2-6A & B** **Typical Turbine Foundations**

Nacelle and Rotors

The nacelle is the rectangular housing that covers the operating mechanism of the turbine. Each nacelle would be approximately 29 feet long, 12 feet wide and 13 feet high. The exterior surface of the nacelle would be constructed of fiberglass lined with sound-absorbing foam. The generator, gear box and associated control equipment for the turbine would be housed inside the shell of the nacelle (see **Figure 2-7**). The nacelle would be accessed internally through the tower, and most servicing of the machinery would be conducted within the nacelle to protect the equipment and the workers from the elements.

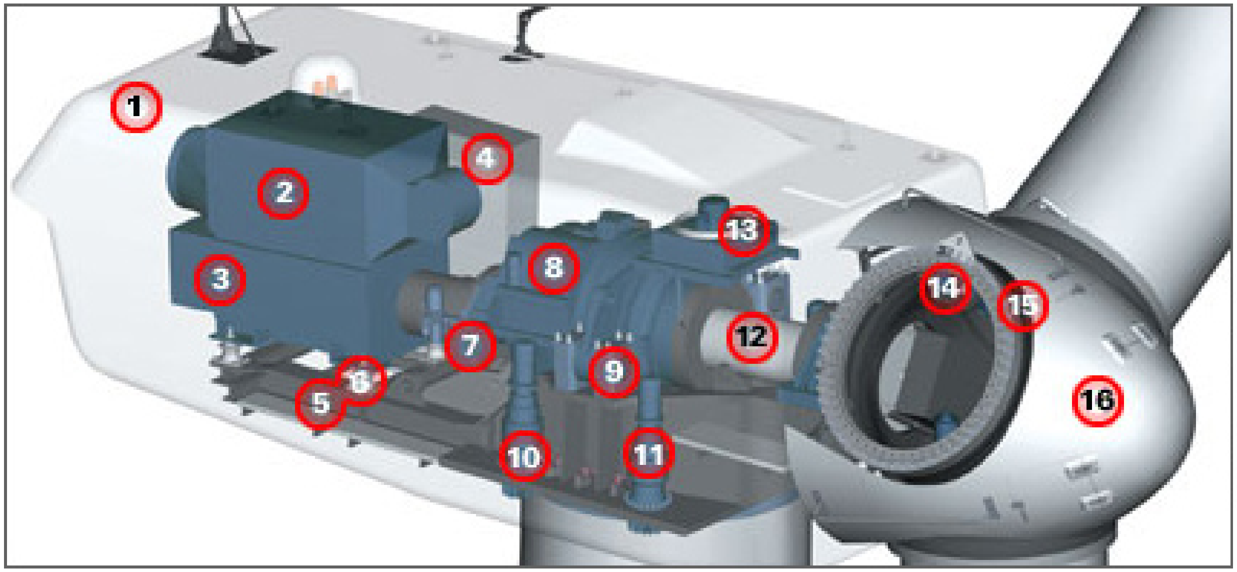
The rotor assembly for each turbine would include three blades, and would be attached to the front of the nacelle at the hub. The Desert Claim project would use the "upwind" turbine design, in which the nacelle is turned into the wind to place the generator and tower behind the blades. The blades would be composed of laminated fiberglass or a fiberglass composite, and would have a smooth outer surface. Each blade would be fabricated offsite in one piece, transported to the project site, and then the assembly would be bolted to the rotor hub, raised into position by crane and connected to the nacelle. When fully assembled at the site, each nacelle, rotor hub and blades combined would weigh approximately 120 tons.

The equipment inside the nacelle would include electrical motors used to turn the nacelle and rotors into the wind, and to control the pitch of the rotor blades, and an automatic braking system. The pitch of the rotor blades would be controlled by a computer that would rotate them continually on their axis to maintain the optimum angle to the wind to maximize generation output at a given wind direction and speed. At wind speeds above the maximum safety threshold of 56 mph, the blades would be rotated into a feathered position and the braking system would stop the rotor from turning. After 20 minutes and when the wind speed reduces to 45 mph or below, the blades would rotate into the wind and start turning again.

2.2.2.2 Turbine Locations

Desert Claim modified the proposed turbine locations depicted in the Draft EIS, using a multi-step process. First, Desert Claim, working with the County's EIS team, field-verified the number and location of 32 residences located within the project area or within 1,000 feet of the project area boundary.

Next, Desert Claim developed and incorporated a 487-foot performance-based safety zone setback into the turbine layout for the project, while maintaining a 1,000-foot setback from residences. The original project proposal analyzed in the Draft EIS included a 1,000-foot setback from residences and a 250-foot setback from the project area boundary, adjoining property lines, public roads, utility corridors and the KRD canal. Numerous comments on the Draft EIS requested a larger setback. Those comments and the responses are provided in **Chapter 5** of the Final EIS.



1. Nacelle
2. Heat Exchanger
3. Generator
4. Control Panel
5. Main Frame
6. Impact Noise Insulation
7. Hydraulic Parking Brake
8. Gearbox
9. Impact Noise Insulation
10. Yaw Drive
11. Yaw Drive
12. Rotor Shaft
13. Oil Cooler
14. Pitch Drive
15. Rotor Hub
16. Nose Cone

Source: GE Wind Energy

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-7** **Typical Nacelle Configuration**

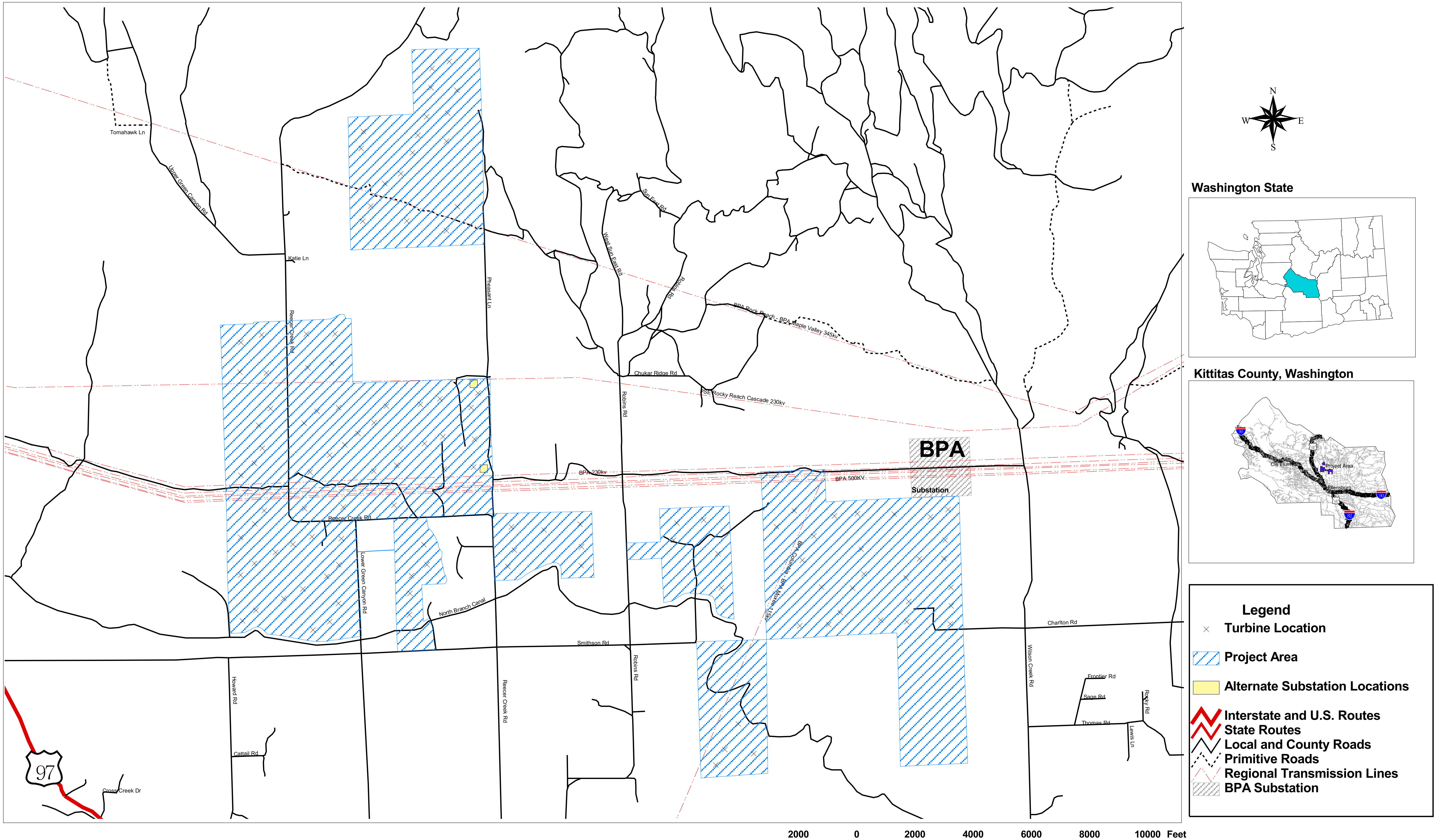
Analysis in the Draft EIS (**Section 3.8**) indicated the potential for, and physical range of potential impacts from mechanical hazards including tower collapse, blade throw and ice throw. For tower collapse, the Draft EIS stated "…human access should be restricted and high-value facilities should not be built within a distance equal to 110 percent of the tower height plus half the rotor diameter." For the GEWE 1.5sl, the tower collapse safety zone is 416 feet (127 meters). For blade throw, the Draft EIS stated "…human access should be restricted and high-value facilities should not be built within a distance equal to 110 percent of the maximum blade throw…" For the GEWE 1.5sl, the blade throw safety zone is 487 feet (443 feet plus 10 percent -- 44 feet, or148 meters; see **Table 3.8-1**). For ice throw, the Draft EIS stated "Ice throw over 100 m has not been documented as a hazard and an ice throw injury has not been reported. GE Wind Energy, the manufacturer of the GEWE 1.5sl, recommends using an ice throw exclusion zone with a radius of 125 m [410 feet] on the downwind side of the tower, which it cites as 125 percent of the largest recorded throw distance." Therefore, using the safety zone for the GEWE 1.5sl for blade throw (487 feet) also provides sufficient setback protection for both tower collapse (416 feet) and ice throw (410 feet).

The performance-based safety zone would provide an adequate setback to ensure protection for the mechanical hazards discussed above and provide flexibility based on the turbine model selected for a specific wind power project. For example, if a turbine model using a larger tower or rotor were proposed, the safety zone setback would increase proportionate to the greater turbine size. Desert Claim incorporated this performance-based safety zone into the modified turbine layout for the project.

A maximum of 120 turbines would be installed within the project area, distributed across the project site according to the modified location plan indicated in **Figure 2-8A**; as before, turbines would be micro-sited at each location to minimize environmental impacts disclosed in this EIS. The modified turbine placement plan was determined using computerized modeling software that incorporated the field-verified residence data, the performance-based safety zone setback and wind resource considerations from metrological data collected in the project area, long-term weather data, project area topography and environmental factors. For comparison purposes, **Figure 2-8B** shows both the modified turbine location plan and the original proposal described in the Draft EIS.

The objective of the turbine location plan is to provide each turbine with optimum exposure to wind from all directions, with emphasis on exposure to the prevailing northwesterly wind direction. Sufficient spacing was established between wind turbine towers to minimize array and wake losses (i.e., energy losses created by turbulence between and among the turbines).

The distribution of turbines for the Desert Claim project differs from what is often seen at existing wind energy projects. Wind projects typically have turbines located in long strings along ridge tops, because the ridge tops are where the winds are strongest and not slowed or stirred by the land. Winds in the Desert Claim project area typically come out of the northwest from the upper valley, after funneling through passes in the Cascade Mountains, and spread out on the lower, flat portion of the northern Kittitas Valley. Therefore, the Desert Claim turbines would be dispersed rather evenly over a broad plain in response to the site's wind energy pattern.

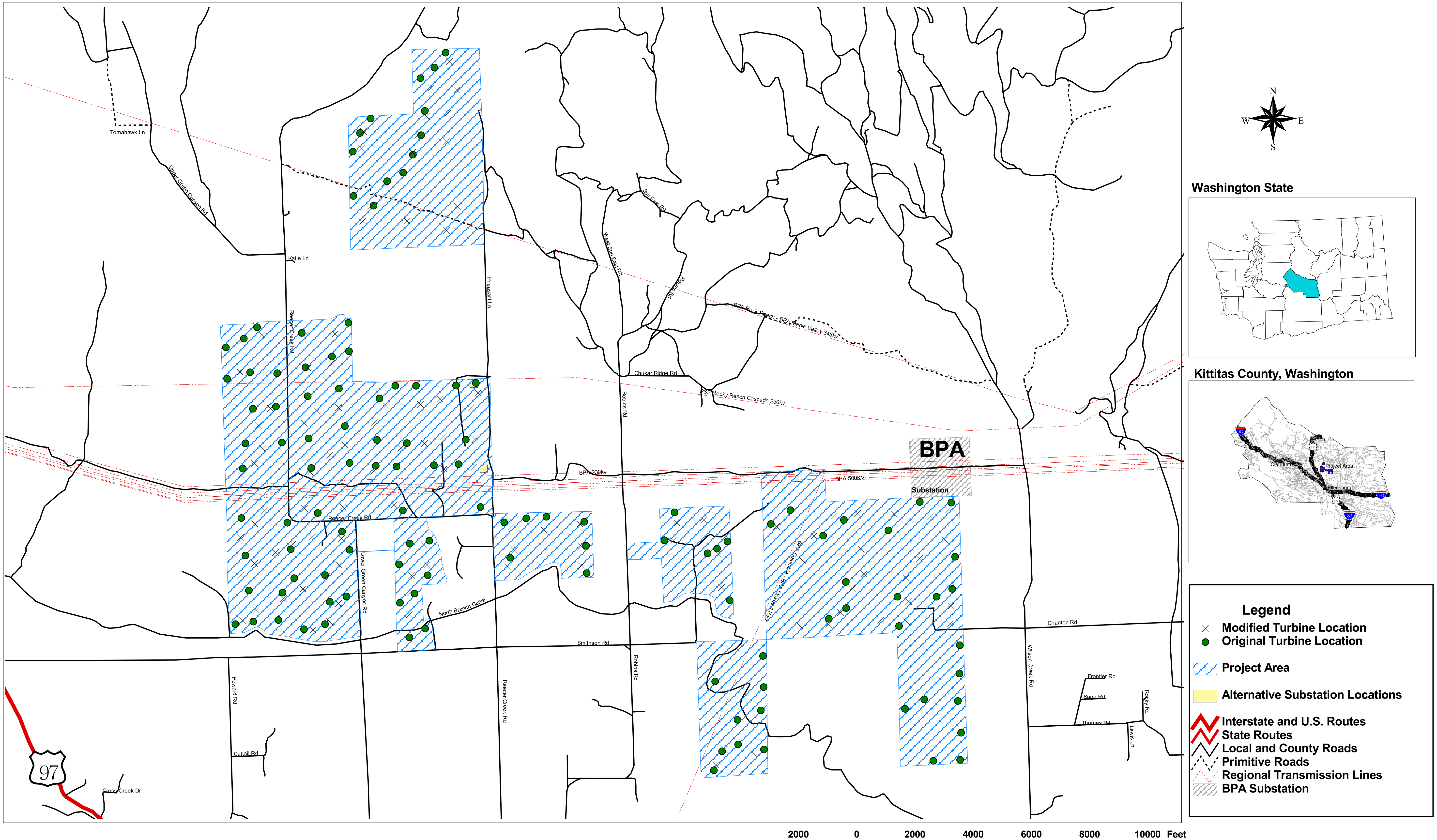


Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 2-8A
Proposed Turbine Location Plan



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 2-8B
Comparison of Modified and Original Turbine Location Plans

2.2.2.3 Project Electrical System

The electrical system for the Desert Claim project would consist of three primary components. These include the power collection system, a project substation and an interconnection to the regional power transmission grid. The function of the electrical system would be to collect the electricity produced by the project turbines and convert it to higher-voltage electricity that can be fed into the regional power system.

Power Collection System

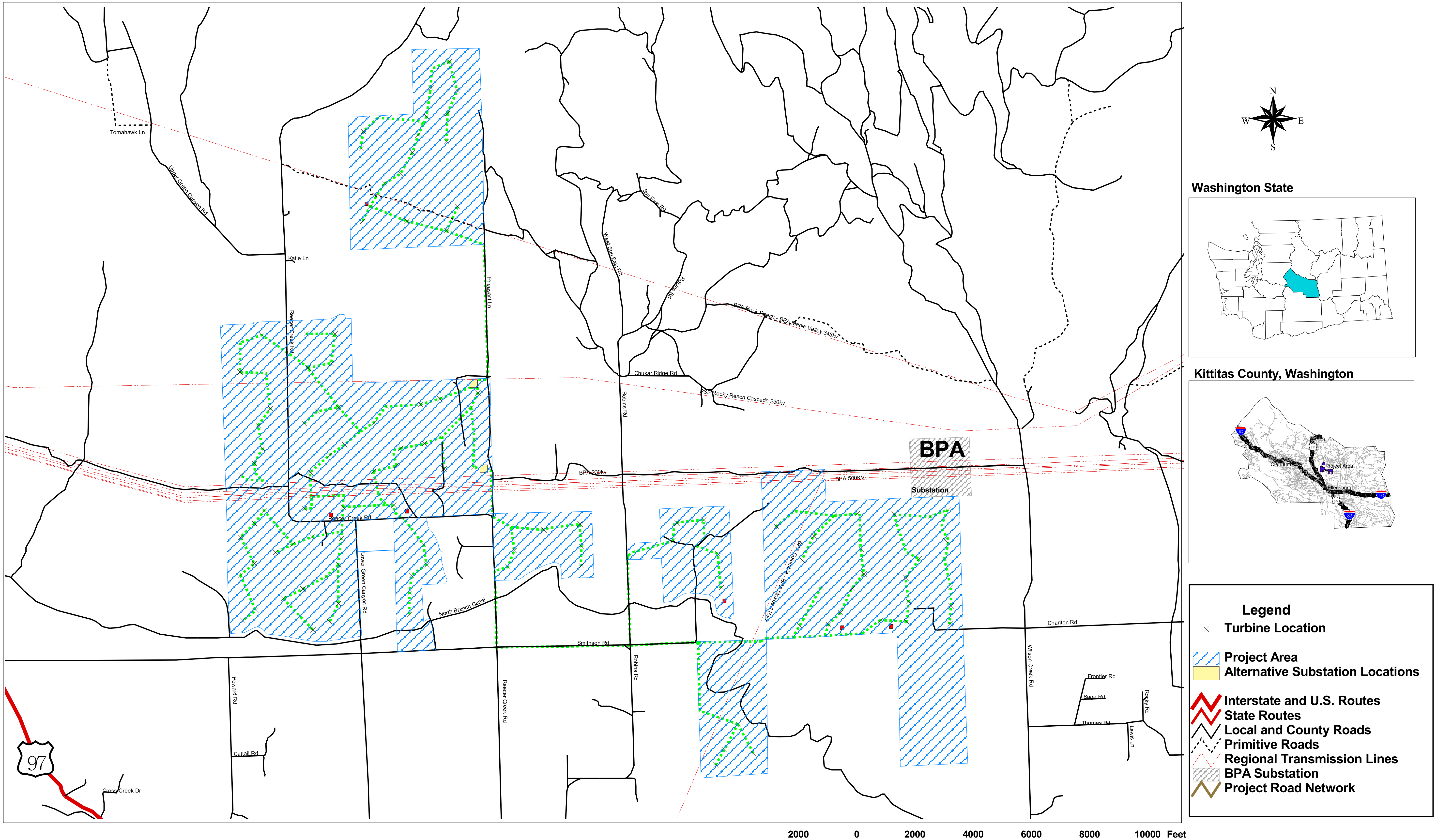
Desert Claim has also reconfigured the power collection system as part of modifying the turbine layout. This was intended to avoid sensitive environmental features identified in the Draft EIS, and to place power collection cables underground except where it is not reasonably feasible to do so. These modifications were designed to minimize project impacts by avoiding sensitive environmental features, including wetlands and streams, as discussed in **Chapter 3**.

The generator housed in the nacelle of each turbine would produce low-voltage electricity at 575 volts. Low-voltage cables located inside the tower would carry the electricity from the nacelle through the tower to a transformer mounted on a concrete pad adjacent to the base of each tower (see **Figure 2-6**). The pad would be approximately 8 to 9 feet square and 1 foot thick. The transformer would occupy almost the entire area of the concrete pad and would be approximately 5 feet high. The transformer would raise the voltage from 575 volts to 34.5 kilovolts (kV).

Electricity would be carried underground from the transformer into a 34.5-kV power cable installed as part of the power collection system. The network of power collection cables would connect the 120 project turbines to the project substation (see below). Junction boxes (equipment for merging multiple incoming cables into one outgoing line) would be installed at various locations within the project area to facilitate the collection of power from individual and groups of turbines. **Figure 2-9** illustrates the expected layout of the project power collection system.

Power collection cables would be placed underground except where it is not reasonably possible to do so based on site-specific physical conditions (i.e., where it would be less disruptive to sensitive environmental features to place the cables above ground, or where steep and/or rocky terrain favored the use of overhead cable). Underground cables would be installed in trenches or plowed-in at a depth of 4 feet below the ground surface.

Overhead collection lines, where they might be used to avoid impacts caused to sensitive environmental features by placing cables underground, would be carried on wood-pole structures typically 37 feet high. **Figure 2-10** includes an illustration of a typical structure that could be used for 34.5-kV overhead collection lines (left panel of graphic). The structures for overhead lines would provide a conductor spacing of at least 3 feet, to reduce the possibility of conductors contacting each other in storms.

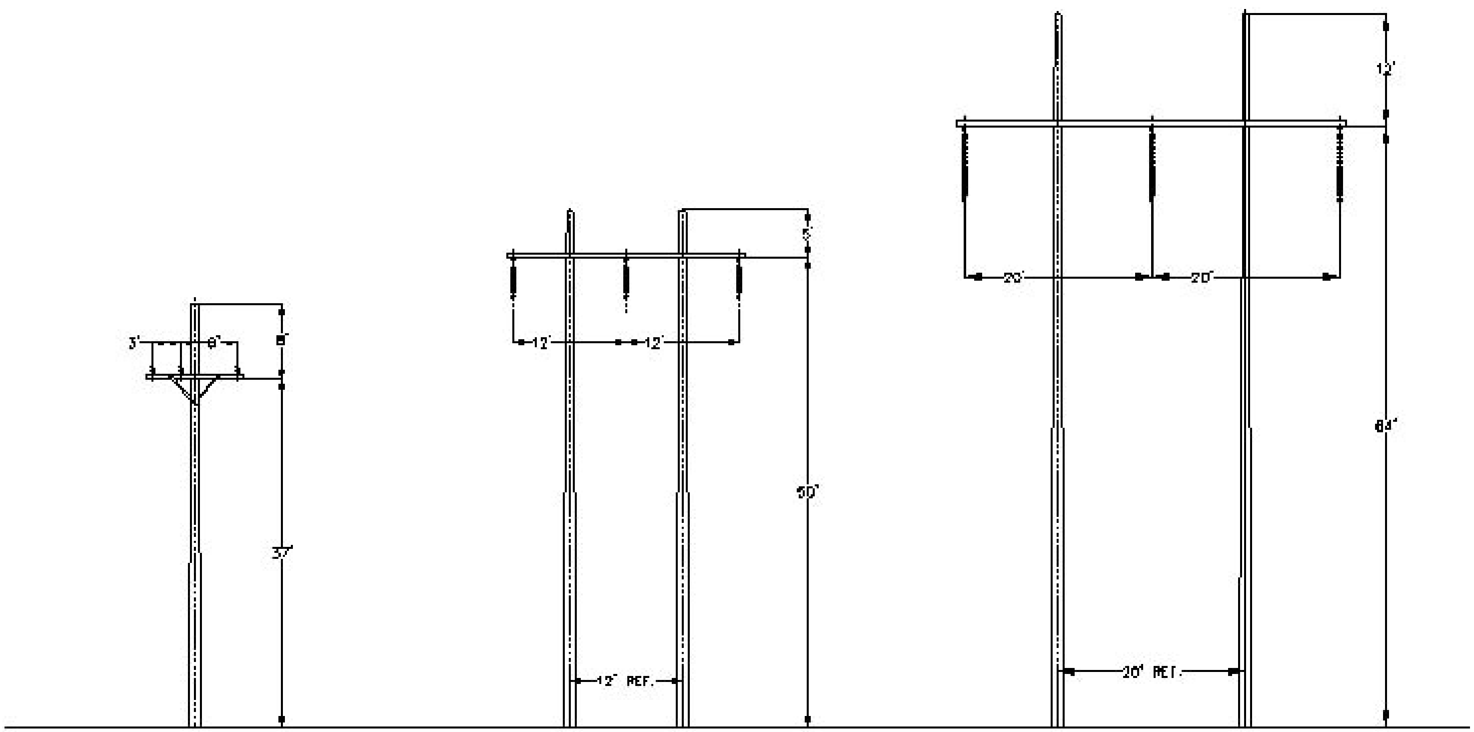


Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 2-9
Project Power Collection System



34.5 KV POLE LINE
(Overhead Power
Collection)

115 KV
TRANSMISSION TOWER

230 KV
TRANSMISSION TOWER

Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power
Project EIS

Figure 2-10

Typical Overhead Power Collection and Transmission Interconnection Structures

The modified configuration of the power collection system represents a net reduction of 1.5 lineal miles of cable compared to the layout documented in the Draft EIS. Overall, the collection system is now estimated to contain approximately 31 lineal miles of underground cable, with less than 1 lineal mile of overhead power collection cable to be substituted for underground cable, if needed in areas where it was not feasible to bury cable. This compares to 25 lineal miles of underground cable and 7.5 lineal miles of overheard cable as stated in the Draft EIS. As before, most of the power collection lines would be located within the properties that comprise the project area. Given the configuration of the project land parcels, however, some lines would need to be located outside the project boundary. This condition applies to approximately 3 miles of collection cable connecting portions of the project area to the substation; wherever feasible, these power collection cables would be located underground, within existing County right-of-way and/or easements obtained by Desert Claim. Prior to operation, the applicant would need to acquire permits, easements, and agreements from the appropriate entities for power collection lines outside the project area boundary.

Substation

An electrical substation would be needed to provide a further increase in voltage for the power collected from the project turbines. Two alternative locations for a project substation are identified in the Final EIS. The Draft EIS identified a substation location near the southeastern corner of Section 21, T. 19N, R. 18E, consistent with the Desert Claim application. This location is essentially adjacent to the multiple BPA transmission lines that cross the project area. The modified project configuration, as shown in **Figure 2-9**, also identifies a proposed substation location near the northeast corner of Section 21, approximately 1 mile north of the intersection of Reecer Creek Road and Pheasant Lane. This location nearly abuts the PSE Rocky Reach-Cascade 230 kV transmission line that also crosses the project area.

The applicant has indicated that either alternative location or that two substations might be required, depending on which transmission system (BPA and/or PSE) is the receiver for the project interconnection and the voltage requirements for that interconnection. The final selection of the substation location(s) would be made after the interconnection point had been determined with the transmission system owner. The applicant has identified a suitable substation location for either case, and the Final EIS addresses the impacts of substation development at either location. Both substation locations are shown on Figure 2-9 and related graphics showing the location of project facilities.

A larger power transformer (as compared to the pad-mounted transformers at the base of the turbines) located within the project substation would step up the voltage of the electricity flowing from the project power collection system (at 34.5 kV) to meet the higher voltage of the receiving electrical transmission line (see discussion below). Substation equipment would include a power transformer, disconnect switches, and metering relays. The substation would include a small building that would house the power generation control and relaying equipment, station batteries, and the supervisory control and data acquisition (SCADA) system. The entire substation area would be cleared, graded and covered with gravel, and would be surrounded by a chain-link fence. The completed substation would occupy an area of approximately 2 acres. The substation would be designed to meet the standards of the National Electric Safety Code and the requirements of the entity operating the receiving transmission line. The operations and maintenance (O&M) facility would be co-located with the project substation.

Transmission Interconnection

An overhead transmission line would be constructed to connect the project substation with an onsite high-voltage electrical transmission line. Desert Claim and *enXco* have not yet negotiated a power sale agreement or an interconnection agreement, but have identified several possible options for interconnecting the project to the regional transmission network. Existing regional transmission lines located on or near the project area include the following:

- The Bonneville Power Administration operates five transmission lines, at voltages ranging from 230 kV to 500 kV, within a major corridor that extends west from the Columbia River hydroelectric system and essentially bisects the project in two areas; the proposed project substation location is just to the south of this corridor.
- The BPA Columbia-Moxee 115 kV line diverges from the main corridor approximately 1 mile west of Schultz Substation and proceeds on a southwesterly path toward the Yakima Valley, crossing through the eastern portion of the project area.
- The Puget Sound Energy Rocky Reach-Cascade 230 kV line follows a generally east-to-west path through the project area; near the proposed substation location, it is approximately one-half mile north of the main BPA corridor.
- The PSE Cle Elum-Kittitas 115 kV line passes near the project area and could provide an interconnection point at the Woldale substation, which is located near the intersection of U.S. Route 97 and State Route 10.

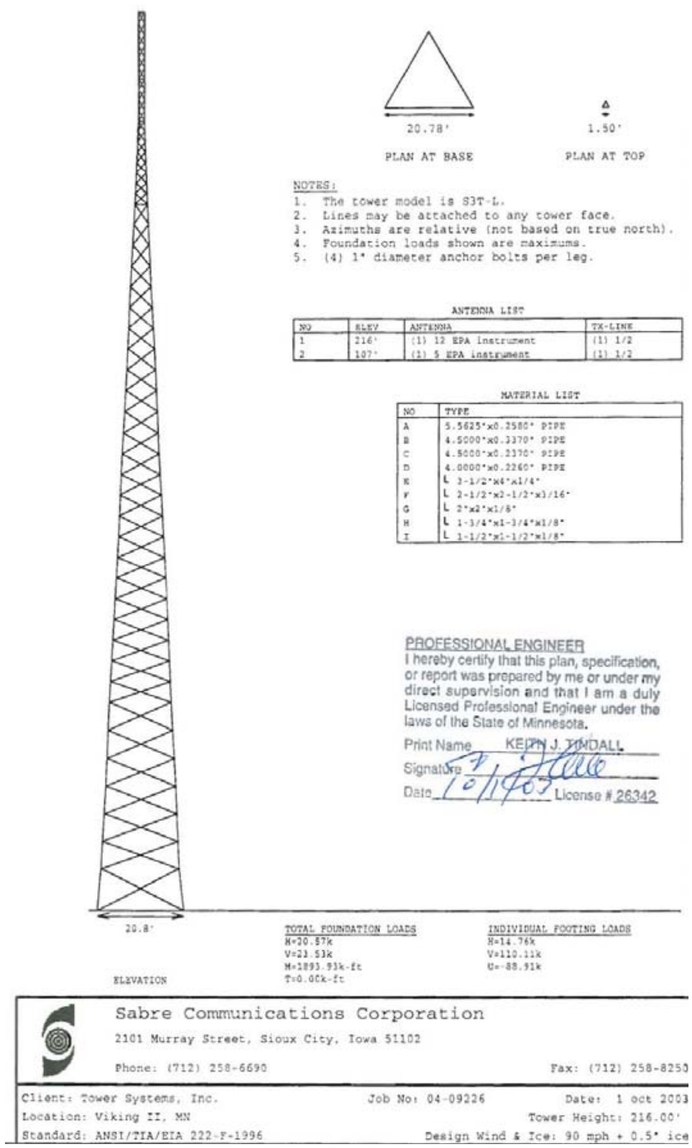
The characteristics of the project interconnection facility would depend upon which transmission option is selected for the interconnection. The length of the interconnection line would be no more than approximately 300 feet for a connection to either the BPA or PSE lines within the project area, based on the alternative substation locations indicated in **Figure 2-9**. If the project connected to a 230-kV transmission line (either BPA or PSE), the interconnection line would likely be mounted on either wood poles or H-frame structures. The structures would likely be from 70 to nearly 100 feet in height and would typically be spaced several hundred feet apart. Connection to a 115-kV line could also involve steel or wood structures with similar spacing but slightly shorter structures. **Figure 2-10** also illustrates typical designs for transmission lines of the applicable sizes (115-kV in the center panel, 230-kV in the right panel).

At this time, the most probable location for a project substation is between the BPA and PSE transmission lines in Section 21, T. 19N, R. 18E. The modified project layout includes two alternative substation locations that provide suitable locations for connection to either the BPA or PSE systems, and that would minimize the length of the transmission interconnection in either case.

2.2.2.4 Meteorological Towers

Permanent towers supporting meteorological measuring equipment are standard features of utility-scale wind power projects. Project development typically involves the use of temporary meteorological (met) towers during the exploration and project design phases. Temporary met towers are usually slender, tubular aluminum structures that are secured by multiple guy wires that extend up to 110 feet from the tower base. Six temporary met towers are currently installed in the Desert Claim project area. Permanent met towers used in wind power projects may be guyed or self-supporting steel structures. Self-supporting met towers use concrete foundations. **Figure 2-11** is a drawing of a typical free-standing met tower The towers usually have multiple anemometers to measure wind speed and direction at different elevations, and are placed at strategic locations that best support automated control of the turbine operations.

Figure 2-11
Typical Permanent Met Tower



Desert Claim is proposing to construct five (5) permanent, free-standing met towers in the locations depicted in **Figure 2-9.** The permanent towers would be approximately 212 feet (65 meters) tall, free-standing rather than secured by guy wires, and set on concrete bases. The met towers would be included in the FAA-required lighting plan for the project.

2.2.2.5 Access Roads

Desert Claim reconfigured the project access road system in conjunction with modifying the turbine layout, to avoid some of the sensitive environmental features identified in the Draft EIS. The modified road system also includes a project access road from the eastern terminus of Smithson Road to the eastern-most project area boundary that would be available for use by emergency vehicles, as requested by Kittitas County. This new project access road would greatly reduce emergency vehicle response time by providing a direct route between Smithson Road/Robbins Road and Wilson Creek Road. Reconfiguring the access road system to provide these mitigation measures resulted in a net addition of approximately 4.5 lineal miles of project access roads; the Draft EIS plan included 23 miles of access roads, while the plan evaluated in the Final EIS includes approximately 27.5 miles. The modified project access road layout is depicted in **Figure 2-12.**

Road access to the project area is currently provided by a number of existing public roads, as shown previously in **Figure 2-8**. Kittitas County roads that cross or pass adjacent to parcels within the project area include Smithson Road, Robbins Road, Reecer Creek Road, Pheasant Lane and Lower Green Canyon Road. Wilson Creek Road and Charlton Road also connect with private roads that provide access to parcels in the eastern portion of the project area.

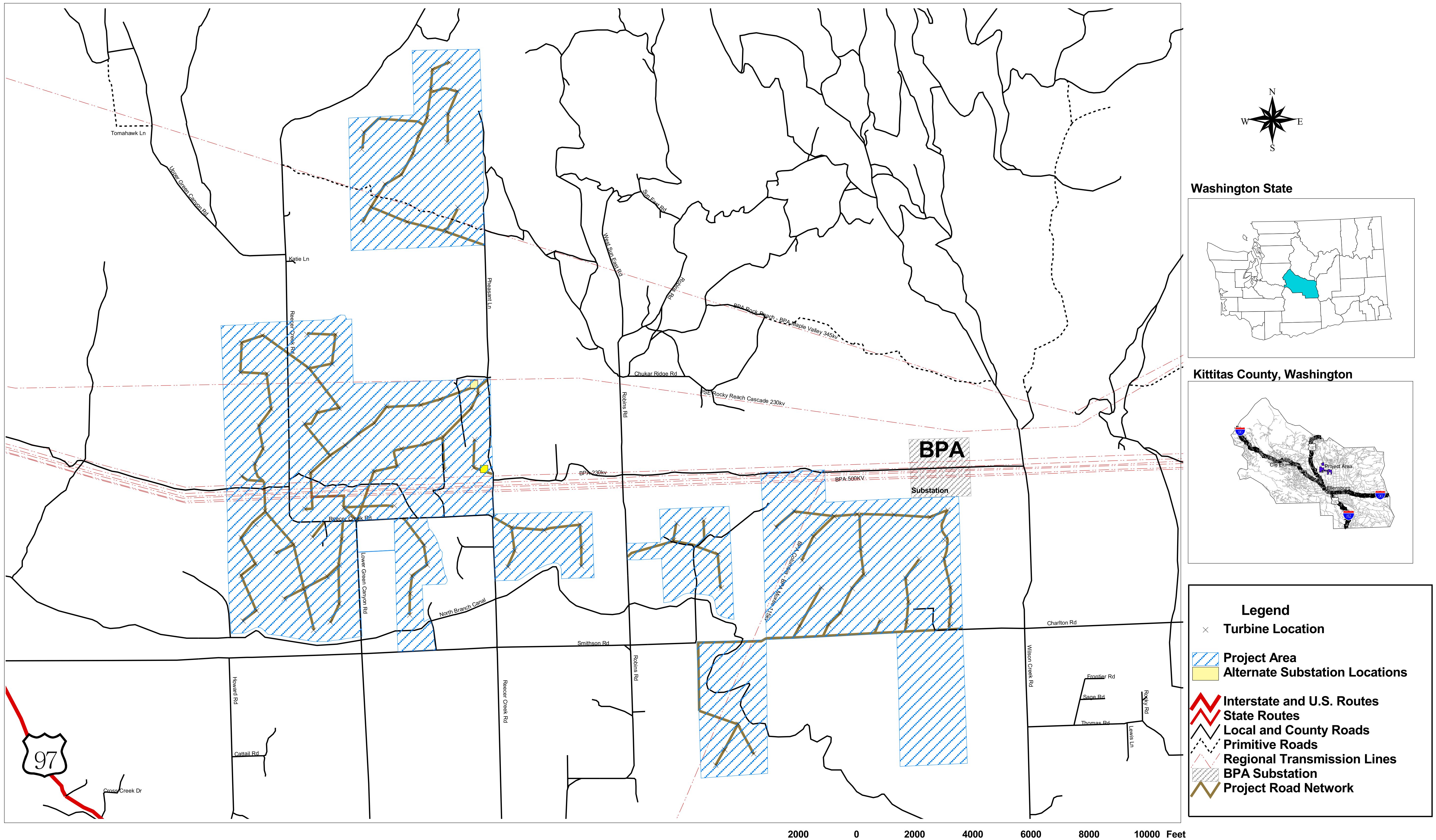
Development of the Desert Claim project would include construction of a system of project access roads providing access connections to all 120 turbines, the project substation, and other key project facilities.

The project roads would connect with the existing public road system at a number of locations including (generally from east to west):

- a point near the eastern end of Smithson Road;
- a point along Robbins Road approximately ½ mile north of the North Branch Canal;
- five points along various sections of Reecer Creek Road; and
- three points on Pheasant Lane.

The project access roads would be one-lane roads with a 15-foot travel surface width for straight sections and up to a 20-foot travel surface width for curved sections. Project access roads would have a compacted gravel surface. **Figure 2-13** shows a typical cross-section for the project access roads. Based on the modified layout, the access road system would include a total of 27.5 lineal miles of road. Existing private roads on the project area properties would be utilized to the greatest extent possible in developing the access road system, so as to minimize the need for new road construction.

Detailed plans for the project road system and the connections to county roads would be prepared following micro-siting of the turbines. Project access road connections to county roads would be designed pursuant to County road standards and would be constructed in coordination with Kittitas County Public Works and Community Development Services.

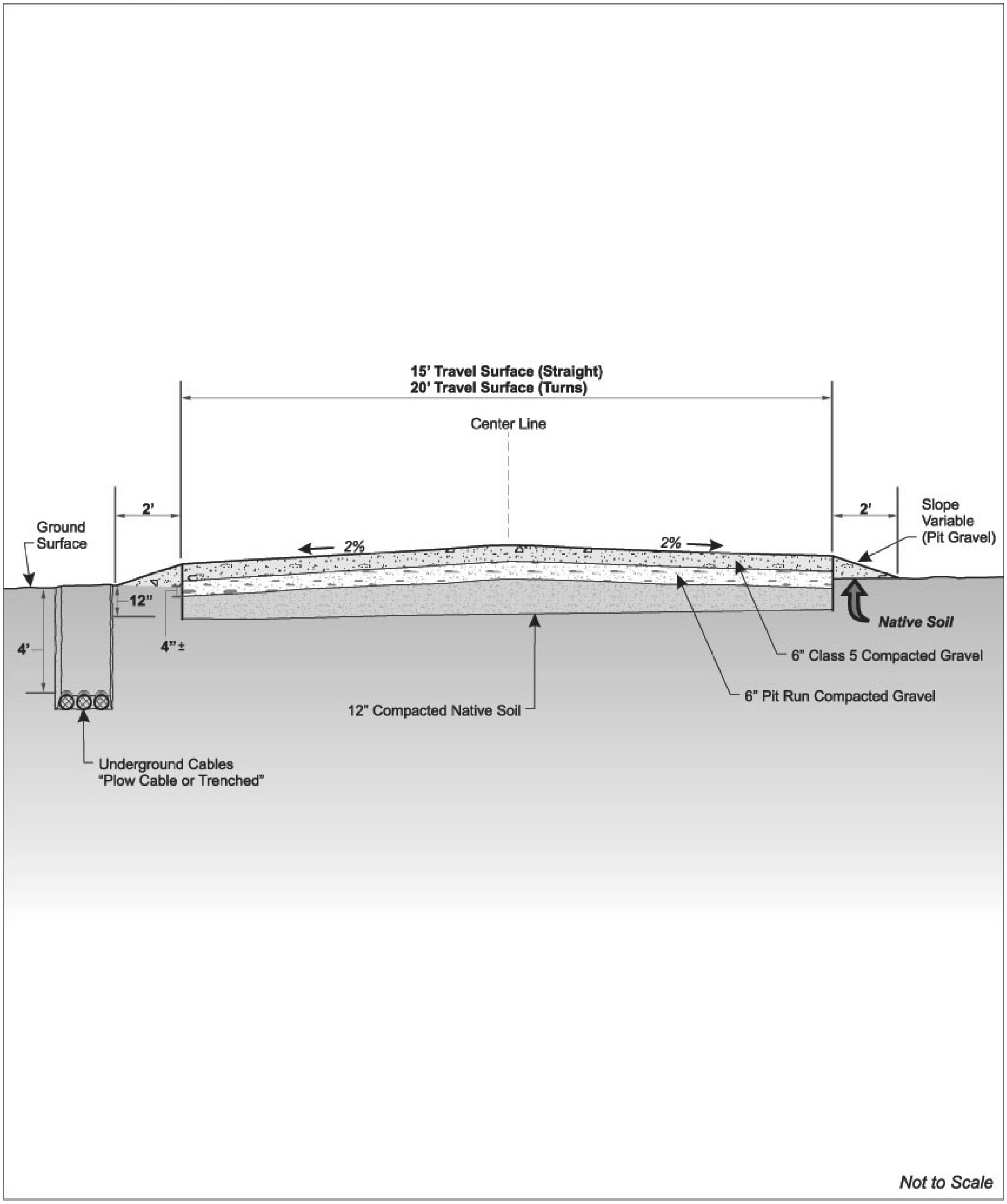


Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 2-12
Project Access Road System



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-13** **Typical Access Road Cross Section**

2.2.2.6 Operation and Maintenance Facility

The proposed project facilities include a permanent building to support ongoing operations and maintenance ("O&M") activities. The O&M building would include an enclosed bay for storage of equipment, parts and supplies; a workshop; an office for administration and monitoring of the facility; restroom and kitchen facilities; and parking for vehicles. The enclosed space needed for the O&M building is approximately 4,000 square feet, and the overall footprint for the facility area would be up to approximately 2 acres.

The Desert Claim application indicated that two options exist for the location of the O&M building. Following publication of the Draft EIS, Desert Claim determined that it would locate the O&M facility at the project substation site (see discussion in **Section 2.2.2.3**), 1 mile north of the intersection of Reecer Creek Road and Pheasant Lane. Domestic water for the O&M facility at this location would either be acquired from the landowner or through development of an exempt well; water consumption would be considerably less than 5,000 gallons per day. Restroom and kitchen facilities would drain into an on-site septic system. The O&M facility would be surrounded by a fenced enclosure with a locked gate.

2.2.2.7 Safety and Control Systems

The completed project would include a communication system for monitoring and control of the turbines. The communication system would use either copper lines, similar to telephone lines, or fiber-optic lines. Wind project communication lines typically run to each turbine, parallel to the low- and medium-voltage power collection lines. The communication lines would likewise be either underground or overhead on poles. In the latter case, both types of lines are thin and not highly visible. The rotor control and braking system (discussed in **Section 2.2.2.1**) would be a key component of the project safety systems.

Safety lighting would be installed on the exterior of some nacelles, to comply with Federal Aviation Administration (FAA) rules for structure lighting. Specific requirements for the Desert Claim project would be developed in conjunction with the FAA and Kittitas County, based on the turbine heights and site-specific conditions. The applicant has developed a proposed lighting plan for the modified turbine layout. Under the updated plan, 48 of the total 120 turbines, or 40 percent, would be equipped with a dual lighting system. This lighting system includes low-intensity flashing red lights (L-864) for nighttime use and medium-intensity flashing white lights (L-865) for daytime and twilight use. Experience with FAA reviews of prior lighting plans indicates this configuration should meet the FAA requirements and provide safe lighting for daytime and nighttime use. See **Section 3.13** for additional discussion.

Each wind turbine, including the rotor blades, would be equipped with a lightning protection system. The lightning protection system would be connected to an underground grounding arrangement to facilitate lightning flow safely to the ground. In addition, all equipment, cables, and structures comprising the wind turbines would be connected to a metallic, project-wide grounding network. All turbine towers would be locked, and the substation would be fenced and locked to prevent unauthorized entry.

2.2.2.8 Visitor Facilities

The Desert Claim project is expected to provide some level of attraction or interest for tourists who want to view a working wind energy facility. Therefore, the project facilities would need to provide accommodation for those visitors. The primary objectives for developing project visitor facilities would be to accommodate public interest in the project, minimize potential traffic impacts to the surrounding area, reduce the potential for trespass and ensure visitor safety.

Specific plans for project visitor facilities have not yet been proposed. Plans for such a facility would be incorporated into the provisions of the development agreement and conditions of approval imposed by Kittitas County. Visitor facilities would likely consist of a roadside turnout adjacent to a County road at a location providing a suitable view of project wind turbines, along with an information kiosk and appropriate signage. The facility could be established either within or outside the project area or it could be incorporated within the O&M facility. In review comments on the Draft EIS, the Kittitas County Public Works Department recommended locating a tourist kiosk along the U.S. Highway 97 corridor or along Smithson Road adjacent to the project area. Discussion in of this facility in Chapter 3 is based on the assumption it would be located along Smithson Road. Desert Claim Wind Power LLC would construct and maintain any such facility.

2.2.3 Construction Process

Construction of the proposed project would involve the use of standard construction procedures typical for wind energy projects in the Northwest. The project area has relatively flat or gently sloping terrain and good drainage, so it is suitable to the construction of roads and turbine foundations. This section summarizes the schedule and general sequence for the construction process, and describes the procedures that would be used for construction of the various project components.

2.2.3.1 Schedule and General Sequence

Construction of the project facilities would start following completion of the environmental review and issuance of project permits. The construction process would be completed over approximately a 9- month period. The applicant may elect to develop the 120-turbine project in two or more phases, depending upon market conditions and power sales commitments at the time construction begins. If constructed in phases, each phase would take approximately 9 months to complete.

The primary tasks in the construction process are outlined as follows:

- survey and stake project facility locations;
- construct project access roads and turbine pads;
- construct foundations for towers;
- excavate trenches for underground utilities;
- place underground power collection and communication cables in trenches;
- construct overhead power collection and communication cables and interconnection with the BPA, PSE or PUD transmission line;
- construct the project substation;
- construct the project operation and maintenance facility;
- transport tower sections to the site and assemble towers;
- assemble and install nacelles, rotors and other turbine equipment;
- install safety and control systems;
- test all project systems; and
- conduct final site grading, reclamation and cleanup.

Several actions to minimize environmental effects and to protect County roads would be included in the development agreement and conditions of approval imposed by the county. Such actions would be instituted before construction begins. Habitat protection areas within the project area would be delineated, defined in contracting documents and marked in the field, pursuant to consultations with Kittitas County, Washington Department of Fish and Wildlife (WDFW) personnel, landowners and other stakeholders.

In general, the first few months of construction activity would involve initial civil and electrical construction, including construction of the project access roads and tower foundations, the power collection system and communication lines, and the project substation. Tower installation would be accomplished in phases. As project access roads and tower foundations are completed, turbines would be erected. Installation of the nacelles, rotors and associated equipment would be the final task of major construction activity for each turbine. Desert Claim expects to begin commercial operation within 1 month after commissioning the first wind turbine.

2.2.3.2 Construction Equipment and Space Requirements

Constructing the proposed project would require the use of various types of construction equipment. **Table 2-2** summarizes the types and functions of construction equipment that are typically used in the construction of commercial wind energy projects.

Table 2-2
Typical Construction Equipment for Wind Energy Projects

Equipment	**Use**
Bulldozer	Road and pad construction, substation, O&M facility, construction staging areas
Grader	Road and pad construction, substation, O&M facility, construction staging areas
Water trucks	Compaction, erosion and dust control
Roller/compactor	Road and pad compaction
Loader	Loading/unloading/moving construction materials
Backhoe/trenching machine	Excavating trenches for underground utilities
Truck-mounted drilling rig, augur	Drilling tower foundations, holes for power poles
Concrete trucks and pumps	Pouring tower and other structure foundations
Cranes	Erecting towers, nacelles and rotors
Dump trucks	Hauling road and pad construction materials
Flatbed trucks	Hauling towers, blades and other equipment
Pickup trucks	General use and hauling minor equipment
Small hydraulic cranes/forklifts	Loading and unloading equipment
Rough terrain forklift	Lifting equipment
Truck-mounted high reach	Aerial framing and clipping
Truck-mounted tensioner and cable reels	Stringing power collection/transmission lines
Winch truck	Realign power collection/transmission structures
Construction Cranes	Off-loading and erecting towers, nacelles, blades

Source: BPA 2001

Construction activities would require temporary disturbance of a larger area than would be occupied by the permanent project facilities. **Table 2-3** identifies the estimated area that would be disturbed in construction and within the permanent footprint of the various project components.

Table 2-3
Estimated Area of Construction Disturbance and Permanent Facilities
(in acres)

Project Feature	**Temporary Construction Disturbance**	**Permanent Project Footprint**
Wind Turbine Pads	146.3	13.2
Internal Power Collection System [1]	1.3	0
Project Substation	2.8	2.1
External Underground Collection System[2]	3.4	0
Met Towers	1.4	0.1
Project Access Roads [3]	163.6	72.9
Project O&M Facility [4]	2.8	2.1
Construction Staging/Storage	19.5	-
Total Area	341.1	90.4
Percent of Project Area	6.5%	1.7%

Notes:
[1] Power collection system within project area (under ground) with 85 percent contained within the project access road areas.
[2] Underground power collection cables linking project parcels and substation to be placed within County road rights-of-way and/or new easements.
[3] Area for project access roads increased 15 percent to include curves and intersections to non-project roads.
[4] Project O&M Facility to be co-located with the project substation; disturbance and permanent footprint in addition to substation area.

2.2.3.3 Work Force

Approximately 120 to 150 people would likely be employed at the project site at some time during the construction period. Some of these workers would be employees of Desert Claim Wind Power LLC/*enXco, Inc.*; while most would be workers for various construction contractors and equipment vendors who would provide construction goods and services to the project. The size of the construction work force present at any given time would vary with the schedule of tasks in the construction process. Relatively few construction workers would be present during the initial and final stages of construction activity, for example. The road/pad and tower foundation construction tasks are likely to be the project activities with the greatest labor requirements. Based on the nature and sequence of construction activity, the peak work force at any given time would not likely exceed 60 to 75 workers.

The applicant has indicated that it would use local construction contractors and suppliers to the extent possible. Based on experience with other wind energy projects in the Northwest, it is likely that local firms and workers would be available for tasks such as surveying, site clearing and grading, road and turbine foundation construction, and site restoration/cleanup. Tasks such as transmission line and substation construction, turbine assembly, installing safety and control systems, and project testing require more specialized skills that are less likely to be available locally, and would presumably be performed by non-local firms and workers.

2.2.3.4 Erosion and Sedimentation Control

Erosion and sedimentation control would be standard practice during active construction and during the restoration and cleanup stage of the construction process. The applicant would accomplish this objective through development and implementation of a Temporary Erosion and Sedimentation Control Plan (TESCP). This design-level plan would prescribe the use of Best Management Practices that are standard features of such plans. The project TESCP would be based on and comply with Kittitas County standards and the Washington Department of Ecology (WDOE) *Stormwater Management Manual for Eastern* Washington. The TESCP would also address the erosion control and water quality conditions of the National Pollutant Discharge Elimination System (NPDES) temporary stormwater discharge permit that would be required for project construction.

Based on the applicable standards, the TESCP would include using coverings for exposed soils (e.g., straw, jute netting, or soil stabilizers), stormwater detention ponds, sediment control basins and traps, and other well-established measures. Surface water runoff would be directed away from cut-and-fill slopes and other disturbed areas, and into ditches that drain to natural drainage features. Exposed areas would be re-vegetated as soon as possible following completion of the corresponding construction task.

The TESCP would be submitted in conjunction with construction approvals. Erosion and sedimentation control measures would be implemented at the beginning of the construction process, following the survey and staking task. Areas of native shrub-steppe habitat and other environmental features to be avoided (based on the County's Critical Areas review) would also be marked at this time. Provisions for restoration of temporarily disturbed areas would be determined through consultations with WDFW and Kittitas County.

2.2.3.5 Roads and Turbine Pads

Heavy construction activity for the project would start with clearing and grading for the project access roads and turbine pads. In some locations existing private farm roads would be used as segments of the project access road system. These existing road segments would be improved as necessary to comply with the design standards for the project roads. Improvement activities could include grading to modify the road geometry, filling in low spots, replacing culverts and other drainage features, replacing cattle guards as needed, and applying new gravel to the road surface. Improvements to existing roads would be coordinated with the landowners to minimize crop damage and ensure suitable access for the landowners.

New graveled roads would be constructed in areas where existing roads could not be used for access to the turbines. As discussed in **Section 2.2.2.5**, these roads would vary in width; having 15-foot travel surface widths for straight sections and 20-foot travel surface widths for curved sections. Project access roads would have turnouts at the turbine pads and other selected locations. The temporary disturbance area along the Project access road routes is assumed to be approximately 35 to 50 feet wide under typical circumstances, with a wider area needed in locations where cuts and fills are required to construct and stabilize roads on slopes. The temporary disturbance width along the access roads would also accommodate trenching for project utility lines and would accommodate access for cranes needed to erect the turbines. Temporary construction disturbance around the turbine pads is assumed to occupy an area with a radius of approximately 130 feet around the tower foundation, representing about 50,000 square feet or about 1.25 acre per turbine.

Topsoil removed during grading for access road and turbine pad construction would be stockpiled onsite adjacent to the disturbed areas. The removed topsoil would be re-spread in cut-and-fill slopes, and these areas would be re-vegetated as soon as possible after road construction was completed. No offsite deposition of excavated material would be needed. A spoils plan would be submitted for review to the Community Development Services Department to ensure compliance with KCC 17A, Critical Areas Ordinance. Once grading for the roads and pads in a given sector of the project had been completed, fill materials (gravel, soil and sand) needed for road and pad bases and road surfaces would be hauled to the construction site, deposited, graded and compacted as needed. Native materials from the project area would be used to the greatest extent possible to meet fill material needs and achieve a cut-and-fill balance within the project area. If fill must be imported, gravel and/or crushed rock provided by local permitted sources would be used. Quantities of filling and grading for the project have not yet been estimated because they are dependent on the mix of tower foundations to be used, and the type of foundation for each of the 120 turbine locations would be determined in the future based on site-specific geotechnical investigation. These quantities would be estimated after the type of tower foundation is determined for each turbine. Based on information developed for other wind energy projects of a comparable scale, however, the total volume of cut and fill quantities for the project could be in the range of approximately 250,000 to 300,000 cubic yards. Gravel and other construction materials purchased by the road construction contractor from existing, permitted local sources would be trucked to the construction site via public roads.

2.2.3.6 Staging Areas

Temporary laydown or staging areas would be established in the project area to support various construction functions. These include temporary storage of tower sections, nacelles and other turbine components; temporary storage of other equipment and supplies; parking of construction vehicles and equipment; parking of construction workers' personal vehicles; and possible installation of portable fuel tanks surrounded by earthen berms for spill control. Staging area locations and dimensions have not yet been determined. The application notes that one or more staging area approximately 10 acres in size would be needed, and that these temporary facilities would be placed near existing roads and on previously disturbed land (e.g., heavily grazed and/or crop or pasture lands). Staging area locations would be selected in consultation with the County during development of the Construction Traffic Plan and the County's Critical Areas review.

2.2.3.7 Batch Plants

Desert Claim Wind Power LLC would contract with one or more local construction companies to install the tower foundations and pads and the transformer pads. These facilities would require sizable volumes of concrete. The construction contractor would be responsible for obtaining the aggregate and concrete necessary to build these features. The contractor could elect to purchase the construction materials from local suppliers, in which case concrete would be manufactured at an existing local plant and trucked to the project.

Alternatively, the contractor could choose to construct one or more temporary concrete batch plants within or near the project area, to minimize the cost impact of transporting concrete to the project. In this event, the location and characteristics of the batch plant(s) would be determined by the contractor, in consultation with Kittitas County and Desert Claim Wind Power LLC, and the contractor would be responsible for obtaining any land use or environmental permits required to develop the facilities.

If the batch plant option were selected, it is likely that the contractor would use a portable unit that could be moved to different locations within the project area as needed. The batch plant(s) would be set up in a temporary staging area, as described previously, and would use cement, aggregate and water purchased from local sources and delivered to the temporary site by truck. A diesel generator would likely be used to power the plant. The area required to support a typical temporary batch plant and support facilities would be approximately 2 to 3 acres. The site would include approximately 1 acre for the plant itself, 1 acre for raw material stockpiles, and 1 acre for parking, equipment storage and a settling pond.

Portable concrete batch plants, defined as plants that operate at a site for less than 1 year, are permitted under the State of Washington's Sand and Gravel General NPDES Permit. The general permit specifies discharge limits and requires the operator to develop plans for monitoring, stormwater pollution prevention plan, erosion and sediment control, and spill prevention and control. The permit requires restoration of the site after the portable plant is removed. Best management practices for concrete truck washout require that a settling pond be built to catch the washdown runoff and stormwater runoff. A water storage tank could be used at the plant site to store water hauled from an off-site source if water was not available at the batch plant site.

2.2.3.8 Turbine Foundations

Once the project roads are constructed, excavation would begin for turbine foundations. As described in **Section 2.2.2.1**, inverted-T and pile-type foundations are likely to be used, with selection of the foundation design depending on site-specific conditions at each turbine location. In either case, construction of the foundation typically requires 3 days per tower with foundation construction activities expected to occur for approximately 4 to 5 months during the Desert Claim construction process.

The inverted-T foundation requires a circular excavation approximately 8 feet deep and 42 feet in diameter (see **Figure 2-6A**). Construction for this design involves excavation with a backhoe; placement of a layer of compacted fill at the bottom of the hole; pouring an octagonal-shaped, reinforced-concrete (concrete poured over steel rebar) footing up to 4 feet deep on top of the fill; pouring a 4-foot deep reinforced-concrete pedestal on top of the footing; and covering the footing and pedestal with compacted backfill and topsoil. Steel anchor bolts extending through the pedestal to near the base of the footing would be used in a subsequent step to fix the tower to the foundation.

The pile foundation requires excavating a hole ranging from 25 feet to 35 feet deep (depending on site-specific subsurface conditions) and approximately 18 feet in diameter (see **Figure 2-6B**). A cylindrical, corrugated metal form approximately 16 feet in diameter would be inserted in the hole, and another cylindrical corrugated form several feet smaller in diameter would be placed inside the larger form. The space between the two forms would be filled with reinforced concrete and two rings of anchor bolts, and the space inside the inner metal form would be filled with compacted backfill.

If bedrock were encountered at any turbine location, rock anchors would likely be used to secure the base of the foundation. Rock anchors would be used in conjunction with either foundation design. Use of explosives (blasting) might be required for installation of rock anchors.

Desert Claim would engage a geotechnical specialist to prepare a geotechnical report for the project that would be used to determine the appropriate foundation design for each turbine location. The applicant would also engage a licensed civil engineer during construction to inspect each foundation pour and prepare a quality assurance report for each foundation.

2.2.3.9 Collection System

The power collection system for the project would be installed using underground cable, except where it is not feasible to do so and avoid sensitive environmental features as discussed in **Section 2.2.2.5**. The cable would follow existing utility rights-of-way where possible, or would be located within the disturbance area for construction of the project road system, or in easements obtained by Desert Claim. Underground cable would be installed using a trenched or plowed-in method. The trenching method requires excavating a trench approximately 3 to 5 feet wide and approximately 2 to 4 feet deep, laying the electrical cables in a part of the trench, partially backfilling the trench, laying parallel communication cables, and backfilling the entire trench. Under the plowed method, the power collection and communication cables would be installed without the need to excavate an open trench; instead, the cables are directly plowed into the ground. In either case, topsoil would be replaced on the surface of the disturbed area and would be reseeded with native plants.

Overhead 34.5-kV collector lines would be used in areas where underground cable was not feasible, as discussed in **Section 2.2.2.5.** Overhead collection cables would be mounted on new or existing wooden poles of approximately 37 feet in height. Construction for these facilities would require heavy equipment access within a corridor approximately 8 to 12 feet wide along each overhead line, plus a temporary laydown and work area around the base of each pole. The poles would be placed in holes excavated by augur, and minimal or no clearing and grading would be required for constructing overhead lines.

2.2.3.10 Transmission Connection

Developing the project transmission interconnection would require constructing an overhead transmission line from the project substation to the existing transmission line selected as the reception point for power generated by the project. The transmission interconnection is expected to be a 230-kV line that would be supported on wood-pole structures approximately 76 feet in height and spaced at intervals of approximately 500 to 800 feet (depending on the overall length of the connection). Standard industry construction practices would be used for this facility and would include surveying, right-of-way preparation, materials hauling, structure assembly and erection, ground wire and conductor stringing, and cleanup and restoration.

A licensed surveyor would survey the transmission line route and stake structure locations. Holes for the transmission structures would be drilled or augured, typically to a depth of 4 to 6 feet and a width of 2 feet. Construction materials would be hauled by truck to the route and the structures would be assembled on site. Conductor stringing equipment would be placed at either end of the transmission connection; additional areas might be needed for angle locations along the route. Construction activity would be concentrated at staging areas and around structure locations. Cleanup and restoration of disturbed areas would occur following stringing and testing of the line. Excess topsoil would be tamped around poles or spread on the right-of-way, and disturbed areas would be reseeded with native plants or agricultural crops, depending on the adjacent use.

2.2.3.11 Substation and Operation and Maintenance Facility

The project substation would be constructed while the electrical system components were being installed. Construction activities would include clearing and grading the substation site, which would occupy up to approximately 2 acres; constructing concrete pads for transformers, the control building and other equipment; installing the electrical equipment; assembling the control building; covering the remainder of the site with gravel; and constructing a chain-link fence around the perimeter of the substation site.

The project operation and maintenance facility would be constructed on a 2-acre site located adjacent to the project substation. It would involve conventional building construction techniques including site clearing and grading, constructing a concrete pad for the building, framing and finishing the building, installing electrical wiring and plumbing, and constructing a septic system and drain field (unless the site were connected to existing utility services).

2.2.3.12 Turbine Equipment

Once a sufficient number of tower foundations were in place and finished, the first turbine towers, nacelles and blades would be brought to the project site for placement. The turbine components would be transported to the project area by truck and trailer. The towers would have three sections, each approximately 65 to 75 feet long. They would be delivered to the site by trailers, each carrying one tower section. Large cranes would be brought on site to lift the multiple tower sections into place. The bottom section would be bolted to the circular ring(s) of anchor bolts on the foundation pedestal, and the upper sections would be sequentially bolted in place.

Following foundation construction, the nacelles, rotors and other components would be delivered to the tower locations. At each site the nacelle would be hoisted to the top of the tower by crane and bolted to the tower. The rotor hub and blades would be assembled on the ground, and the assembly would be lifted by crane and secured to the nacelle.

The permanent met towers would also be installed during this stage of the construction process. The tower components would be transported to the construction site in sections, hoisted by crane and anchored to the met tower foundations.

2.2.3.13 Final Grading and Restoration

Final grading of disturbed surfaces within the project area would occur following completion of the heavy construction activities, and any additional gravel needed would be placed on the project access roads. All areas temporarily disturbed by project construction would be restored to their original condition and reseeded with native vegetation. Areas subject to construction activity would be inspected for the presence of noxious weeds and treated as necessary. Long-term stormwater management and erosion control measures outlined in the WDOE stormwater manual would be implemented. A final site cleanup would be made before shifting responsibility for the project area to the project operations and maintenance crew, including collection and disposal of all construction debris and other waste materials that could not be reused. County roads would be restored to their pre-project condition, as determined through inspection by the Kittitas County Public Works Department.

2.2.3.14 Testing

Following completion of construction activities on the first group of wind turbines, approximately a month of testing would occur before commercial operation of the project would begin. Testing would involve inspections of the mechanical, electrical and communication systems to ensure they were working properly and performing according to their respective specifications. The testing process would include checks of each wind turbine and the overall project control system. Technicians qualified for the specific systems would perform all inspections.

2.2.3.15 Transportation and Access Management

Management of construction access and traffic would be a specific focus during the construction process, primarily because of the roadway and traffic considerations associated with transportation of construction materials and turbine components to the project area. Desert Claim, in coordination with the Kittitas County Community Development Services, Public Works and Sheriff's Departments, the Washington State Department of Transportation and the Washington State Patrol, would develop a Construction Traffic Management Plan that would address transportation and access concerns during the construction period. The plan would define access routes and procedures to be used by various types of construction equipment and material shipments, approved hours of operation for construction traffic, safety provisions and other management requirements.

2.2.4 Operation and Maintenance

Desert Claim Wind Power LLC staff would operate and maintain the project once construction was complete and the project began commercial operation. Electricity generated by the project would be sold to power marketing entities, such as the Bonneville Power Administration; local and regional public utilities, such as the Kittitas County PUD and the Grant County PUD; and/or regional investor-owned utilities, such as Puget Sound Energy and Avista. Power from the project would ultimately be distributed by utilities to their customers. **Section 2.2.4** summarizes the activities associated with long-term operation and maintenance of the Desert Claim Wind Power Project.

2.2.4.1 Functions

Long-term operation and maintenance activities for the project would include the following functions:

- round-the-clock monitoring of project output, the project's safety and control system and the performance of individual wind turbines;
- controlling turbine operations as necessary to meet scheduled power deliveries and implement scheduled outages for scheduled turbine maintenance;
- performing periodic, routine testing and maintenance of the turbines as needed to maximize performance and detect potential mechanical difficulties;
- on-site repairs of project equipment in response to malfunctions or scheduled maintenance;
- patrolling the project area to ensure project security and monitor on-site conditions, including inspection for erosion, re-vegetation success, unauthorized uses and potential wildlife impacts;
- periodic maintenance of project access roads, including grading and application of additional gravel, as necessary; and
- implementing the project noxious weed control plan, in consultation with the Kittitas County Noxious Weed Control Board.

Through the life of the project, Desert Claim Wind Power LLC would follow a project operations and maintenance protocol that would specify the timing of routine turbine maintenance and inspection. Such a protocol typically adheres to a program developed by the turbine manufacturer, similar to the way automobile manufacturers define recommended maintenance. Scheduled maintenance would be conducted approximately every 6 months on each wind turbine. On average, each turbine would require 40 hours to 50 hours of scheduled mechanical and electrical maintenance per year.

Most servicing of the turbines would be performed within the nacelle via access through the tower, rather than using a crane to remove the turbine from the tower. The use of a crane and equipment transport vehicles for turbine adjustments, larger repairs or replacement of rotors or nacelle equipment would be needed on an occasional basis. Routine maintenance would include replacing lubricants and hydraulic fluids at specified intervals. The towers would need to be repainted on a longer-term periodic basis. All lubricants, hydraulic fluids, paints, solvents and other potential hazardous substances would be carefully stored, used and disposed of in accordance with applicable laws and regulations.

2.2.4.2 Work Force

The project would employ approximately 10 full-time staff for long-term operations and maintenance. This staff would include a project operations manager, technicians specializing in maintenance and repair of the turbines, and field staff responsible for other project functions. Most of the O&M staff could likely be hired from the local work force.

2.2.4.3 Access Management

All project access roads would be posted and maintained as private roads, with locked gates to minimize unauthorized access. Desert Claim would supply a limited number of access keys to emergency service providers to allow their use of the project access road extending east from Smithson Road to the eastern-most project area boundary for emergency access. Public roads within and adjacent to the project area would remain open to public use, as in their current condition.

2.2.4.4 Safety Measures

The wind turbines would be monitored continuously by a supervisory control and data acquisition (SCADA) system. Each turbine would be equipped with monitors that communicate operation conditions through communication lines (installed in the same trench as the power collection system). Alarm systems would be triggered if operational characteristics fell outside set limits. Each turbine would have an automatic braking system to shut down the rotor in the event of malfunctions or excessive wind speeds

The turbines would use synthetic oil as a lubricant in the gearboxes and hydraulic fluid for the blade pitch actuators. Each turbine would contain approximately 80 gallons of oil. Turbine oil would be tested regularly and replaced as needed. Waste oil and fluid collected during maintenance would be transferred to an approved waste facility.

enXco has developed and implemented standard safety plans at the wind energy facilities that it operates. The safety plans include key components that are specific to wind energy facilities, such as fire safety and emergency tower rescue programs. These programs define hazards that could be present, prescribe procedures to be followed by operations and maintenance personnel, identify equipment needed to implement the programs, and specify applicable training requirements (*enXco*, 2001a, 2001b). These safety plans would be employed for the Desert Claim project, with project-specific modifications as necessary.

2.2.4.5 Expected Operating Patterns

The Desert Claim wind turbines would not operate during all hours of the year because the wind does not blow at sufficient speeds to operate the turbines all of the time. Desert Claim collected nearly 3 years of meteorological data within the project area. These data were correlated with existing public data collected at Bowers Field. Based on the combined wind data, Desert Claim expects the project to operate approximately 60 percent of the time annually. Of the 8,760 hours in a year, the turbines are expected to operate approximately 5,300 hours, while during the remaining 3,500 hours the turbines would not be operating (i.e., the turbine blades would be idle and the generators would not produce electricity).

Based on recent historical wind data, the majority of the annual production from the project would occur from March through October. There are approximately 5,880 hours during this 8-month period. The turbines would likely be in production (i.e., the blades would be turning and producing some electricity) approximately 71 percent of the time during the spring-summer period, or approximately 4,170 hours. The turbines would be idle the remaining 29 percent of the time, or approximately 1,700 hours. Out of the approximately 2,880 hours in the fall and winter months from November through February, the turbines would be in production approximately 36 percent of the time (i.e., approximately 1,040 hours) and sitting idle the remaining 64 percent of the time (i.e., approximately 1,840 hours). During both periods of the year, the majority of the daily production and operation time would occur during daylight hours. Over the course of the year, two-thirds (67 percent) of the production and operation would likely occur from 7 a.m. to 10 p.m.

2.2.5 Decommissioning

Desert Claim Wind Power LLC proposes to operate the wind energy facility throughout the useful life of the project, which is assumed to be 30 years. New technology may become available for re-powering the project (replacing the generators and/or other major turbine components) at some time in the future. If Desert Claim decides to re-power the project, and re-powering was not permitted under the county-approved development agreement, Desert Claim would apply for all required environmental and permit reviews. At the time Desert Claim decides to terminate operation of the project, the project would be decommissioned. Decommissioning the project would involve removal of the wind turbine nacelles, blades, towers, foundations, cables, and other facilities to a depth of 4 feet below grade; regrading the areas around the project facilities; removal of project access roads (except for any roads that landowners wanted to remain); and final restoration of disturbed lands.

To ensure the future availability of resources needed for decommissioning, decommissioning funds in the form of a bond or corporate surety would be set aside as a specific project budget item. A set-aside guarantee bond or corporate surety would be executed on behalf of Desert Claim in favor of the County, with an independent administrator of such funds to cover all decommissioning costs. The guarantee bond or corporate surety would also name the project landowners as additional beneficiaries.

2.3 ALTERNATIVES TO THE PROPOSAL

2.3.1 Process for Identifying Off-Site Alternatives

This section describes Kittitas County's approach to defining off-site alternatives for evaluation in the EIS. The County's approach included four steps: (1) consideration of SEPA requirements for alternatives; (2) definition of site selection/suitability criteria, which are based on the physical, technological and practical requirements of wind power facilities; (3) site screening, which involved application of the site selection/suitability criteria to the characteristics of numerous potential sites; and (4) identification of sites that met the criteria and would be carried forward for more detailed consideration in the EIS. Kittitas County and its EIS consultants developed the criteria and site screening process in coordination with the Washington Energy Facility Site Evaluation Council (EFSEC). *enXco* and Desert Claim Wind Power LLC, the proponent for Desert Claim, and Zilkha Renewable Energy, the applicant for the Kittitas Valley and Wild Horse wind power proposals, provided information regarding potential sites. As lead agencies for SEPA compliance, both Kittitas County (Desert Claim) and EFSEC (Kittitas Valley and Wild Horse) intend to use the following discussion to document their consideration of alternative sites.

The analysis concludes that the potential alternative sites identified and reviewed in this draft EIS are not available or practicable to the Desert Claim applicant and, therefore, are not "reasonable alternatives" pursuant to SEPA. Nevertheless, two alternative sites (Whiskey Dick Mountain/Wild Horse and Springwood Ranch) are included and evaluated in the Draft EIS to provide decision makers with additional information about environmental impacts and to inform the decision making process.

2.3.1.1 SEPA Requirements

Kittitas County's review process for wind power proposals requires approval of a site-specific rezone, a comprehensive plan land use map amendment, a development permit and a development agreement (KCC Chapter 17.61A). For private proposals that require a rezone, which applies to Desert Claim, the SEPA Rules require that an EIS consider alternative sites (WAC 197-11-440 (5)(d)). The purpose of considering off-site alternatives is to provide comparative environmental information to facilitate an informed decision concerning a proposal. Consideration of off-site alternatives is authorized, but not required, if other locations for the type of use proposed have not been considered in existing planning or zoning documents.

In general, alternatives considered under SEPA must be "reasonable," which is defined in the SEPA Rules to mean that they can feasibly attain or approximate a proposal's objectives at lower environmental cost (WAC 197-11-440 (5)(b)). The word reasonable also limits the number and range of alternatives, and the amount of detailed analysis required under SEPA (WAC 197-11-440 (b)(i-ii)). The lead agency may also limit alternatives to sites on which it has the authority to control impacts through the imposition of mitigation measures (WAC 197-11-440 (b)(iii)).

The applicant's objectives are identified in **Section 1.3** of the Draft EIS. They include developing a commercially viable wind energy facility with a total nameplate capacity of at least 180 MW and a maximum of 120 turbines, with associated project support facilities. To achieve this objective, the project site should be on large parcels and be free of significant environmental constraints, such as parks and recreation areas, and landowners must be willing to enter into long-term leases. Kittitas County's objectives, identified in **Section 1.4** of the Draft EIS and KCC 17.61A.010, include establishing a process to recognize and designate properties for wind power facilities in suitable areas of the County; to protect the health, safety, welfare and quality of life; and to ensure compatible land uses in the vicinity of areas affected by wind farms.

Consideration of alternatives has been limited to sites within Kittitas County, based on the County's authority to impose it's adopted review process and to control direct and indirect environmental impacts (WAC 197-11-440 (b)(iii)).

2.3.1.2 Site Selection and Suitability Criteria

Site selection criteria were developed based on information provided by wind energy developers (*enXco* and Zilkha, 2003), and a review of published information regarding siting wind energy facilities (e.g., *Wind Energy – How Does It Work*, AWEA, 2002; *10 Steps in Building a Wind Farm*, AWEA, 2002; Patrick Mazza, *Wind: A New Economic Opportunity for Rural Communities*, 2002; *Basic Principles of Wind Energy Evaluation*, AWEA, 1998; and *Wind Energy Resources*, National Wind Coordinating Committee, 1997). The objective of the research was to identify the actual, not hypothetical, criteria that are typically used by developers to identify and investigate potential sites and to determine their suitability for wind facilities. The following five key criteria were identified: (1) sufficient wind resource (the most important); (2) proximate/adequate transmission facilities; (3) large land area; (4) absence of significant environmental constraints; and (5) property owner interest. Each criterion is considered essential, and failure of a site with respect to any one criterion is considered to be a "fatal flaw" that would make a wind-power facility unfeasible at that site. The criteria are discussed further below; the experience of the Desert Claim and Zilkha proposals is used to provide context where appropriate.

(1) Sufficient wind resource. The most important criterion for siting a wind power facility is, of course, sufficient commercially viable wind. Sites that do not possess sufficient wind are not considered further by prospective developers, regardless of other characteristics. In Washington, sites with a minimum *average* wind speed of 13 to 17 miles per hour (Wind Classes 3-4) are desired to support a commercially viable wind energy facility. Given the current energy market conditions in the Northwest and the characteristics of current wind energy proposals, an average wind speed of 15 to 17 mph appears to be the lower range of economic viability for a site. Sites with average speeds greater than 17 mph (Wind Classes 5 and above) are most desirable, but such sites in Washington are generally found in areas not conducive to wind power development, including mountain peaks and off-shore in the Pacific Ocean. Since the energy that can be derived for power generation from the wind is proportional to the cube of the wind speed, even a slight increase in wind speed results in a large increase in energy production; this also results in a reduction in the production cost of electricity (AWEA, 2002). Developers typically rely on published wind energy maps to initially identify regions or large areas with sufficient wind resources. They then conduct more detailed site-specific meteorological (and environmental) studies, typically over 1 to 2 years. The *Wind Energy Resource Atlas of the United States* (U.S. Department of Energy, 1986) identifies the Ellensburg corridor as having Class 3, 4 and 5 winds. (Also see Northwest Sustainable Energy for Economic Development, 2003).

Both *enXco* and Zilkha conducted additional meteorological studies and site visual surveys to further narrow their search for potential wind energy facility sites in Kittitas County to between four and five areas/sites with sufficient wind resources. Once a potential site/area was identified, meteorological data were used, along with information on natural conditions and environmental features, to determine an optimal configuration of wind turbines. A computer model aids in this siting process for each individual turbine (referred to as "micro-siting") for a specific potential project site.

(2) *Proximity to existing transmission facilities with adequate capacity*. Wind energy projects must connect to an electric transmission line to deliver power to the regional power system. The most important transmission-related factors considered by developers in project location decisions are the adequacy of existing transmission facilities (i.e., the availability of unused capacity on existing lines), and the distance from the project site to a transmission line. The need to either upgrade a regional transmission facility or build an off-site project transmission line more than about 10 miles (or less, depending upon the capacity of the project) to interconnect to an existing line can make a site financially infeasible. Interconnection agreements with the utility that owns the transmission line(s) are typically negotiated during development of the wind project and after the land is secured.

Existing transmission facilities located in the northern portion of the Kittitas Valley are owned and operated by the Bonneville Power Administration (BPA; five 230 kV to 500 kV lines and one 115 kV line) and Puget Sound Energy (PSE; one 230 kV line and one 115 kV line). Transmission lines at voltages below 115 kV are not adequate for connection of wind energy projects generating over 100 MW of electricity.

(3) Large land area. Some of the factors that bear on the size of a site needed for wind energy facilities include the size of the project (in terms of power output and the size and number of turbines); separation between turbines to ensure safety and efficient operation; dispersed population; a prevalence of rural/agricultural activities (to minimize potential land use conflicts); sufficient setbacks from nearby residences, structures and public roads (to minimize potential environmental impacts); and large undivided parcels of land (greater than 100 acres). These criteria generally translate into project sites encompassing approximately 5,000 ± acres of land for a 180 MW wind project. However, developers typically begin their search by investigating very large study areas covering many thousands of acres (e.g., 20,000-50,000 acres or larger), and gradually focus in on a more defined area. In practice, a developer may be actively and simultaneously considering, and applying the criteria to, several potential sites within the larger area.

The Desert Claim (*enXco*) and Kittitas Valley (Zilkha) proposals each involve approximately 120 turbines producing roughly 180 MW of electric power. Each developer independently defined an initial study area that included the entire Kittitas Valley (extending generally from Lookout Mountain on the west to the Columbia River on the east, and between the National Forest lands to the north and approximately Interstate 90 to the south). Each also conducted the studies necessary to determine desirable sites within this search area, then began to focus on smaller areas.

(4) Absence of significant environmental constraints. Wind energy developers try to avoid sites with significant environmental constraints. The presence of constrained areas can increase construction costs and make permitting more complex, time consuming and uncertain. At the level of determining general site suitability and feasibility studies, characteristics taken into account include the presence of parks or designated recreational lands, wildlife refuges, prevalent wetlands and/or sensitive habitat/species, significant cultural and archaeological resources, and conflicting land uses. Qualified developer personnel and consultants identify these resources through research of published sources, on-site investigations and discussions with resource agency staff.

(5) *Property owner interest/property availability*. Wind energy facilities are typically constructed on lands leased from property owners. As a practical matter, property owner support, responsiveness and willingness to enter into long-term leases are essential preconditions to gaining the ability to propose a wind facility on a particular site. As to a particular private applicant (whether *enXco* or Zilkha in an individual case), a site that is not actually available for use would not meet that proposal's objectives and

would not, therefore, be a real or "reasonable alternative" (as defined in the SEPA Rules) as to that applicant. As discussed previously, comparative environmental information about such sites may nevertheless be of use to decision makers, and may be included in an EIS.

2.3.1.3 Site Screening Process

The criteria identified above were applied to areas/sites within the Kittitas Valley. Sites located outside Kittitas County were not considered to be "reasonable alternatives" per WAC 197-11-440 (b)(iii), and were not considered for evaluation in the EIS.

Four broad geographic areas, shown in **Figure 2-14**, were defined for investigation: west of Highway 97, east of Highway 97, Whiskey Dick Mountain, and south of Whiskey Dick/Boylston Mountains. These areas coincide with those identified in published information (e.g., the U.S. Department of Energy's *Wind Energy Resource Atlas*) as having potentially viable wind resources. These areas were explored by both *enXco* and Zilkha to identify the sites of their respective proposals. Characteristics of each area relative to the site selection and suitability criteria are summarized below.

West of Highway 97

The area west of Highway 97 contains four potential sites of interest for wind energy development – Springwood Ranch, the land south of Lookout Mountain, Manastash Ridge and a site (located both east and west of Highway 97) recently proposed for development as a wind farm by Zilkha Renewable Energy (the Kittitas Valley Wind Power Project).

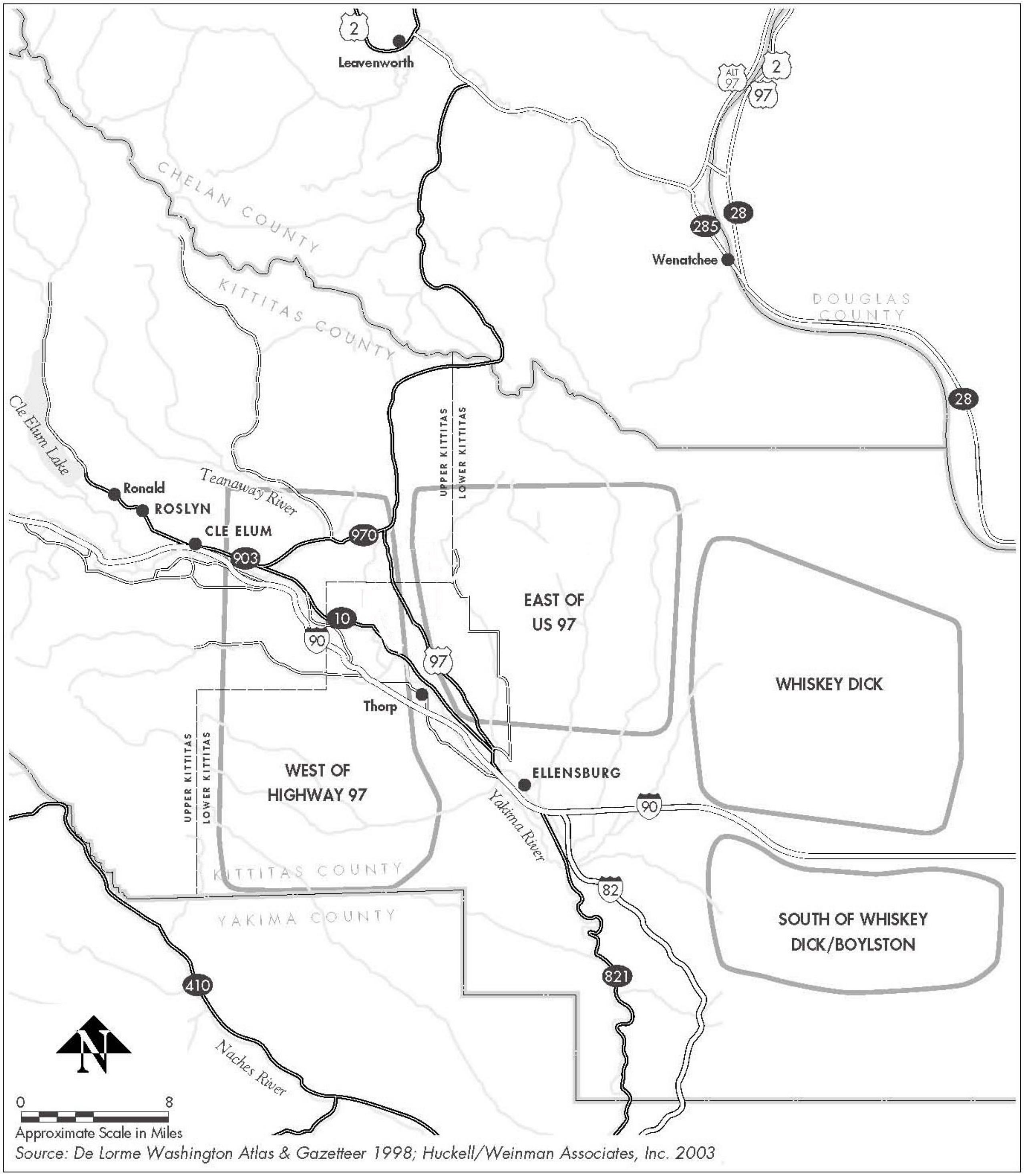
Springwood Ranch

The Springwood Ranch is an approximately 3,600-acre property that has been proposed or considered for development several times over the past 15 years. A conceptual master plan for a resort on this site was developed in the late 1980s, but an application for development was never submitted. The site was considered as an off-site alternative for the MountainStar Master Planned Resort and was evaluated in the EIS for that proposal (Kittitas County, 1999).

The Springwood Ranch site satisfied some but not all of the site selection criteria for a wind energy facility, and thus does not qualify as a "reasonable alternative." Sufficient wind resource is present, the site is in single ownership and environmental constraints are not extreme. However, transmission facilities are not currently accessible to the site. Site size, configuration and terrain would also likely limit the number of turbines that could be sited; consequently, the amount of power that could be produced falls well short of the proponent's objective as stated in **Section 1.3**. The property owner, a foreign corporation, did not support wind power and was not interested in discussing leasing to accommodate a wind power facility. The site would not, therefore, meet the proponent's project objectives. Nevertheless, this site is evaluated in the Draft EIS to provide comparative environmental information to decision makers and the public.

South of Lookout Mountain

The area south of Lookout Mountain includes approximately 2,600 acres of the Swauk Valley Ranch. Sufficient wind resource is present and environmental constraints are not extreme. In 2001, *enXco* evaluated this area and met with a group of local property owners. This site failed the site selection criteria because the property owners were not interested in participating in a wind energy project.



Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-14** **Areas Investigated for Wind Energy Development**

Manastash Ridge

The Manastash Ridge area, south of I-90 and west of the Yakima River, also has sufficient wind resource to be of interest for development. Much of this area consists of the L.T. Murray Wildlife Recreation Area, however, which encompasses approximately 106,000 acres and is managed by the Washington Department of Fish and Wildlife (WDFW). Adjacent lands include the Wenatchee National Forest on the west and the Oak Creek Wildlife Area (also managed by WDFW) on the south. The significant wildlife values and recreational use of this area would not satisfy the siting criteria related to environmental constraints. Also, this area is not adjacent to adequate transmission lines, and any project located in this area would require construction of a relatively long off-site project transmission line to reach existing transmission lines.

Kittitas Valley Site

The Kittitas Valley site is located both west and east of Highway 97. It met all defined criteria for site suitability. On January 13, 2003, Sagebrush Power Partners LLC (2003), a company wholly owned and managed by Zilkha, submitted an Application for Site Certification to the Washington Energy Facility Site Evaluation Council (EFSEC). The proposal is for approximately 120 wind turbines (at 1.5 MW each) producing a total of 180 MW of power, located on approximately 5,000 acres in mostly larger parcels. That application was the subject of an EFSEC land use hearing in May 2003. EFSEC is lead agency for an environmental impact statement, which was issued on December 12, 2003.

Given that the Kittitas Valley site is the subject of an active application by another wind developer (who has exclusive rights to wind energy development on the site through agreements with landowners), the site is not available to *enXco*, does not meet their proposal's objectives, and is not a practical or reasonable alternative. There were two additional reasons for not evaluating this alternative in the Desert Claim Draft EIS. First, the Draft EIS for the Kittitas Valley Wind Power Project was not issued at the time the Desert Claim Draft EIS was being prepared; the Kittitas Valley Draft EIS was issued on December 12, 2003, while the Desert Claim Draft EIS was issued on December 15, 2003. Thus, both EISs were available for review contemporaneously. Decision makers and the public, therefore, had the ability to review environmental information about the Kittitas Valley site and compare it to the Desert Claim, albeit in a separate document. The purpose of considering off-site alternatives in the context of SEPA was therefore satisfied. Second, the cumulative effects of the Kittitas Valley project are considered (along with those of the Wild Horse proposal) throughout this EIS. Decision makers and the public therefore, had ample information about the Kittitas Valley site and proposal, considered both as an individual project and in combination with other proposed wind facilities in Kittitas County.

East of Highway 97

The area east of Highway 97 generally satisfied all suitability criteria for wind energy development. Both *enXco* and Zilkha identified respective sites (or portions of sites) within this area, and developed wind power proposals based on those sites.

A portion of the Kittitas Valley site, discussed previously, is located east of Highway 97. The Desert Claim site, proposed by Desert Claim Wind Power LLC, a Washington company wholly owned and managed by *enXco*, is located approximately 8 miles northwest of Ellensburg. Desert Claim Wind Power LLC submitted an application for development of a wind energy facility on this site to Kittitas County in January 2003. The proposal is for a maximum of 120 wind turbines (at 1.5 MW each) producing a total of at least 180 MW of power, located on approximately 5,237 acres of privately-owned land in eight parcels.

Whiskey Dick Mountain

This is a large area east of Ellensburg and north of I-90, centered on Whiskey Dick Mountain. The area east and northeast of Whiskey Dick Mountain contains the Schaake, Quilomene and Colockum Wildlife Areas. The ownership of these lands by WDFW and potential conflicts with wildlife and recreational values of these lands could make them unsuitable for wind energy development. The area west of Whiskey Dick, which quickly drops to the Valley floor, shows a poor wind resource, making it not commercially viable based on historic met data for this area.

An area of approximately 26,000 acres centered on Whiskey Dick Mountain is owned by two parties controlled by the same group. This area contains sufficient wind resource, has adequate transmission facilities near the site, and is not characterized by wildlife area lands or readily apparent major environmental constraints. Zilkha Renewable Energy executed an agreement with owners of approximately 8,000 acres within this area and, through its wholly owned company, Wind Ridge Power Partners LLC, submitted a request for a Potential Site Study to EFSEC in July 2003. The proposal (as defined at the time) would include approximately 110 to 120 wind turbines and would generate approximately 180 MW of power.

South of Whiskey Dick/Boylston Mountains

The Boylston Mountains area, which is south of Whiskey Dick Mountain and east of the Yakima River, has sufficient wind resource but is comprised of lands that do not satisfy criteria related to land use or environmental constraints. The large area between the Yakima River and the Columbia River consists primarily of the Yakima Training Center, a federal military reservation administered by the U.S. Department of Defense and actively used for military training. Construction and operation of a wind farm in the Boylston Mountains would conflict with ongoing military operations on these lands and would not be allowed by the Defense Department.

2.3.1.4 Sites Carried Forward for Detailed Consideration

Based on the foregoing site screening process, two sites were selected for consideration in the EIS as off-site alternatives for the Desert Claim proposal – the Wild Horse (Whiskey Dick Mountain) and Springwood Ranch sites. The objective of considering these sites in the EIS is to provide decision makers and the public with comparative information about environmental impacts. This screening process is not intended to suggest that these are the only sites in Kittitas County with the potential for wind power development. Future proposals, if any, would not be limited to the sites identified herein.

As noted previously, neither of these sites is a practical, reasonable alternative that is available to *enXco*. The Wild Horse site is proposed for development by Zilkha Renewable Energy; a request for a Potential Site Study was submitted to EFSEC by Zilkha in July 2003. The Springwood Ranch site lacks accessible, adequate transmission facilities and it does not meet the proponent's objectives because it will not support a 180 MW project due to site size, configuration and terrain constraints that limit the number of turbines that could be located on this property. Also, the owner of the Springwood Ranch expressed lack of interest in discussing wind power development with *enXco*.

Information regarding existing conditions and potential impacts for the Wild Horse site is based on preliminary studies prepared by Zilkha, documentation that Zilkha submitted to EFSEC in conjunction with the potential site study request, and the potential site study released by EFSEC in October 2003

(Jones and Stokes, 2003). Similar information regarding the Springwood Ranch site is based largely on information contained in the MountainStar EIS. Information concerning the Kittitas Valley Wind Power Project is being published in a Draft EIS contemporaneous with the publication of the Desert Claim EIS; it will, therefore, be available for consideration by decision makers. The Kittitas Valley Wind Power Project is included in the discussion of cumulative impacts contained in this Draft EIS.

2.3.2 Alternative Sites Selected for EIS Analysis

As indicated in **Section 2.3.1.4**, Kittitas County elected to consider two off-site alternatives to the Desert Claim proposal in this EIS. This was done to meet the objective of providing decision makers with comparative information about potential environmental impacts, pursuant to the SEPA Rules. To achieve this objective, these alternatives are defined as the development of equivalent (to the extent possible) wind energy projects at plausible locations other than the Desert Claim project site. This section provides a summary description for such wind energy project development at the two selected alternative sites. Because wind turbines and associated project facilities at each site would be configured according to the wind, terrain, access and other pertinent conditions present at each site, a conceptual project layout for each site is included in the project description for the alternative. Except as specifically noted below, the project facilities, construction process and operations and maintenance program for these alternatives would be as described in **Section 2.2** for the Proposed Action.

2.3.2.1 Alternative 1: Wild Horse Site

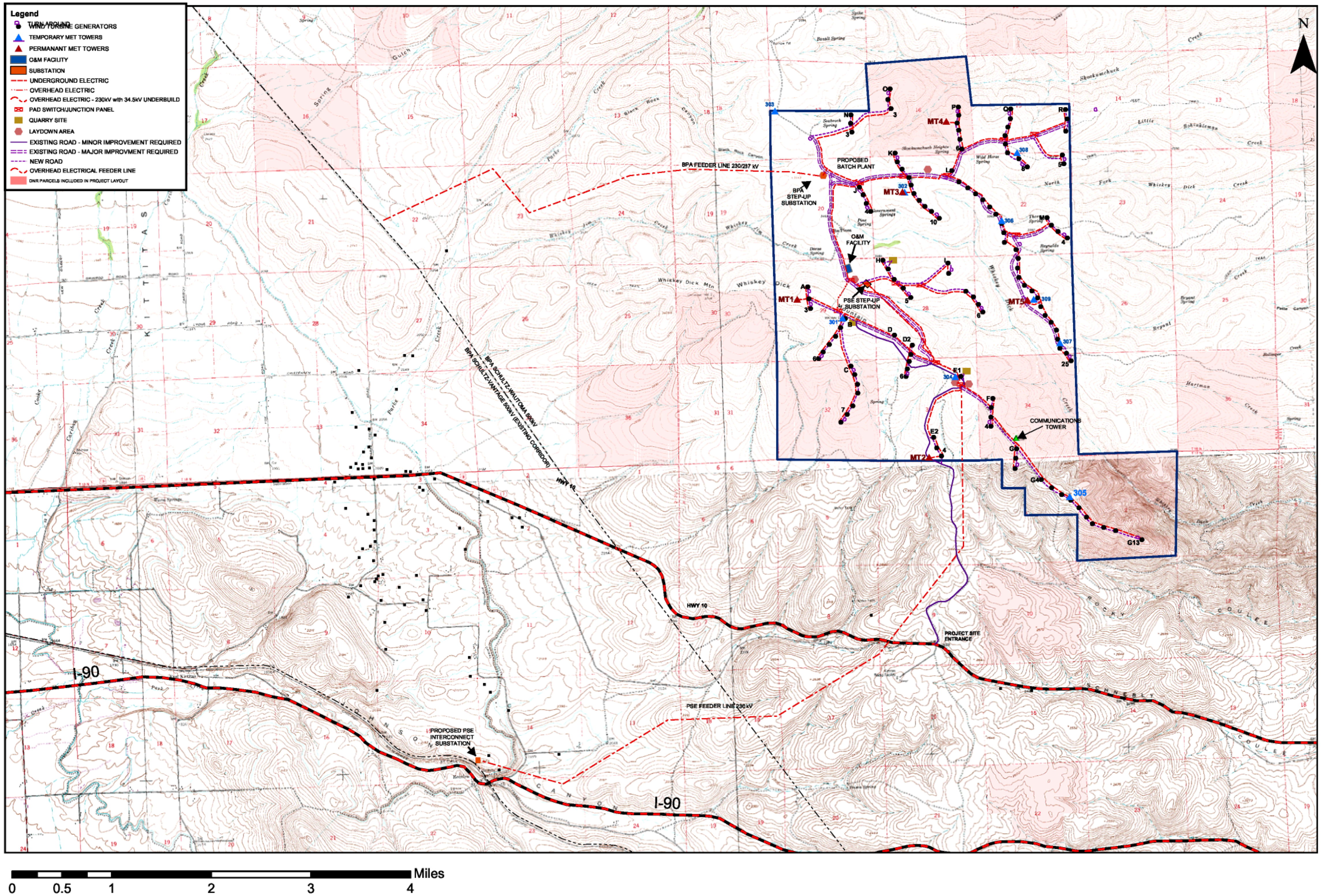
Because there is an existing proposal for wind energy development at the Wild Horse site, the project description for Alternative 1 is based on the Zilkha/Wind Ridge Power Partners LLC proposal for the Wild Horse Wind Power Project, as submitted to EFSEC in July 2003. (The October 2003 potential site study for this proposal indicates the EFSEC EIS will actually consider a range of turbine numbers and capacities for the Wild Horse project, but such a range is not reflected in the description for Alternative 1.) A graphic of the proposed layout for the Wild Horse project is included in this EIS, courtesy of Zilkha, as **Figure 2-15**.

Location and Site Characteristics

The Wild Horse Wind Power Project is proposed on a site of approximately 5,000 acres located about 10 miles east of the town of Kittitas, on the eastern slopes of Whiskey Dick Mountain. Except for Whiskey Dick Mountain, much of the site consists of a relatively flat plateau with steep-sided drainages. Several creeks originate on the site (Whiskey Dick, Skookumchuck and Whiskey Jim); several other creeks and their tributaries are located on or near the project site. The majority of the site consists of shrub-steppe habitat. No wetlands occur on the site, according to National Wetland Inventory (NWI) maps.

The proposed project area is zoned Forest and Range. It consists of open range land that is currently used for grazing. There are no residences on the project site, and none within 2 miles of any proposed turbine location. The area surrounding the Wild Horse site is sparsely populated. The proposed route for the transmission feeder line passes near a few residences.

The Wild Horse project area (as proposed by Zilkha) includes three parcels of State-owned land administered by WDNR and totaling approximately 1,900 acres. Wind turbines and associated facilities would be developed on these lands, through a lease agreement with WDNR. Vehicle access to the site is via private road from Old Vantage Highway, at a point approximately 2 miles south of the project boundary and 10 miles east from Kittitas.



Source: Zilkha Renewable Energy

Huckell/Weinman Associates, Inc.

HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 2-15

Project Layout for Alternative 1: Wild Horse Site

Wind Power Facilities

The presumed configuration of wind turbines on the Wild Horse site, as defined for Alternative 1, is shown in **Figure 2-15**. The proposal would include approximately 122 wind turbines, each with a nameplate capacity of 1.5 MW, and associated facilities. The proposal would generate up to approximately 183 MW of power. (The potential site study prepared for EFSEC [Jones and Stokes, 2003] indicates the project could actually involve from 83 to 125 turbines and a capacity ranging from 125 MW to 249 MW. To avoid unnecessary complexity, Alternative 1 for the Desert Claim EIS is defined by the 183-MW project described in the July 2003 submittal to EFSEC.) Facilities and construction techniques would generally be as described in **Section 2.2** for the Proposed Action. The project would interconnect to either the existing BPA transmission line located approximately 4 miles west of the project site, or to the existing PSE transmission line located approximately 5 miles southwest of the project site. (If the interconnection were to the BPA system, the actual point of connection would be at the Schultz Substation farther to the northwest, although the BPA would build and operate the new section of line that would run parallel to the existing lines.)

The location of the project substation would depend upon the transmission system selected for interconnection, pursuant to an agreement with BPA or PSE. **Figure 2-15** shows two potential substation locations. A location near the northwestern corner of the project site would be used for the substation if interconnection were to the BPA transmission system, while a substation location in the southwestern quadrant of the site would be used for a PSE interconnection. An operations and maintenance facility would be constructed near the center of the project area.

A network of graveled project access roads would be constructed to provide vehicle access to all of the turbine locations, as described for the proposed action. Minor or major improvements to existing primitive roads on the site would be implemented where possible, to minimize construction of new roads. **Figure 2-15** shows the configuration of the project road system in relation to the turbines and other project facilities. Power collection cables (primarily underground) would generally follow the routes of the project access roads. Five permanent met towers and a communications tower would be constructed at various locations on the project site.

Construction for the proposed Wild Horse project would occur over a 9-12 month period and is expected to be completed by the end of 2005. Gravel and other material needed for project construction (for roads, pads, etc.) would be obtained from three quarries developed on the site. **Figure 2-15** shows the location of a temporary batch plant that would be built to provide concrete for the project. Five construction laydown areas would be developed for temporary use.

The total area occupied by the turbines and associated permanent facilities would be approximately 130 acres. The total area cleared/temporarily disturbed by construction activities would be approximately 300 acres. Once construction was completed, an estimated 10 to 14 local workers would be employed to operate and maintain the facility.

2.3.2.2 Alternative 2: Springwood Ranch Site

Although wind energy companies have investigated the prospects for wind energy development in the Springwood Ranch area, there has been no specific proposal for a wind energy project on this site. The project description for Alternative 2 is based on a conceptual layout for a wind power project on the Springwood Ranch site that was prepared by *enXco,* at the County's request, specifically for use in this

EIS. A graphic of this conceptual layout is included as **Figure 2-16.** Because this site would not represent a viable or reasonable alternative to the Desert Claim site for *enXco*, Kittitas County has not requested *enXco* to prepare complete plans for a hypothetical project on this site. Therefore, **Figure 2-16** identifies wind turbine and met tower locations, but does not include locations for access roads, power collection cables, a substation, an operations and maintenance facility, or a transmission interconnection. These facilities would be required for a wind power project at this site, and their characteristics would be similar to those defined in **Section 2.2** for the same components of the proposed action.

Location and Site Characteristics

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

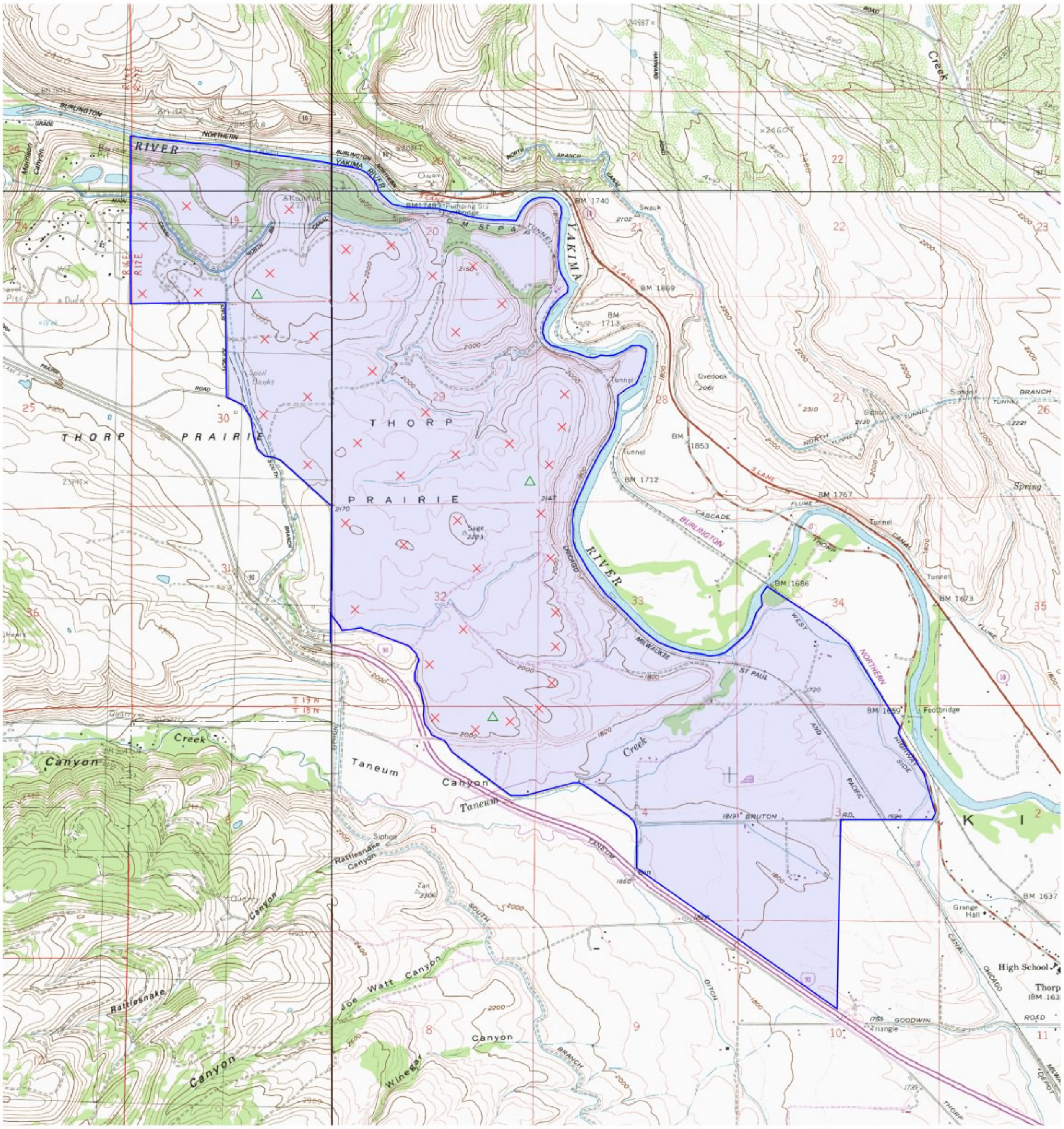
The surrounding area is primarily rural/agricultural (designated Forest Multiple Use and Agriculture in the Kittitas County Comprehensive Plan, and zoned Agriculture-20 and Forest and Range). A small cluster of commercial uses is located at Thorp (designated an Urban Growth Node (UGN) in the Kittitas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

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

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

Wind Power Facilities

Based on site size, meteorological conditions and topography, and assuming the same sized turbines and approximate spacing between turbines as for the Proposed Action, the Springwood Ranch site could accommodate approximately 40 to 45 turbines; **Figure 2-16** shows locations for 43 turbines. A smaller or greater number of turbines could potentially be accommodated based on micro-siting. Using a 1.5 MW turbine, this number of turbines would generate approximately 64.5 MW of electric power, which is less than half of the capacity of the Proposed Action.



△ Proposed met tower location
× Proposed wind turbine location

Source: *enXco, Inc.*

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 2-16** **Project Layout for Alternative 2: Springwood Ranch Site**

This reduced scale raises questions whether this could be a commercially viable site; in any case, it is below the applicant's objectives for a wind power facility (i.e., at least 180 MW) and less than the quantity of wind energy that is currently being sought by regional utilities PSE and PacifiCorp (150 MW and 100 MW, respectively). Connection to transmission facilities (for the BPA lines) would require building a transmission line approximately 5 miles long, including crossing the Yakima River. Easements would also need to be acquired to travel across private properties located between the project site and the transmission line.

Other project facilities and construction techniques would be the same as described for the Proposed Action. The project substation would be located on the property, while a switchyard would be located at the interconnect point. Project access roads would be similar in design to the proposed action, but would be proportionally less in terms of total distance and disturbance. Based on the corresponding unit factors for the various project components addressed in **Section 2.2**, the total area disturbed by construction for Alternative 2 would be approximately 125 acres. The total area permanently occupied by project facilities in this case would be approximately 30 acres. The labor force required for construction and for long-term operation and maintenance of a 65-MW wind project on the Springwood Ranch site would be less than for the Proposed Action, but the specific numbers or differences have not been estimated.

2.3.3 No Action Alternative

The No Action Alternative implies a decision by Kittitas County not to approve the application for the Desert Claim Wind Power Project. Under the No Action Alternative the proposed Desert Claim Wind Power Project and all associated features including the turbines, access roads, utility trenches, and substations would not be constructed. There would be no environmental impacts from development of the wind power facility within the Desert Claim project area. The No Action Alternative would eliminate the local economic effects for Kittitas County and nearby communities in the form of lease payments, tax revenues and opportunities for employment resulting from this proposal.

Under the No Action Alternative, on-site agricultural and rural residential activities would continue for the foreseeable future; current Ag-20 and Forest and Range zoning would likely continue. The potential for residential development in the project area, to the extent permitted by existing zoning, and the potential for conflicts with existing agricultural activities, would continue. For the approximately 4,000 acres zoned as Ag-20, the potential exists for development of up to 400 residential lots over this area. Conversion to rural residential uses could displace existing uses and affect rural character over time.

The No Action Alternative evaluated in this EIS is specific to the Desert Claim proposal and does not apply to any other current or potential future proposals for energy generation. Under the No Action Alternative there would be no contribution to new electrical generation from the Desert Claim Wind Power Project in response to identified electric power demands in the Pacific Northwest and adjoining regions. Other energy generation projects, using wind and other energy resources and involving other sites in Kittitas County and elsewhere in the region, have recently been proposed and could be pursued in response to a portion of those demands. The No Action Alternative for the Desert Claim project does not include or preclude any specific action with respect to those existing proposals or similar proposals that might occur in the future.

2.4 ALTERNATIVES NOT CONSIDERED IN DETAIL

2.4.1 Alternative Site(s)

Section 2.3 discusses the process used to identify alternative sites for evaluation in the EIS. This process resulted in identification of two action alternatives based on sites other than the project area proposed by Desert Claim. The discussion references other areas of Kittitas County that initially may have been considered as candidates for wind energy development, but were not selected for evaluation based on one or more of the site screening criteria. These other sites represent alternatives not considered in detail.

2.4.2 Alternative Generation Technologies

As discussed in **Section 2.1.3**, wind energy technology has evolved considerably over the past several decades. Various types of wind turbines have been employed to generate electricity on an experimental or a commercial basis. The applicant proposes to use three-bladed, horizontal-axis rotors mounted on the upwind side of the turbine. Other turbine configurations that have been used in the past include vertical-axis turbines (also known as the "eggbeater" design, such as the demonstration model that has been inactive on the Springwood Ranch property for several years), turbines with two-bladed rotors, and turbines with rotors mounted on the downwind side of the turbine. Desert Claim believes that the turbine technology proposed for the project is the most reliable, efficient and commercially viable wind energy technology available. Information readily available within the industry likewise indicates the three-bladed, horizontal, upwind turbine is the most proven design and is the current industry standard. Consequently, Kittitas County concluded that it would not be necessary or appropriate to include detailed evaluation of alternative types of wind turbine technology in the EIS.

The applicant proposes to use 1.5-MW wind turbines for the Desert Claim project. Larger turbines up to a capacity of at least 3 MW are currently available, as are smaller units; turbines with a capacity ranging from approximately 500 to 750 kW have been used in a number of relatively recent wind power developments. The potential use of larger (3-MW) turbine units is currently being evaluated in the EIS for the Kittitas Valley Wind Power Project proposed by Zilkha Renewable Energy (EFSEC, 2003). Because the Kittitas Valley EIS will provide an indication of the relative tradeoffs in environmental impacts through use of larger turbines, there is no need to evaluate the possible use of larger turbines for the Desert Claim project. Use of smaller turbines in the 500 to 750 kW range would result in a greater area of disturbance, a larger project footprint, approximately twice the number of turbines and a greater overall level of environmental impact for the same amount of power. Consequently, it is not necessary to evaluate the use of different turbine sizes in the EIS.

2.4.3 Alternative Transmission Interconnections

Desert Claim Wind Power LLC has indicated that it might deliver electric power from the proposed project to existing transmission lines operated by the Bonneville Power Administration or Puget Sound Energy. Determination of which transmission system would be used for the project interconnection would depend on the outcome of power sales contract negotiations. Interconnections with both the BPA system and the PSE system are evaluated in the Desert Claim EIS. The prospective connection points represent the shortest links from the project to each transmission system, and the routes for those connections would not involve unusual or notable environmental impacts. Therefore, use of alternative transmission interconnections would not result in lower environmental impacts, and there is no need to evaluate alternative transmission interconnections in the EIS.

3. AFFECTED ENVIRONMENT, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This chapter of the EIS describes baseline conditions for the respective elements of the environment, documents the expected environmental impacts of the proposed action and the alternatives, and identifies mitigation measures pertinent to those impacts. The intent is to focus specifically on the environmental conditions that would likely be subject to significant change from development of the project. Consistent with guidance provided by SEPA rules, insignificant impacts and elements of the environment that would not be affected significantly are discussed briefly or not at all. Based on the results of scoping for this EIS, this chapter is organized into 16 sections addressing the following elements of the environment:

- **3.1 Earth**
- **3.2 Air Quality**
- **3.3 Water Resources**
- **3.4 Plants and Animals**
- **3.5 Energy and Natural Resources**
- **3.6 Cultural Resources**
- **3.7 Land and Shoreline Use**
- **3.8 Health and Safety**
- **3.9 Noise**
- **3.10 Aesthetics/Light and Glare**
- **3.11 Recreation**
- **3.12 Ground Transportation**
- **3.13 Air Transportation**
- **3.14 Public Services and Utilities**
- **3.15 Population, Housing and Employment**
- **3.16 Fiscal Conditions**

As a general rule, all sections include a similar subheading structure. The affected environment is typically addressed first in each section, in a level of detail sufficient to allow an overall understanding of baseline conditions. For most elements the geographic focus of this discussion is the project area for the proposed Desert Claim project, although information on conditions elsewhere in the vicinity is provided when that context is pertinent to the impact analysis. In addition, information on baseline conditions relevant to the Wild Horse and Springwood Ranch sites defined for Alternatives 1 and 2, respectively, is included. Subsequent material presents the expected environmental consequences of the proposed action, given the baseline conditions for each element and the modified project characteristics described in detail in **Section 2.2**. Impacts are then provided for the two action alternatives and the no-action alternative. Because Alternatives 1 and 2 involve similar actions at different project sites, impacts for these alternatives are generally presented in comparison to those for the proposed action. Consequences under the no-action alternative consist of the existing conditions in the Desert Claim project area projected into the future, as they might likely evolve under current planning and zoning provisions.

Information on existing conditions and expected impacts for the proposed action and the Desert Claim project area is based on the Desert Claim application, studies prepared in support of the application and studies conducted specifically for the Desert Claim EIS. *enXco*/Desert Claim Wind Power LLC does not have access to and control over the sites defined for Alternatives 1 and 2 and Kittitas County did not perform site-specific studies for those alternatives to support the EIS. Instead, Kittitas County relied on existing, readily available information applicable to the Wild Horse (Alternative 1) and Springwood Ranch (Alternative 2) sites. Information on existing conditions and potential impacts for the Wild Horse site is based on preliminary studies prepared by Zilkha Renewable Energy, documentation that Zilkha submitted to the Washington Energy Facility Site Evaluation Council (EFSEC) in conjunction with the potential site study request for the Wild Horse Wind Power Project, the potential site study released by EFSEC in October 2003 (Jones and Stokes 2003) and the Wild Horse project application submitted to EFSEC in March 2004 (Wind Ridge Power Partners, LLC 2004). Comparable information for the Springwood Ranch site is based primarily on documentation in the Draft EIS for the MountainStar Master Planned Resort (Kittitas County, 1999), supplemented with additional, readily available existing data.

Material on the impacts of the alternatives is followed by subheadings for cumulative impacts, mitigation measures and significant adverse unavoidable impacts. Assessment of potential cumulative impacts requires that the expected effects of the proposed project be considered within the context of other past, present and reasonably foreseeable actions affecting the resources. Because this assessment involved consideration of cumulative impacts of the Desert Claim project individually and combined with those of two other proposed wind power projects, cumulative impacts for all elements of the environment are discussed separately in **Chapter 4**. The mitigation discussions distinguish between measures to avoid or reduce expected impacts that are proposed, i.e., that are incorporated into the plans for the proposed action, and other, possible measures that have not been adopted as part of the project. Significant adverse unavoidable impacts are impacts that cannot or would not be mitigated and would remain significant.

All sections of Chapter 3 have been updated as necessary in the Final EIS to reflect the modified project layout presented in **Section 2.2**. Relative to the project plans described in the Draft EIS, proposed locations for wind turbines, power collection lines, project access roads and other facilities have been shifted somewhat in response to issues identified in the Draft EIS impact analysis and/or public comments from review of the Draft EIS. In particular, the modified proposal incorporates a larger performance-based setback of wind turbines (487 feet) from the project area boundary, adjacent property lines and public road rights-of-way relative to the 250-foot setback from these features discussed in the Draft EIS. The applicant also applied this larger setback to existing utility corridors and the KRD canal. As in the Draft EIS, the proposal maintains a 1,000-foot setback from all residences, the locations of which were field verified by the County for the Final EIS. The performance-based setback from property lines and roads is in response to a Kittitas County request that the applicant establish a uniform safety zone, based on the hazard analysis documented in the Draft EIS, around all proposed wind turbines. As a result of including the larger safety zone, as well as modifications related to minimizing other environmental impacts, the proposed locations for all 120 turbines shifted somewhat compared to the Draft EIS project description. Desert Claim Wind Power LLC also modified the proposed layout for other components of the project (i.e., access roads, power collection cables, etc.) to match the modified turbine layout.

For several elements of the environment, the Draft EIS referenced the potential to avoid or reduce impacts through micro-site analysis of locations for turbines and other project facilities. To a degree, the modified project configuration presented in the Final EIS represents a comprehensive micro-site analysis for the entire project and project area in an attempt to reduce overall project impacts. The project configuration described in the Final EIS is not a final, precise plan for the location of all project facilities, however. If the project is approved, the applicant would still need to proceed with detailed design of project facilities and staking of those facility locations in the field. Prior to actual construction, it would still be possible to shift the precise locations of individual turbines, using another layer of micro-siting, by up to 50 or perhaps even 100 feet if this were desirable to avoid disturbance of a feature such as a wetland or a cultural resource site. There are practical limitations on the number of turbine locations that could shifted in this manner, but a degree of micro-siting to avoid impacts would still be possible.

3.1 EARTH RESOURCES

3.1.1 Affected Environment

This section provides a summary discussion of geologic and soil characteristics pertinent to the project area. Supporting technical detail is provided in **Appendix A**.

3.1.1.1 General Physiography

The proposed location for the Desert Claim wind energy facility is on the western edge of the Columbia Plateau, approximately 50 miles (80 kilometers [km]) east of the Cascade Range divide. The proposed project area is located within the Kittitas Valley, a wide segment of the Yakima River Valley that is the topographic expression of a broad synclinal basin (inward dipping fold) within the Yakima Fold Belt. The project area rises gradually to the north to Table Mountain in the Wenatchee Mountain Range. Manastash Ridge forms the southern boundary of the Kittitas Valley.

Two project alternatives involving other sites are addressed in this EIS. The site for Alternative 1 is located along the eastern margin of the Kittitas Valley, approximately 14 miles to the southeast of the Desert Claim project area. The site for Alternative 2 is located near the western edge of the Kittitas Valley, approximately 5 miles to the west of the Desert Claim site. All three sites are located within the same physiographic province, and the discussion of regional geology provided in **Section 3.1.1.2** and **Appendix A** is applicable to all three sites. Following a description of geologic and soil conditions applicable to the Desert Claim project area, comparable conditions for the Alternative 1 and Alternative 2 sites is provided in **Sections 3.1.1.6** and **3.1.1.7**, respectively.

The Kittitas Valley is filled with eroded sediments from surrounding ridges and Pleistocene-age glacial outwash deposits, up to a level approximately 1,600 feet above the Yakima River in the project area. Older glacial and nonglacial deposits have been carved by Recent-age (postglacial) alluvial material, leaving remnant terraces up to 200 feet above the surrounding topography.

3.1.1.2 Regional Geology

The Columbia Plateau of central and eastern Washington is underlain by the Miocene-age flows of the Columbia River Basalt Group (CRBG). The Grande Ronde Basalt flow was the largest of the CRBG flows and underlies Kittitas Valley, continuing approximately 15 miles northeast and up-valley of the project area to lap onto the eastern margin of the Cascade Range. Interfingered with the basalt flows are sandstones, siltstones, and conglomerates of the Ellensburg Formation that are derived from sediment eroded or erupted from the Cascade Range.

Regional tectonic stresses caused north-south compression and east-west extension in central Washington during emplacement of the CRBG. The stresses created the southeast-trending ridges and valleys of the Yakima Fold Belt. Kittitas Valley and the Wenatchee Mountains are a resulting valley and ridge, respectively, of the Yakima Fold Belt. The stress regime creating the Yakima Fold Belt is likely still active today (Reidel et al. 1994).

Kittitas Valley in the vicinity of the project is filled with Pliocene-age to Recent-age alluvial material derived from the surrounding basalt mountains and glacial deposits. Pleistocene-age glaciers originating in the upper Yakima River Valley contributed sediment from their source to the Kittitas Valley. Outwash (glacial sand and gravel) of Kittitas Drift extends to the central Kittitas Valley in the project vicinity. Older Thorp Gravel deposits (composed of sand and gravel) in Kittitas Valley are of Pliocene-age and may not be of glacial origin. Younger, post-glacial, sediments are derived from the surrounding basalt mountains to create alluvial fans and deposits in the project vicinity (see **Appendix A** for further details).

3.1.1.3 Desert Claim Project Area Geology

Geologic conditions of the Desert Claim project area were evaluated using data obtained from field explorations by Associated Earth Sciences, Inc. (AESI) and AESI's review of regional geologic maps and publications. Additional text and figures describing the geologic conditions of the project area and the locations of AESI's field explorations are included in **Appendix A**. Detailed exploration logs documenting the findings of the field studies are available for review from Kittitas County.

The surficial geology of the project area consists of Recent-age postglacial alluvial fans and other stream deposits that overlie and carve into older Pleistocene-age sidestream glacial outwash (Kittitas Drift) and Pliocene-age sidestream alluvium (Thorp Gravel). Erosion by the younger streams has carved distinct terraces in the older deposits. Miocene-age Grande Ronde Basalt underlies the sediments described above and the entire project area. It crops out on the northernmost property of the project and other isolated locations. A small outcrop of Miocene-age volcaniclastic Ellensburg Formation was located on the northeastern portion of the project area at the base of a Thorp Gravel terrace. **Appendix A** provides a detailed description of the geologic units present in the project area and field observations of those units.

The ridges and valleys in the region have a general northwest-to-southeast structural orientation. Folds and faults identified in the bedrock at and in the vicinity of the project area often follow this northwest-southeast trend. This trend corresponds to the same general trend of the Olympic-Wallowa Lineament (OWL), a 500-km alignment of folds and faults stretching from northeast Oregon across Washington to the Puget Sound area. Recent tectonic studies (McCaffrey et al. 2000) indicate that the OWL may be an active structure that divides Washington from a tectonic block of earth crust that includes most of Oregon and is rotating relative to Washington. A detailed discussion of this structure and the tectonic environment is in **Appendix A, Section 3.1.**

Growth of anticlines south of the Kittitas Valley may have influenced the accumulation of the Pliocene-age Thorp Gravel in the Kittitas Valley that is contemporaneous with the accumulation of deposits farther east on the Columbia Plateau (Ringold Formation). Focal mechanisms of earthquakes indicate modern north-south compressive stress in some eastern basins analogous to the Kittitas Valley; suggesting that structures in central Washington have grown during the Pliocene and younger epochs. Waitt (1979) cited many references that indicate faults cutting the Grande Ronde Basalt and Ellensburg Formation are associated with many of the anticlines in central Washington. He suggested that if some of the folds are growing, some of the faults may be at least intermittently active, but there is little evidence that Pleistocene sediment in central Washington is either folded or faulted. Waitt (1979) concluded that faults peripheral to the Kittitas Valley evidently do not disrupt modern sidestream fans and can be dated only as post-Miocene-age and pre-late Holocene-age (Recent-age).

Thorp Gravel terraces are interrupted by three east-trending, north-facing fault scarps related to regional bedrock structures. Tabor et al. (1982) mapped the structures; one occurs immediately south of Section 31 (Township 19 North, Range 19 East), Section 35, and Section 36 (Township 19 North, Range 18 East). Part of this fault trace is shown on **Figure A-1** in **Appendix A**. The trace of a second structure is apparent in the Thorp Gravel terrace approximately 2 km west of the project area boundary. The third structure is marked by small terraces of Thorp Gravel that end abruptly approximately 8 km southwest of the project area boundary. The Thorp Gravel appears to be the youngest deposits that are demonstrably deformed by these structures. The younger Kittitas Drift deposits are not demonstrably offset. This bounds the likely age of faulting to be between 3.7 and 0.13 million years.

3.1.1.4 Project Area Soils

General Conditions

Physical and chemical weathering of surficial glacial deposits, nonglacial deposits, and bedrock has resulted in the formation of various types of surface soils on the project site. Surface soils data were obtained from the Natural Resource Conservation Service (NRCS) office located in Spokane, Washington. The NRCS soil survey of Kittitas County has not been completed as of the date of this report. Draft versions of soil maps and descriptions were available for the project site (NRCS 2003a). Individual soil units have been mapped by the NRCS on recent orthophotoquads of the site vicinity. **Figure A-4** in **Appendix A** presents a surface soils map for the project area based on the orthophotoquads obtained from the NRCS and modified as determined from site-specific subsurface investigations.

Comprehensive descriptions for map units shown in **Figure A-4** are not currently available. However, draft engineering and selected physical properties of each soil unit were obtained from the NRCS and are summarized in **Table A-1** (NRCS 2003a). Also, soil profiles for most on-site soils are available from the NRCS database via the Internet (NRCS 2003a). Based on this information, descriptions of each unit are presented in **Appendix A, Section 2.2**.

The five factors typically used to define the type, characteristics and formation of specific soils are: (1) parent material; (2) climate; (3) topography; (4) organisms (biota); and (5) time. The soils of the wind energy site formed over young glacial, nonglacial alluvial deposits, and basalt bedrock. Climatic conditions are semiarid. Average annual precipitation is 8.9 inches and average annual snowfall is 27.9 inches. Summers are warm and dry, and winters are cold and somewhat moist. Topography is gentle over most of the site. Steeper slopes are found on the northernmost property. On-site elevations range from 1,900 to 3,500 feet. Sagebrush and grasses cover most of the site. Organism activity and diversity is low due to the dry climate. The soil units exhibit a direct relationship to the characteristics listed above.

Geologic and Soil Unit Correlation

Grande Ronde Basalt

Soils that form over Grande Ronde Basalt are characterized by brown, stony/cobbly and ashy loam. Gray and yellow hues are present as well. These soils are moderately deep to deep, and well drained. Permeability is moderate and runoff varies with slope.

Thorp Gravel

Soils that form over Thorp Gravel are characterized by brown, gravelly and ashy loam. Gray and yellow hues are present as well. These soils typically have a cemented zone 1 to 2 feet below ground surface. Thorp Gravel soils are very shallow to moderately deep and well drained. Permeability is slow to moderately slow and runoff is slow to medium.

Kittitas Drift

Soils that form over Kittitas Drift are characterized by brown and gray, gravelly/cobbly and ashy loam. Yellow hues are present as well. Fine sand, silt, and clay are often present in the matrix. Some Kittitas Drift soils have a cemented zone 1 to 2 feet below ground surface. These soils are well drained and vary in depth. Permeability is slow to moderately slow and runoff varies.

Recent Alluvium

Soils that form over recent alluvium are characterized by brown, gravelly/cobbly and ashy loam. Gray and yellow hues are present as well. Soils that have a cemented zone are found where streams are actively depositing material over Thorp Gravel and Kittitas Drift terraces. These soils are well and moderately well drained, and vary in depth. Permeability is slow to moderate and runoff varies.

Permafrost Mounds

Throughout the Thorp Gravel deposits in the project area, round or ellipsoidal mounds are present. The sagebrush that covers the surrounding soil is absent and the mounds are covered in grasses. The mounds are the result of intensive frost action during a periglacial climate that occurred after Thorp Gravel deposition. The freeze/thaw action sorted fine material from coarse material such that a layer of fine sand and silt is now present at the surface of the mounds and coarser grains are encountered several feet below ground surface. These soils are typically well drained and permeable (Kaatz 1959).

3.1.1.5 Project Area Geologic Hazards

Geologically hazardous areas are defined in Section 17A.02.150 of the Kittitas County Code (Critical Areas Ordinance [CAO]) as, "…areas that because of their susceptibility to erosion, sliding, earthquake, or other geological events, are not suited to the siting of major commercial, residential, or industrial development consistent with public health or safety concerns without proper engineering consideration and design." The following sections discuss the existing and/or potential erosion, landslide, and seismic hazards in the Desert Claim Wind Power Project area.

Erosion Hazards

Erosion hazard areas are identified by Kittitas County in Section 17A.02.080 of the Critical Areas Ordinance (CAO) as, "…those geologically hazardous areas containing soils which may experience or have experienced a severe to very severe surface erosion process." The CAO (Section 17A.06.015) also states that, "Areas identified as high risk erosion/landslide geologic hazard areas including cliff or talus slopes, may require specialized engineering to ascertain the property is suitable for development purposes." In response to these ordinance requirements, an analysis of the existing erosion hazard potential of the project area was conducted.

An understanding of where and how erosion occurs is required to evaluate potential erosion impacts (and to subsequently provide mitigation) as a result of the proposed project. Movement of sediment begins by a process called gross erosion that can be broken down into sheet erosion and channel erosion.

Sheet erosion is caused by shallow "sheets" of water flowing over the cleared land surface and transporting soil particles that have been detached by raindrops. The shallow surface flow rarely moves as a uniform sheet for more than a few feet before concentrating in surface irregularities and resulting in rill erosion that causes additional sediment transport. This erosion process is continuous over several storm or normal rainfall events. If the rills become more than a few inches deep, then the erosive regime changes to gully erosion where concentrated water flow can transport large quantities of sediment during a single storm event. This type of large-scale gully erosion process usually occurs on slopes greater than 20 percent.

Different soil types and geologic parent materials can have widely differing susceptibilities toward each erosive process. As an example, bedrock in the project area typically develops soil horizons that are significantly less dense than the underlying strata. These soils are susceptible to sheet erosion or channel erosion (concentrated flows) due to their lower density and percentage of fines. However, the underlying bedrock is generally resistant to erosion. As a result, gully erosion is not common in bedrock areas. Conversely, the coarse-grained alluvium and glacial outwash deposits develop soil horizons that are much less susceptible to sheet erosion, primarily due to their high permeability preventing the development of sheet flow during normal rainfall events. However, both the soil and the parent material (mostly sand, gravel, and cobbles) are susceptible to gully erosion under concentrated flow regimes.

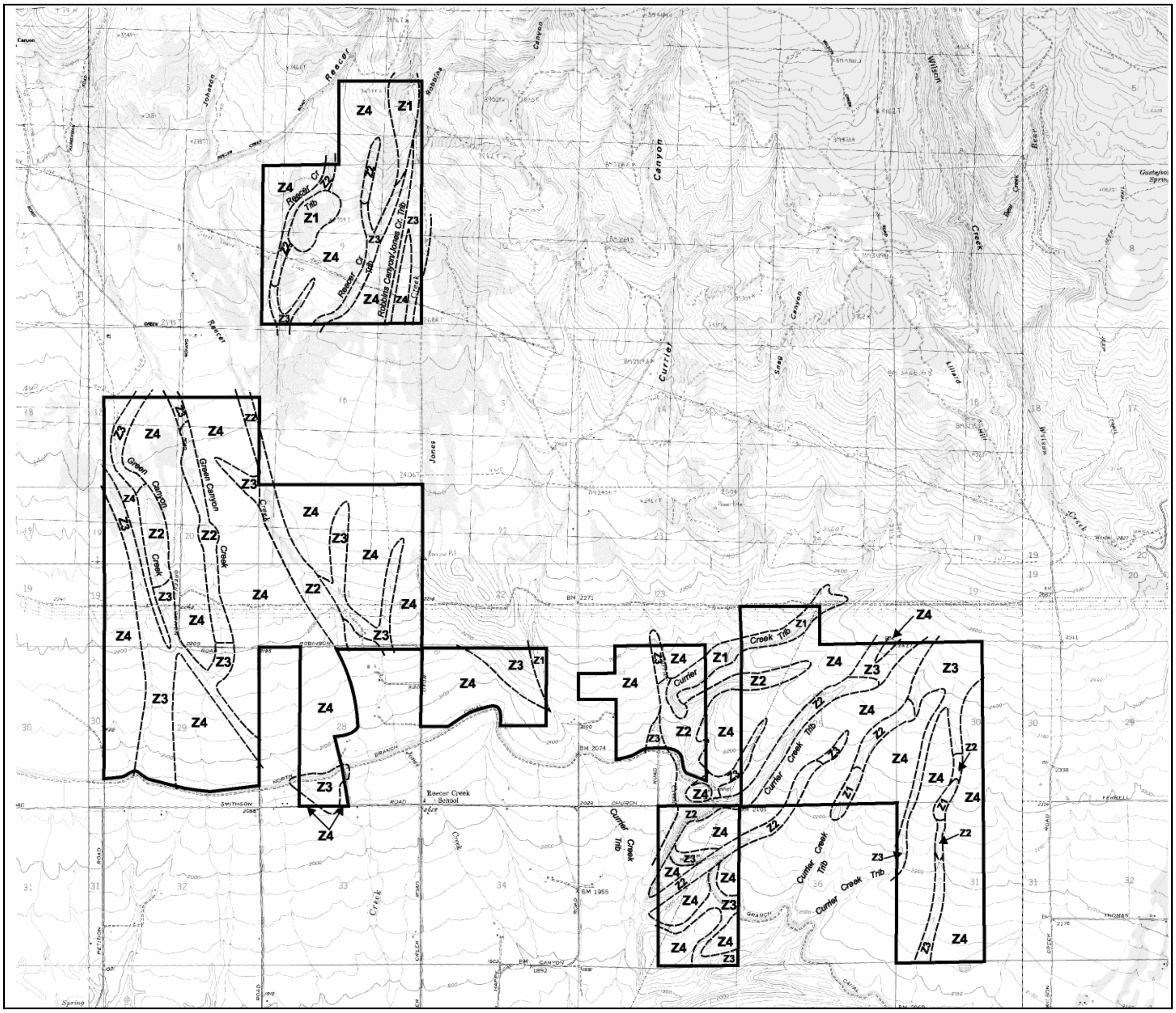
Slope gradients and vegetation also play an important role in determining erosion impacts. In general, steeper slopes have a higher susceptibility to erosion as surface water has the capability of achieving higher velocities and, hence, has more energy available to erode and transport sediments. Higher amounts of surface vegetation often reduce the potential development of concentrated flows by dispersing rainfall, impeding surface water flow, and reducing surface water velocities.

In general, project area erosion hazards are limited in extent and severity. Evidence of erosion in the project area was observed from two primary sources: (1) along stream drainages and irrigation ditches; and (2) along existing paved and dirt roads. Four zones with differing degrees of potential erosion hazard were mapped in the project area based on existing erosion occurrences, the sediment characteristics and slope gradients. The erosion noted on the site at the time of fieldwork and erosion hazard zones are discussed further below. The erosion hazard zones are shown on **Figure 3.1-1**.

Erosion Hazard Zone 1

Erosion Hazard Zone 1 is considered to possess a high to severe risk of erosion from sheet and concentrated flows under existing conditions. Areas classified as Erosion Hazard Zone 1 include areas of steep slopes in drainages and along edges of the Thorp Gravel terrace, in the eastern part of the project area; the landslide area in Section 9, in the northernmost project parcel; and steep slopes associated with bedrock outcrops.

Valley walls of Currier Creek tributaries that cross the Thorp Gravel terrace in Sections 25, 26, 30 and 31 (in the eastern part of the project area) become steep locally, with slopes in excess of 45 percent. Active or recent erosion was observed in these areas during field reconnaissance. Areas of bare soil and eroded side banks were observed at the base of the valley walls. The Thorp Gravel deposits possess a high risk of erosion during concentrated flows on steeper slopes due to their coarse-grained nature. Although sheet flow will infiltrate quickly on coarse-grained terraces of low to moderate slopes, concentrated flow on steep slopes will entrain coarse sediment that is not bound by a fine-grained matrix.



LEGEND

Project area

EROSION HAZARD ZONES

Z1	**High to severe hazard**
Z2	**Moderate hazard**
Z3	**Moderate to low hazard**
Z4	**Low hazard**

N

0 4000

SCALE IN FEET

REFERENCE: TOPO MAP FROM DELORME

Source: Associated Earth Sciences, Inc.

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power
Project EIS

Figure 3.1-1

Erosion Hazard Zones

Steep slopes in excess of 50 percent characterize the margins of the Thorp Gravel terrace. Loose colluvium of angular basalt gravel covers the lower half of the slopes, which are sparsely vegetated. Evidence of recent erosion was not observed on these slopes during fieldwork. However, because these deposits occur on steep slopes, are coarse-grained and lack a binding matrix, there is a high risk of erosion during concentrated flows.

In Sections 26 and 24, Currier Creek and a tributary traverse Quaternary alluvial deposits at the base of the Thorp Gravel terrace. Soils developed on the alluvial deposits are loose and contain fine-grained material. The finer-grained portions of the recent alluvial deposits are susceptible to both sheet and concentrated flows that may, in part, originate from terrace runoff. Localized bank erosion was encountered during field reconnaissance, resulting in near-vertical stream banks, 4 to 10 feet high, that expose a substratum of loose, silty sand with subangular gravel.

The northeast portion of Section 27 (near the center of the project area) and the portion of Section 4 (the northern end of the project area) included in the project area are underlain by Grande Ronde Basalt. Soils in these areas are coarse, shallow and well drained. They possess moderate to slow rates of permeability and rapid runoff rates on steep slopes. In Section 27, the bedrock is truncated by a northwest-trending fault mapped by Tabor et al. (1982). The slope is steep (in excess of 50 percent) and drops approximately 100 feet to a drainage ravine. In Section 4, slopes are generally 30 to 50 percent. Colluvium of broken basalt gravel is present on the lower half of bedrock slopes. Soils in these areas of the project are considered a high erosion risk because of the steep slopes, the relatively low soil permeability, and anticipated high runoff rates.

A tributary of Reecer Creek traverses Section 9 near a mapped landslide deposit (Tabor et al. 1982). The landslide deposit forms moderate slopes and is covered with relatively loose, coarse-grained soils that have a moderate to very rapid runoff rate, thereby being susceptible to sheet and concentrated erosion.

Erosion Hazard Zone 2

Erosion Hazard Zone 2 is considered to possess a moderate risk of erosion from sheet and concentrated flows under existing conditions. Areas classified as Erosion Hazard Zone 2 include portions of drainage ravines and ditches throughout the project area and some slopes that exist at the edges of Kittitas Drift terraces.

Drainages that cross the Thorp Gravel terrace in Sections 25, 26, 30, 31 and 35 (the eastern project parcels) are tributary to Currier Creek. They have low to moderate slopes with isolated areas of steep slopes described as Erosion Hazard Zone 1. Soils in this area are high in gravel content, well drained and possess slow runoff rates. They are generally resistant to erosion on low to moderate slopes. Minor amounts of erosion were observed at the base of some valley walls during field reconnaissance.

Portions of Green Canyon Creek traverse Section 20 (near the western edge of the project area) where irrigation ponds and ditches exist, predominately in recent alluvial deposits of low slopes. During fieldwork, the drainage ditches were observed to be incised up to 3 feet, and bank erosion occurred in meander bends of the drainages. Soils in this area are high in sand and silt content with some gravel. They are predominately well drained with moderate permeability rates. The fine-grained component of the soil would be easily entrained in sheet and concentrated flows; however, the low slopes reduce the risk of erosion.

Some locations in Section 20 contain drainage ditches that traverse the margins of Kittitas Drift terraces and flow onto recent alluvial plains of low slopes. The terrace soils are predominately coarse-grained and resistant to erosion on low slopes. The edges of the terraces have moderate to steep slopes that increase the risk of erosion, as observed in fieldwork. A stream channel that traverses the terrace margin was incised up to 4 feet until the presence of a cemented durapan layer appeared to inhibit erosion, thereby forming a small bench that extended for several feet in the drainage. In a reach of higher slope gradient, an increase in erosion resulted in incision continuing through the durapan layer and to the recent alluvial plain.

Reecer Creek traverses Section 21 in recent alluvial deposits located on low slopes. The soils are deep, moderately drained, and predominately fine-grained, consisting of clay and silt. The channel of Reecer Creek is incised where it crosses Reecer Creek Road. Bank erosion has resulted in near-vertical banks 8 to 10 feet high. Erosion was noted in the channel along the road caused by concentrated road runoff. Due to the observed erosion and high percentage of fine-grained material in this area, the risk of erosion is considered moderate.

A tributary of Reecer Creek traverses the western portion of Section 9 near the mapped landslide deposit (Tabor et al. 1982). Soils in this area are coarse-grained and have localized steep slopes. Minor erosion was noted at the base of valley walls, and this area is considered to be a moderate risk of erosion.

Erosion Hazard Zone 3

Erosion Hazard Zone 3 is considered to possess a moderate to low risk of erosion from sheet and concentrated flows under existing conditions. Areas classified as Erosion Hazard Zone 3 include portions of drainages throughout the project area and observed wetland areas.

Portions of drainages on the Thorp Gravel terrace in Sections 25, 26, 30, 31 and 35 have relatively low slopes and pose a low risk of erosion under concentrated flow.

Wetland areas were noted on the south side of the North Branch Canal in Sections 35 and 28. The wetland areas are due to leakage from the canal. The ground was observed to be marshy with standing water and vegetated with wetland plants. The soils in this area are moderately well drained, and consist of sandy and clayey loam with gravel. Although no erosion features were observed, this area does have a low risk of erosion under conditions of concentrated flow, due to the shallow slope and slow runoff rate of the soils.

Section 29 (the southwest corner of the project area) consists predominately of a recent alluvial plain with a very low slope gradient. Several irrigation drainage ditches cross the section and natural drainages exist in small swales. Soils are deep, well drained, and fine-grained. Minor incision was encountered in the main drainage ditch that traverses the section. The fine-grained soils are susceptible to erosion from concentrated flow.

Drainages in the eastern portion of Section 9 are tributary to Jones Creek. Soils that exist in these drainages are typically well drained and are predominately fine-grained with some gravel. Minor incision was encountered in some portions of the drainages. The fine-grained soils are susceptible to erosion from concentrated flow. The Reecer Creek tributary in the western portion of Section 9 traverses a coarse-grained Kittitas Drift terrace. Drainage walls were observed to have minor erosion at the base and areas of bare soil. This tributary channel is relatively wide and the active channel meanders across the entire width. Concentrated flow could result in active channel migration and incision. Therefore, this tributary drainage has a low to moderate risk of erosion from concentrated flow.

Erosion Hazard Zone 4

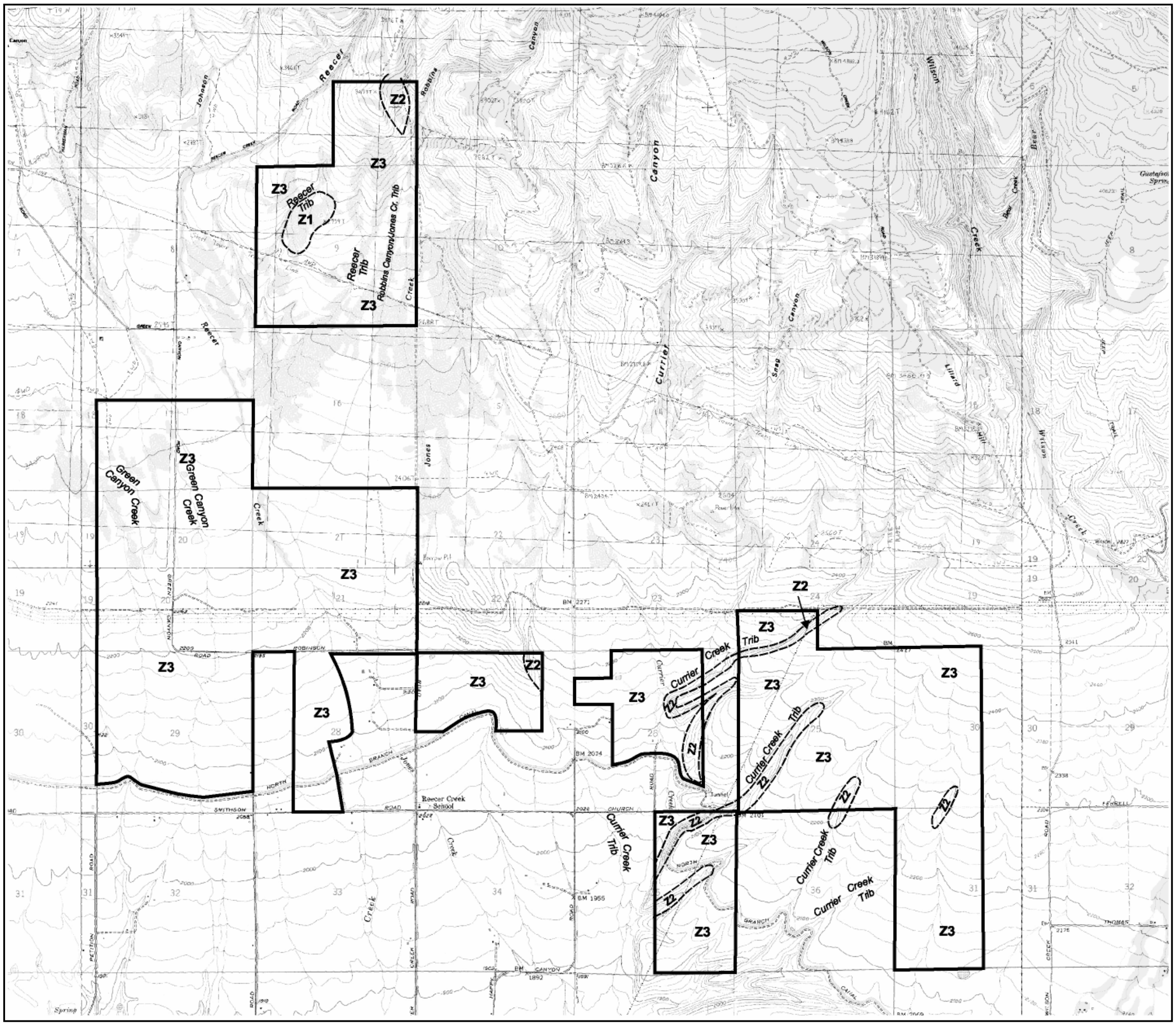
Erosion Hazard Zone 4 is characterized by slopes less than 20 percent. This zone encompasses the remaining portions of the project area, including the upper, flatter surfaces of the Thorp Gravel and Kittitas Drift terraces, and the recent alluvial plains. Under existing conditions, Erosion Hazard Zone 4 is considered to possess a low risk of erosion. However, the erosion risk for this area could increase with unmitigated concentrated flows.

Landslide Hazards

Landslide hazard areas are defined by Kittitas County in Section 17A.02.200 of the CAO as, "…geologically hazardous areas subject to severe risk of landslide based on a combination of geologic, topographic, and hydrologic factors, including bedrock, soil, slope gradient, slope aspect, geologic structure, groundwater, or other factors." The CAO (Section 17A.06.015) also states that, "Areas identified as high risk erosion/landslide geologic hazard areas including cliff or talus slopes, may require specialized engineering to ascertain the property is suitable for development purposes." Kittitas County's requirements for setbacks from slopes are based on the 1997 *Uniform Building Code* (UBC). Chapter 18 of the 1997 UBC offers slope setback distances for structures on or adjacent to slopes that are steeper than 33.3 percent (1H:3V [Horizontal:Vertical]). The code requires that structures be set back from the top of a slope a distance equivalent to $^1/_3$ its height, although the setback distance need not exceed 40 feet. Setbacks from toes of slopes should be measured a distance equal to ½ the height of the slope, although the setback need not exceed 15 feet. These setbacks are general guidelines that do not take into account geology, slope gradients, ground water conditions, landslide history or erosion history. In recognition of this, the 1997 UBC approves alternate setback approaches that may "include consideration of material, height of slope, slope gradient, load intensity and erosion characteristics of slope material." A landslide analysis of the project area and adjacent areas was conducted in accordance to these criteria.

Generally, there are three types of landslides that commonly occur in the vicinity of the project. The first type is termed earth slump. This type of earth movement is deep-seated and usually involves the regolith (topsoil and weathered zone) and the underlying sedimentary units. Slides of this type can be very large. The second type is termed debris slump or debris flow, and usually involves the upper few feet of the regolith. This type of slide is very dependent on the moisture content and weathering characteristics of the sediment, and stabilization may include surface water control and/or regrading. A third type is termed rock falls. Rock falls form by the free falling or rolling of material from a vertical or near-vertical exposure. The movement is rapid to very rapid and may be preceded by minor, progressive spalling. Rock falls typically occur on bedrock cliffs.

The landslide hazard for the Desert Claim Wind Power Project area has been subdivided into three hazard zones based on observed landsliding, sediment characteristics, and degree of slope. Evidence of landsliding was observed in and along stream drainages and at the base of Thorp Gravel terraces. Two distinct landslide features were observed during field reconnaissance. The landslide hazard zones are illustrated in **Figure 3.1-2** and are described below.



LEGEND

Project area

LANDSLIDE HAZARD ZONES

Z1	**High hazard**
Z2	**Moderate hazard**
Z3	**Low hazard**

N

0 4000

SCALE IN FEET

REFERENCE: TOPO MAP FROM DELORME

Source: Associated Earth Sciences, Inc.

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power
Project EIS

Figure 3.1-2

Landslide Hazard Zones

Landslide Hazard Zone 1

Landslide Hazard Zone 1 is considered to possess a high landslide hazard, particularly during a seismic event. Zone 1 within the project area includes the large landslide in Section 9 mapped by Tabor et al. (1982). The landslide occupies an area of approximately 36 acres. It has a hummocky surface and consists of relatively loose, fine-grained sediment with some gravel. The feature is fully vegetated and probably represents an ancient event. The slide covers the eastern drainage wall of a Reecer Creek tributary and the toe extends into the stream valley bottom, limiting the width of the active streambed. Active erosion of the toe will occur during high concentrated flow events.

Landslide Hazard Zone 2

Landslide Hazard Zone 2 is considered to possess a moderate landslide hazard, particularly during an earthquake, due to the steep slope gradients and the height of the slopes. Within the project area, Landslide Hazard Zone 2 is characterized by moderate to steep slopes (>40 percent) underlain by unconsolidated alluvial deposits, and includes the stream drainages and the margins of the Thorp Gravel terrace. The edges of the Grande Ronde Basalt bedrock outcrops in Sections 35 and 28 consist of steep slopes covered with a loose colluvium of broken basalt gravel. This area is considered to possess a moderate risk of rock falls.

Landslide Hazard Zone 3

Areas classified as Landslide Hazard Zone 3 encompass the remaining portions of the project area, including the upper, flatter surfaces of the Thorp Gravel and Kittitas Drift terraces and the recent alluvial plains. Drainages of moderate to low slopes across the project area are also considered to possess a low landslide hazard. This landslide hazard zone is considered to possess a low risk of slope instability under existing conditions due to low slope gradients.

Seismic Hazards

The proposed Desert Claim project location is in an area of low to moderate historical seismicity. **Table A-2** summarizes historical and recorded seismic events greater than magnitude (M) 3.0 in the vicinity of the site, as obtained from the University of Washington's Pacific Northwest Seismograph Network (PNSN). Two earthquakes within an area of approximately 1 degree latitude by 1 degree longitude surrounding the project area had a measured magnitude of 5.0 or greater (M 5.0 and M 6.8). The M 5.0 event occurred in 1943 and was located just north of Table Mountain in the Wenatchee Mountains of the Cascade Range, about 14 to 17 miles north of the project area. The M 6.8 event occurred in 1872 and was located approximately 55 miles northwest of the project area. All other earthquakes are M 4.3 or less. Both the M 5.0 and the M 6.8 earthquakes occurred prior to the operation of the PNSN. Two M 4.3 earthquakes located about 27 miles southwest and 34 miles northeast of the project area are the largest seismic events recorded in the site vicinity since the installation of the PNSN. One earthquake (M 3.0) epicenter is located in the project area and is discussed below.

The Kittitas County CAO (Section 17A.02.260) defines seismic hazard areas as, "*…geologically hazardous areas subject to risk of earthquake damage.*" Four types of potential geologic hazards are usually associated with large seismic events: ground rupture along a surficial fault zone; ground motion response; liquefaction; and seismically induced landslides.

Surficial Fault Zones

Geologic structures that relate to surficial fault zones near the project area are described in **Section 3.1.1.3.** The anticlines of the Yakima Fold Belt are underlain and often caused by thrust faults. Recent studies indicate that the Yakima Fold Belt is actively accommodating north-south shortening of central Washington (McCaffrey et al. 2000) as discussed in **Appendix A, Section 3.1**. Several generally east-west trending faults are mapped within the Yakima Fold Belt (Bakun et al. 2002, Tabor et al. 1982). However, evidence of Quaternary deformation has not been identified to date.

The 1872 earthquake (M 6.8) is important in quantifying the seismic hazard in central and eastern Washington because it is the largest historical earthquake in Washington east of the crest of the Cascade Range. Bakun et al. (2002) suggest that the earthquake was shallow, based on aftershock patterns, and the epicenter was located south of Lake Chelan (as shown on **Figure A-5**). The rupture plane of the 1872 earthquake has not been located and may represent a recent rupture within the Yakima Fold Belt or deeper Cascade Range crystalline rock that does not have surface expression. Bakun et al. (2002) suggest that events as large as M 6.8 can reasonably be expected over most of south to central Washington.

There are northwest-southeast trending faults that cross the project area as mapped by Tabor et al. (1982) (the inferred fault traces are shown on **Figure A-1**). Currier Creek drainage patterns appear to be influenced by this fault near the center of the project area in Section 22 (Township 19 North, Range 18 East). The fault is not visible under recent alluvial deposits, but may be continuous from Section 22, trending northwest to cut diagonally across Section 9 (Township 19 North, Range 18 East). In Section 9, the fault trace crosses a landslide deposit mapped by Tabor et al. (1982). The landslide block was observed in the field and the mapped area on **Figure A-1** was adjusted as per field and aerial photography observations. The landslide material is part of the Kittitas Drift; therefore the material was deposited approximately 130,000 to 140,000 years before the present. The landslide is fully vegetated and does not represent a recent disturbance. Landslide movement may have been due to seismicity along the fault at some time after deposition.

AESI identified northwest-trending lineaments on stereo pair aerial photographs on the eastern Thorp Gravel terrace (Section 25, Township 19 North, Range 18 East and Sections 30 and 31, Township 19 North, Range 19 East). However, these lineaments were not visible during field exploration. The 1995 M 3.0 earthquake that occurred in the project area was located on the eastern side of the property on the Thorp Gravel terrace near a fault mapped by Tabor et al. (1982). Deformation along the fault affects the Pliocene-age Thorp Gravel terrace. More recent activity along the fault system is possible, however, offset has not been documented in post-Pliocene-age deposits.

Ground Motion Response

Ground motion from an earthquake results from shear, pressure, and surface waves propagating through the earth's crust from the earthquake's hypocenter. The ground motion caused by these waves is the seismic shaking felt during an earthquake. The intensity of the shaking felt at a given location during and immediately after an earthquake, is a result of several variables including: 1) the magnitude of the earthquake; 2) distance from the earthquake; 3) depth of the earthquake; 4) the type of rocks and unconsolidated sediments underlying a given site; and 5) attenuation of the seismic energy between the earthquake and a given site. Although the project site is located in an area of relatively low to moderate historical seismicity, there are several sources of large earthquakes in western Washington and possibly within central Washington, as indicated by the 1872 event.

The February 2001 Nisqually earthquake provided direct observation of ground motion during a large regional earthquake. The University of Washington's PNSN created a "shake map" of peak acceleration and velocity from wave forms collected during the earthquake. Peak acceleration is the maximum acceleration experienced by a particle at the earth's surface during the course of the earthquake motion. The event was located between Olympia and Tacoma, 33 miles deep, approximately 95 miles east of the project areas. The shake map shows light shaking within 20 miles of the project area (peak acceleration of 1 to 4 percent of the acceleration of gravity (g) [g = 9.8 meters per second]) (http://www.ess.washington.edu/shake/0102281854/intensity.html).

The United States Geological Survey (USGS) has created seismic hazard maps to predict the expected peak ground acceleration from earthquakes (Frankel et al. 2002). According to this work, in the next 50 years there is a 10 percent chance that ground motions will exceed 15 percent g in the vicinity of the project. This work contributed to the 1997 *Uniform Building Code* (UBC) determinations of seismic zones in the Pacific Northwest. The UBC's seismic zone classifications are used to determine the strengths of various components of a building or structure needed to resist earthquake damage caused by ground motion. Design guidelines for minimizing earthquake damage to structures based on anticipated ground motions for a specific region are included in the UBC. The seismic zones used by the UBC range from Seismic Zone 0 (area of low seismic risk) to Seismic Zone 4 (area of high seismic risk). The project is located within Seismic Zone 2B as classified by the 1997 UBC.

Unconsolidated young deposits may amplify ground motion. Ground motion in these areas will likely be more intense than predicted for hard rock sites.

Liquefaction

Liquefaction is the process in which soil loses strength or stiffness during vibratory shaking, such as that caused by earthquakes, and temporarily behaves as a liquid. Shaking during an earthquake can cause an increase in pore water pressure in the soil, and decrease the soil shear strength. Soils are considered to liquefy when nearly all of the weight of the soil is supported by the pore water pressure and becomes relatively unstable. The seismically-induced loss of soil strength can result in failure of the ground surface and can be expressed as landslides or lateral spreads, surface cracks and settlement, and/or sand boils. Seismically induced liquefaction typically occurs in loose, saturated, non-cohesive sandy and silty soils commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill.

AESI's field exploration and review of area well logs indicate that unconsolidated sediments up to 300 feet thick underlie much of the project. Some material is young stream deposits that are relatively loose and fine-grained and may be subject to liquefaction under strong seismic shaking, however these sediments are expected to be thin. The majority of the property is underlain by well-drained sand and gravel deposits that are not susceptible to liquefaction. Based on the results of the field exploration program, experience with similar soil types, and understanding of the regional seismicity, it is likely that the potential for liquefaction at the project area is low. However, unconsolidated soils underlying wetlands and stream corridors may be susceptible to liquefaction during larger seismic events, although most of the susceptible soil layers are likely relatively thin.

Seismically-Induced Landslides

Earthquake vibration may cause unstable material to fail by influencing existing planes of weakness within bedrock (such as bedding planes or fault planes) or within unconsolidated material. The USGS documented many earthquake-induced landslides throughout the Puget Lowland that occurred due to shaking from the 2001 Nisqually event, and several researchers have correlated previous mass movements in Lake Washington to the A.D. 900 earthquake on the Seattle Fault (Jacoby et al. 1992; Karlin and Abella 1992, 1996). Although landslides were identified on the project area (see the **Landslide Hazards** section above), it is unknown whether these landslides were induced by associated seismic events. The risk of seismically-induced landslides occurring on the site is generally interpreted to be low due to the relatively moderate slope gradients and soil characteristics. Locally, along steep slopes, the risk of seismically-induced landslides is considered moderate.

3.1.1.6 Alternative 1: Wild Horse Site

The Wild Horse site is located in the eastern part of Kittitas County. With the exception of Whiskey Dick Mountain, much of the site is a relatively flat plateau with steep-sided drainages eroded into it. Slopes within the area generally range from less than 5 degrees on the flat plateau area and ridgelines, and up to 40 degrees on Whiskey Dick Mountain and in side drainages. Most streams originate as springs that exist approximately between elevations 3,300 and 3,400 feet above mean sea level. Two streams flow southwest in the direction of the Yakima River, while the remaining ephemeral and spring-fed streams flow primarily eastward from the Wild Horse site into the Columbia River.

Geologic conditions under the Wild Horse site are generally as described in **Section 3.1.1.2** and **Appendix A**. The Wild Horse site is located within the Yakima Fold Belt. Relatively thin deposits of silt and clay (mainly wind derived) overlie basalt bedrock of the Miocene-age Grande Ronde Basalt flows. The basalt is dark gray, fine-grained, and very hard but fractured into angular to subrounded cobbles within a few feet of the ground surface. In most of the test pits excavated in the area, the basalt in the upper few feet is fractured, but fracture density and rock mass quality increases downward rapidly. Most test pits were terminated within 3 feet of the ground surface and were unable to be excavated further by the backhoe. A localized outcrop of sedimentary rock consisting of interbedded, weakly-cemented, volcaniclastic sandstone, siltstone, and minor dark mudstone is mapped in the southeast portion of the Wild Horse area. This unit is part of the Ellensburg Formation and occurs interbedded and on top of Grande Ronde Basalt flows. Locally it has an average thickness of 16 to 33 feet. Based on observations and documentation of springs in the area, it appears that the springs are located along a relatively horizontal low-permeability zone that likely correlates with the sedimentary unit.

A large landslide, estimated to be approximately 1/3 square mile in area and almost a mile long, is located in the vicinity of the Wild Horse site. 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 springs appear to be emanating from some areas 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. No faults are mapped within the project area for Alternative 1, but a few faults are mapped within approximately 4 miles to the southwest. Many of these faults are inferred, and there is no indication that these faults had been active in the late Quaternary. Mineral resources in the immediate vicinity of the Wild Horse site include a small inactive borrow pit near the northwest corner of the site.

Surficial materials consist primarily of a thin veneer of wind-deposited, brown, silty clay varying in thickness from a few inches to 3 feet. A thin alluvial deposit containing cobbles overlies bedrock in some locations. In general, soils on the Wild Horse site have a slow to moderate permeability resulting in a moderate to relatively high runoff potential. 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 where clay and fine-grained material was present in the upper 8.5 feet. At most locations on the site, the thickness of soil overlying bedrock is minimal. Bedrock is either very near or outcropping at the surface.

Geologic hazards that reasonably could be expected to occur at the Wild Horse site include seismic hazards generated from earthquakes, volcanic eruptions, erosion, and landslides. Maps of specific erosion and landslide hazard areas within the Wild Horse site have not been prepared. 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). The Uniform Building Code Seismic Risk Map of the United States shows that the Wild Horse site, along with all of eastern Washington and Eastern Oregon, is located in Seismic Zone 2B. This seismic zone corresponds to an intensity VII earthquake on the Modified Mercalli Scale, which can produce moderate damage, should one occur. Information from the USGS seismograph records shows that the Wild Horse area has experienced very low seismicity since 1959. However, numerous small earthquakes with magnitudes between 3 and 4 have been recorded within 60 miles of the site (see **Appendix A**). The closest earthquakes were magnitude 3.3 and 3.4 events that occurred 7 and 9 miles from the site, respectively. The largest historical event was an estimated magnitude 7.0 earthquake that occurred in 1872, centered approximately 57 miles to the northwest in the Cascade Mountains.

3.1.1.7 Alternative 2: Springwood Ranch Site

The following information on baseline conditions for the Springwood Ranch site is largely incorporated from the MountainStar Master Planned Resort Draft EIS, Vol. II, Appendix B (Kittitas County, 1999).

Site Geology

The Springwood Ranch property is located along the south side of the Yakima River approximately 12 miles southeast of Cle Elum. The site consists of terraced upland surfaces incised by the Yakima River, Taneum Creek and several intermittent drainages. The Yakima River has eroded a relatively steep-walled canyon along most of the eastern limits of the property in the north and central portions of the site.

Shallow bedrock beneath the site consists of the Grande Ronde Basalt and the Ellensburg Formation. Both the Grande Ronde Basalt and the Ellensburg Formation outcrop along some of the bluffs adjacent to the Yakima River (Converse, 1989). Unconsolidated sediments overlying the bedrock include Pleistocene glacial deposits, recent alluvium and landslide debris. Loess deposits mantle many of the glacial deposits at the site.

The Pleistocene glacial deposits, consisting of Kittitas-age and Lakedale-age glacial outwash and till, comprise most of the surficial sediments in the upland areas (Converse, 1989). The glacial outwash deposits consist primarily of sand, gravel, cobbles and boulders. The till consists of poorly sorted sediments containing varying amounts of clay, silt, sand, gravel and boulders. Till covers a large portion of the northern half of the Springwood Ranch site, and forms a portion of the end moraine described by Porter (1976) as the outer limit of the Swauk Prairie ice advance.

Surface Soils

Most of the surficial soils on the Springwood Ranch site range from about ½ to 6 feet in thickness, and often include a mantle of loess. The loess consists of about equal parts sand, silt and clay (NRCS, 1998). Soils formed on till, outwash and alluvium consist primarily of sand and gravel, with silt and clay typically comprising less than 50 percent of the sand-size or smaller particles (NRCS, 1998). Many of the soils mapped at the site include a layer of weathered "hardpan" located at depths ranging from 7 to 60 inches. Soils mapped at the Springwood Ranch site include the following soil series: Amabilis, Argixerolls, Kayak, Lablue, Maxhill, McDaniel, Metser, Millhouse, Nint, Qualla, Reelow, Reeser, Sketter, Swauk, and Weirman (NRCS, 1998).

Geologic Hazards

The Springwood Ranch site is located in an area of relatively low historical seismicity, and within Seismic Zone 2B of the 1997 UBC. There are no identified active surface faults or lineaments in the vicinity. Portions of the Yakima River and Taneum Creek floodplains may be underlain by soils susceptible to seismically induced liquefaction.

Most of the shoreline of the Yakima River along the northeastern boundary of the Springwood Ranch site has been mapped as high erosion hazard and landslide hazard area. Most of the traverse of Taneum Creek through the site is bounded by soils with moderate erosion potential. Some soils with high erosion potential are also located at the mouth of Taneum Creek.

Evidence of past landslides was observed along portions of the steep bluffs along the Yakima River; many seem to be the result of meandering of the river and consequent undercutting and oversteepening of the valley sidewalls. These areas are considered to have a high landslide potential and generally occur within the outwash deposits and the Ellensburg Formation. Areas with moderate to low landslide potential occur along the side slopes of on-site terraces, portions of the Yakima River Valley slopes, and slopes along Taneum Creek near the confluence with the Yakima River. Gradients of these slopes are generally between 35 percent and 50 percent. Low landslide potential was identified for the relatively flat terraces (0 to 15 percent gradients) and bedrock slopes in the northern portion of the site.

3.1.2 Environmental Impacts of the Proposed Action

The following section describes potential environmental impacts relative to geologic hazards that might result from the proposed Desert Claim Wind Power Project. The analysis of potential impacts associated with geologic hazards includes erosion hazards, landslide hazards and seismic hazards. The analysis has been updated for the Final EIS, based on a site-specific evaluation of the modified project configuration presented in **Section 2.2**. The modifications to the project resulted in shifting of the proposed locations for the wind turbines, access roads, power collections cables and other project facilities. These modified locations have been reviewed against the distribution of erosion, landslide and seismic hazards within the project area to provide an update of the impact analysis presented in the Draft EIS.

The following discussion of potential impacts to earth resources focuses on expected construction of the entire Desert Claim project within a single construction period of approximately 9 to 12 months in duration. Pending conditions applicable to potential approval of the project, it is possible the applicant would elect to schedule project construction in multiple phases (such as 3 phases of 40 turbines each, for example). If phased construction occurred, each phase of construction activity would likely be up to about 9 months long and the total duration of construction activity could be more than 2 years (although there would likely be intervals of at least several months between phases). The effect of phased construction on the level of earth resource impacts would be to extend the total duration of temporary disturbance impacts from project construction, but to reduce the intensity or magnitude of impacts for any individual phase. Potential construction impacts related to erosion, landslide or seismic hazards in a phased-construction scenario would still be equivalent to those resulting from development of the project during a single construction period.

3.1.2.1 Erosion Hazards

Construction

Under existing conditions, the project area has been subdivided into four erosion hazard zones based on geology, hydrology, and slope gradient conditions. These erosion hazard zones are described in **Section 3.1.1.5** and are graphically illustrated in **Figure 3.1-1**. Erosion impact potential from the project would be greatest in the zones of highest erosion hazard. Existence of high erosion hazard in a given area does not indicate that construction activity in that area would necessarily result in high erosion impacts, however. As indicated in the Kittitas County Critical Areas Ordinance (CAO) (KCC 17A.06.015) "Areas identified as high risk erosion/landslide geologic hazard areas *may require specialized engineering* [emphasis added] to ascertain the property is suitable for development purposes." Consequently, facility engineering and erosion control practices can often be employed to satisfactorily limit erosion impacts, even in areas of high erosion hazard.

Erosion is considered to be both a long-term and short-term hazard for the project, although the risks would generally be the greatest during the construction phase. Project activities that might induce new or additional erosion beyond existing conditions are clearing and grading activities, uncontrolled stormwater runoff, and structural changes to existing drainages. The extent and magnitude of an individual erosion incident would be dependent on the triggering event for that incident.

Clearing and grading activities during construction would increase the erosion potential on and adjacent to the project area through the removal of vegetation and the direct exposure of soil to precipitation and runoff. The most significant increase in erosion hazard potential would be during the construction phase when earthwork activities commence. Unless otherwise mitigated, erosion would produce sediment that could be transported to on-site surface water features. Uncontrolled gully erosion could lead to oversteepening of the slopes and subsequent slope instability hazards. The majority of clearing and grading would take place during construction of the access roads (including underground cable trenching) and turbine pads. Significant clearing and grading would also occur during construction of the project O&M building and substation (see **Section 2.2**).

Erosion impacts from clearing and grading activities could occur in all areas of the project that would be disturbed for construction. Portions of the access road alignments cross each erosion hazard zone, and the potential for erosion from clearing and grading for the roads would generally correspond to the distribution of erosion hazard along the access road routes. For the modified project configuration described in **Section 2.2**, 97 of the 120 proposed turbine locations (81 percent of the total) are within areas of Erosion Hazard Zone 4 (low erosion hazard), while five turbine locations (4 percent) in the northern portion of the project area are within Erosion Hazard Zone 1 (high erosion hazard) and are also located near an active landslide area or adjacent to steep slopes (see additional discussion below). Six turbine locations (5 percent) near the center of the project area are within Erosion Hazard Zone 2 and are along streams or on steep slopes. The remaining 12 turbine locations (10 percent of the total) are within Erosion Hazard Zone 3; these locations are in the central and western portions of the project area and are adjacent to steep slopes, near streams or in wetland areas created by leakage from the North Branch Canal. The O&M building and the alternative substation locations, as described in **Section 2.2**, would be located within areas considered low in erosion hazards (Erosion Hazard Zone 4).

Uncontrolled stormwater runoff from road construction into stream and irrigation drainages could increase erosion and sediment transport hazards. The majority of streambeds observed in fieldwork are lined with gravel and cobbles and underlain by coarse-grained alluvial and glacial outwash deposits. It is probable that erosion in these drainages during project construction would be limited, as the gravel and cobbles of the streambed and underlying formation tend to armor and protect the streambed from incision. However, uncontrolled stormwater runoff on drainage sidewalls or steep slopes along the edge of Thorp Gravel and Kittitas Drift terraces could cause erosion. The material making up these slopes is coarse-grained and lacks a binding matrix, and is susceptible to erosion from concentrated flow. Therefore, a key to limiting potential erosion impacts in these areas is to ensure that stormwater runoff is controlled.

Increases in stormwater runoff into existing drainages would increase stream capacity (ability to carry sediment). Some streams on-site are small, active stream channels that meander within a larger drainage ravine. At times of high flow, the active stream channel can reoccupy previously abandoned channels within the drainage ravine or form new ones. Consequently, during high-flow events the stream transports additional sediment that would be deposited at a downstream location. This downstream deposition could further alter the course of the stream. Roads constructed within the streambed would be subject to the risk of damage from meander-triggered erosion and sediment transport hazards unless proper mitigation measures were provided.

Potential erosion impacts during construction of the project could result from clearing and grading activities, uncontrolled stormwater runoff, and changes to existing drainages. Overall, minor soil loss is expected from ground-disturbing activities during the construction phase of the project because: (1) the total area of surface disturbance would be less than 350 acres out of 5,237 acres (i.e., approximately 6 percent of the total project area); (2) surface disturbance would be temporary in duration, occurring for only a portion of the 9-to-12-month construction period for any disturbed site; (3) standard construction practices include source control measures that involve covering disturbed areas and soil stockpiles; and (4) standard construction practices include prompt revegetation of temporarily disturbed areas. In addition to limiting soil erosion at the source, standard construction practices include a variety of measures to control stormwater runoff from construction areas, and thereby limit transport of eroded soil and the associated consequences. Consequently, potential erosion impacts can be mitigated to acceptable levels during and after construction with the proper implementation of best management practices (BMPs), even in areas where a high to severe erosion risk may be present. Use of these BMPs is a standard condition for construction stormwater discharge permits that are required for construction projects of this scale (see additional discussion in **Section 3.1.5.1**). Based on the required use of construction BMPs, erosion impacts from construction of the Desert Claim project would be limited in area, duration and intensity, and therefore would be insignificant.

Operation

Following project construction and during project operation, the risk of erosion would be similar to existing conditions. However, impervious surfaces, although minimal, would be created from the O&M building, portions of the substation, small portions of project access roads, and footings of the turbines/transformers. Uncontrolled stormwater runoff from impervious surfaces or from drainage conveyance systems (pipes, swales, outfalls) could pose a risk of erosion, particularly on steep slopes. With use of proper stormwater management measures, which are also standard practice, runoff from impervious surfaces can be controlled and long-term erosion impacts can be minimized. Based on application of these stormwater management measures, long-term erosion impacts during project operation would be insignificant.

Decommissioning

Potential erosion impacts from decommissioning the proposed project would be similar to those for construction of the project and would be low. The proposed project is assumed to have a life of 30 years. Decommissioning at the end of the project life would consist of removing the wind turbine nacelles, blades, towers, and then removing foundations, cables, and other underground facilities to a depth of 4 feet below grade. Decommissioning would also include removal of project roads and restoration of all disturbed land. Consequently, decommissioning would result in ground disturbance within an area similar to the temporary disturbance from construction. The standard erosion control practices employed during construction would also be applied to decommissioning as needed, resulting in insignificant erosion impacts from the decommissioning phase of project activity.

3.1.2.2 Landslide Hazards

As discussed previously, three types of landslides are considered possible in the region of the Desert Claim Wind Power Project. These include earth slumps, debris flows/slumps and rock falls. The subject property was subdivided into three landslide hazard zones based on topographic, geologic, geomorphic, and hydrologic information (see **Figure 3.1-2**). The highest landslide hazard under existing conditions is in Zone 1, which is located along the slopes of a Reecer Creek tributary in Section 9, where a large debris flow or earth slump has been documented (Tabor et al. 1982).

Sloping ground has an inherent risk of instability. In some cases, due to low-slope gradients and geologic and hydrologic conditions, the landslide risks may be considered low. The risk typically increases where ongoing or historic landslide activity has occurred. Landslides are naturally occurring phenomena, although the risk of a landslide could be increased as a result of land use practices or development activity. The magnitude and extent of a landslide incident would be dependent on the nature of the triggering mechanism. Landslides are considered both a long- and short-term hazard for the property. Depending on the characteristics of a slide, avoidance of the hazard zone may be the most economic and prudent mitigation alternative. This is generally the case for large or deep-seated landslides, where structures would be set back from the zone of influence. For other landslide areas, the risk of slope movement can be reduced to an acceptable level by proper grading, drainage control, and/or the use of retaining structures.

Project construction (or decommissioning) activities that might induce new or additional landsliding beyond existing conditions are clearing and grading activities, uncontrolled stormwater runoff, and structural changes to existing drainages. Clearing of vegetation that would normally reduce stormwater runoff volume and rates could increase the existing landslide hazard potential in all landslide hazard zones (1, 2, and 3). This could result in concentrated stormwater runoff on cleared slopes that could precipitate erosion and oversteepening of the hillside and result in slope instability.

Uncontrolled grading (earthwork) activities could also increase the existing landslide hazards. Fill soils placed on or adjacent to steep slopes might increase the driving forces of the soil column and result in slope failures. Grading typically modifies surface drainage patterns. If the new drainage pattern resulted in an increase in either surface or subsurface water flow on or near a slope, landslides could develop. In addition, improperly placed fill soils could fail due to inadequate compaction effort, use of organic material or soft, fine-grained soils, placement of material at oversteepened gradients or other factors. Cut slopes could also fail due to removing the toe support for a slope, or from improper drainage control.

As discussed in **Erosion Hazards** above, increases in stormwater runoff into existing drainages could lead to stream meandering beyond natural conditions. Changes in the position of the streams could occur as new channels are formed or old channels reoccupied. These changes in stream position could result in stream erosion at the toe of slopes and reactivate existing landslides or create new landslides. As also discussed in **Section 3.1.2.1**, however, standard construction practices that limit soil loss and control stormwater runoff are typical requirements under construction stormwater discharge permits. The same control measures that address erosion hazards also serve to limit impacts associated with potential landslide hazards.

Based on the modified project configuration described in **Section 2.2**, three turbines and associated sections of project access road and underground power collection cables would be located within the recommended setback area (a 125-foot buffer) of Landslide Hazard Zone 1 in Section 9. Two of these turbine locations appear to be very close to the edge of the area disturbed by the historic slide. Constructing these facilities in the proposed locations could result in instability that could trigger future landslides. Using micro-siting prior to final project design, it might be possible to relocate these turbines outside of the buffer to avoid this potential impact. If these turbines were not or could not be relocated, site-specific geotechnical studies designed to evaluate and address the landslide hazard would be required. This would be consistent with the Kittitas County Critical Areas Ordinance (CAO), which states that areas identified as high landslide hazard areas *may require specialized engineering* [emphasis added] to ascertain whether the property is suitable for development purposes (KCC 17A.06.015). Facility engineering and land stabilization practices can often be employed to satisfactorily limit potential landslide impacts, even in areas of high landslide hazard. Consequently, potential landslide impacts during construction (or decommissioning) are expected to be mitigated to a level of insignificance with the proper implementation of best management practices (BMPs). The methods most likely to be employed would be additional land stabilization features incorporated within or added to the proposed turbine foundations (see **Figure 2-6**) that would account for the added soil forces from the active landslide.

The landslide risk during project operation would be similar to existing conditions. Areas disturbed during construction would be stabilized, primarily through revegetation following construction. Additional stormwater runoff created by the addition of impervious surfaces at the project could still pose a risk to erosion, oversteepening of slopes and slope instability. With use of proper stormwater management measures that are standard practice, however, runoff from impervious surfaces can be controlled and long-term risks to land stability can be minimized. Therefore, all potential landslide impacts during project operation are expected to be mitigated with the proper implementation of best management practices (BMPs), even in areas where a high landslide risk may be present.

3.1.2.3 Seismic Hazards

As described in **Section 3.1.1.5**, the project area is located in a region of relatively low to moderate historical seismicity. The seismic sources capable of producing earthquakes of sufficient magnitude in the vicinity of the project area include the subduction zone (over 100 miles west) and east-west trending faults in the Yakima Fold Belt that are actively accommodating north to south compression of Washington. One large earthquake in recorded time (1872) is suggested to be of this nature, but a recurrence interval is not known (see **Section 3.1.1.5** and **Appendix A, Section 3.1**). Review of readily available data for earthquake hazards in Washington indicated that historical seismicity in the site vicinity has not resulted in widespread damage to surrounding communities.

As discussed previously, the hazards associated with seismic events felt in the project area include surface rupture, seismically induced landslides, soil liquefaction and ground motion (shaking). Siting and design of project facilities should consider existing seismic risks present in the area, as discussed in the subsequent paragraphs. However, development of the proposed project would have no influence on the level of seismic hazard applicable to the project vicinity, and would not result in potential seismic-related impacts on adjacent uses or properties.

Section 3.1.1.5 describes surface faulting mapped and identified in the project vicinity. The current proposed locations of several turbines are near potential faulting on the eastern Thorp Gravel terrace. AESI's review of aerial photographs identified several northwest-trending lineaments that cross the terrace. One moderate (M 3.0) earthquake epicenter is located in the area, and Tabor et al. (1982) mapped a fault that cuts across the Thorp terrace just south of the project area. Site-specific seismic studies of this area would be advisable before final location of turbines.

Areas prone to seismically-induced landslides would probably correspond to Landslide Hazard Zones 1 and 2. A seismic event of significant local intensity might function as a trigger mechanism for landslides and/or rock falls to occur in areas of the project site delineated by these two landslide hazard zones. Therefore, turbines, roads, or structures located within Landslide Hazard Zones 1 and 2 might be subject to increased risks from seismically-induced landslides.

Soils susceptible to liquefaction during larger seismic events may be present in areas of the site underlain by shallow, saturated cohesionless soils, such as portions of wetland areas and young stream deposits. Specific areas of liquefaction-prone soils in the streambeds and wetland areas are likely of limited extent and thickness because most of the sediments are coarse-grained consisting of sand, gravel, and cobbles. Turbine and associated building locations do not correspond to locations with young stream deposits or potential wetland features, however some proposed roads traverse streambeds and potential wetland areas. If portions of these areas are underlain by liquefiable soils, unmitigated development of the proposed roads could increase the risk of damage to the roads as a result of loss of soil shear strength during an earthquake.

Significant ground motion caused by an earthquake of sufficient intensity could result in damage to turbines, associated buildings, and roads. If such damage occurred, the consequences would be limited to project facilities and would not extend to off-site areas. Because the intensity of a specific seismic event is the result of numerous factors (**Section 3.1.1.5**), site-specific studies would be necessary to identify areas that would be more susceptible to damaging ground motion.

3.1.3 Impacts of the Alternatives

3.1.3.1 Alternative 1: Wild Horse Site

Impacts from Alternative 1 to earth resources in the area would be similar to those described for the proposed action. Similar to the proposed action, changes to the local topography are expected to be minimal and would be limited to the footprint of the project facilities and roads. The project would alter the landscape with minor cuts and fills for roadways and leveling for wind turbine foundations. These alterations would result in a minimal long-term impact to existing topography, surface geology and drainage patterns, and would not cause any significant change to those conditions. Impacts to the topography of areas adjacent to the facility would be negligible, because the proposed facilities would be constructed at or near existing grade.

Impacts to local geologic resources would be limited to redistribution of rock and soil excavated during wind turbine foundation construction. Earth materials disturbed during excavation activities are not considered significant geologic resources, and therefore, impacts to local geologic resources would be negligible. It is anticipated that impacts on area soils would be limited to areas disturbed by the project construction activities. As discussed in **Section 3.1.2**, erosion and landslide impacts are expected to be insignificant with implementation of standard erosion control measures that are proposed or required management practices. Development of Alternative 1 would have no influence on the level of seismic hazard applicable to the project vicinity.

3.1.3.2 Alternative 2: Springwood Ranch Site

Impacts from Alternative 2 to earth resources in the Springwood Ranch area would be similar in nature to those described for the proposed action, but would be less extensive due to the smaller number of turbines and smaller project footprint for this alternative.

Construction activity on the site would cause a temporary increase in erosion rates. The turbine layout for Alternative 2 would generally locate turbines on topographic plateaus and would avoid areas of the site with steep slopes and landslide features. Moderate erosion hazard zones were mapped along the steeper portions of the on-site terraces where slopes between 15 and 45 percent were identified; some of this hazard zone is scattered throughout the site. Low to moderate erosion hazards were identified for portions of the Yakima River bluff on the north and northeastern end of the site. These areas are underlain by bedrock and are generally more resistant to erosion. Given the use of standard erosion control and stormwater management BMPs, as assumed for the proposed action, erosion impacts would be localized and temporary, and therefore insignificant.

Areas with a high landslide potential were identified on portions of the bluffs along the Yakima River, while moderate-to-low landslide hazards were identified along the side slopes of the on-site terraces, portions of the Yakima River Valley slopes, and slopes along Taneum Creek near the confluence with the Yakima River. The conceptual plan for Alternative 2 suggests that approximately 10 to 15 turbines could be located near these areas. If construction occurred in these locations, there would likely be a higher risk of triggering landslides on the adjacent slopes. Setbacks from the top of the adjacent slope and/or engineered protective measures might be needed to address the landslide risk.

Seismic hazards for Alternative 2 would be low, as the Springwood Ranch site is located in an area of relatively low to moderate historical seismicity. Portions of the site with moderate to high landslide hazards might be prone to seismically-induced landslides. The Yakima River and Taneum Creek floodplains might be underlain by soils susceptible to liquefaction during an earthquake. No turbines would be located within the floodplain. Development of Alternative 2 would not increase the seismic hazard for any existing uses on the site or adjacent lands.

3.1.3.3 No Action Alternative

The no action alternative would result in continued use of the project area by current and future landowners, including agricultural uses, rangeland used for grazing, and rural residential use. Ongoing impacts relative to the erosion, landslide and seismic hazards addressed in **Section 3.1.1.5** could generally continue, or they could increase in response to future human activity within the area. Most of the land in the project area is currently zoned agricultural, with a 20-acre minimum parcel size. The entire project area and the adjacent lands are within a large area designated as rural in the Kittitas County Comprehensive Plan. Maximum density of housing is 1 or 2 dwelling units per 20 acres, depending on zoning; therefore, long-term future development and land conversion could result in as many as about 400 developed parcels across the Desert Claim project area. It is likely that the future pace of development would be similar to what has occurred in recent decades, as described in **Section 3.7.1.1**.

Under this alternative, agricultural or construction activity could potentially occur in all erosion hazard and landslide hazard zones. As a result, the erosion risks could be increased from existing conditions and localized areas of significant erosion could occur. Similarly, future development in higher landslide hazard zone areas could trigger landslide activity. However, because the parcel sizes would generally be 20 or more acres, it is possible that sufficient room would be available to construct residences on the lower hazard zones or implement appropriate mitigation measures, such as slope setbacks or retaining walls. Future development in the project area would be subject to some risk of damage from seismically-induced landslides or soil liquefaction, as discussed previously.

3.1.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.1.5 Mitigation Measures

A number of measures are available to mitigate the potential project impacts relative to erosion and landslide hazards, as discussed in **Section 3.1.2**. Some of these measures are incorporated in the project description, as documented in **Section 2.2**, some would be required as conditions of permits needed for the project, and others are additional measures that could be implemented. These measures are described below, along with actions that could be taken to protect project facilities from potential seismic hazards. These measures would be applicable to Alternative 1 or 2 as well as the proposed action.

3.1.5.1 Erosion Hazards

Proper control of surface water runoff would be important in alleviating potential erosion hazards and subsequent potential slope stability hazards from the proposed action. To mitigate and reduce the sheet and channel erosion hazard potential in the project area, BMPs outlined in the Washington Department of Ecology (WDOE) *Stormwater Management Manual for Eastern Washington* would be implemented. As per WDOE guidelines, the following erosion BMPs would be needed to meet the terms of the construction stormwater discharge permit and would be implemented during construction:

- Source control measures are practices that are used to reduce erosion risks before they occur. These measures typically involve soil cover practices and drainage control. In general, it is more effective and efficient, both physically and economically, to employ source control methods to prevent erosion rather than to establish repairs to erosion features or to trap sediment once it is in motion. Source-control BMP mitigation measures for the project area for cleared areas during summertime construction should include, at a minimum, the proper placement of 1.5 tons/acre of straw mulch (tacked down) on exposed ground surfaces. Prior to the onset of winter, the exposed subgrade should be seeded, covered with plastic sheeting, or otherwise protected. In addition, exposed construction slopes should be trackwalked (up and down) in order to roughen the ground surface and reduce runoff velocities. Surface water runoff should be directed away from exposed subgrades or into approved temporary stormwater conveyance systems, such as tightlined drains or rock-lined swales.
- Stockpiled soils to be used as backfill material should be stored in such a manner to minimize sheet, rill or gully erosion. Protective measures may include, but are not necessarily limited to, covering the stockpiled soils with plastic sheeting, the use of low stockpiles in flat areas to reduce the risk of sediment transport from the area, or the use of silt fences around the perimeter of the stockpiles to trap eroded sediment.
- Temporary sedimentation traps or ponds should be installed to provide sediment transport control during construction. These facilities are designed to slow the water flow in order for sediment to settle out of the water column prior to the material entering surface water features. Discharge points for stormwater release, including emergency overflow outfalls, should be provided with an energy dissipater to reduce the risk of erosion.
- Rock check dams are often utilized to reduce water velocities and trap transported sediment. Rock check dams should be established along roadways during the earthwork phase of construction. In addition, rock check dams should be used within drainage ditches constructed along sloping ground to reduce the water energy and the subsequent risk of channel incision.
- Silt fences are temporary structures utilized to trap sediment transported from sheet erosion while allowing some conveyance of water through the filter fabric. Silt fences are not designed for concentrated flows but are most effective in retaining sediment transported from sheet flow in relatively small catchment areas. Silt fences should be established along wetlands, stream and river corridors, open space areas, and other sensitive areas located in or adjacent to construction zones to reduce the risk of sediment transport into these features.
- All construction runoff must be collected and treated by sediment ponds, turf-covered sand filters, temporary filtration, or other approved methods before release to any surface waters. Surface discharge should not exceed 5 nephelometric turbidity units (NTU) above background in the receiving water and be free of construction waste or its influences.

- Clean water entering construction areas should not be allowed to mix with construction water. All intercepted clean water should either be routed around construction areas to discharge into the original receiving waters or discharge separately into stormwater facilities. Energy dissipaters may be required at discharge points depending on the site conditions.
- A temporary erosion and sediment control plan (TESCP) should be established for the development during the design phase. A TESCP inspector should be on-site during construction to assist in maintaining the integrity of the erosion control structures and to provide further site-specific erosion recommendations, as necessary. The TESCP inspector should be independent of the contractor and have the authority to stop work if necessary to facilitate implementation of erosion control measures during construction.
- TESCP measures should be in place and operating properly prior to beginning major clearing and earthwork activities.
- Disturbed areas beyond the permanent footprint of project elements would be revegetated, using an appropriate seed mix, by the close of the construction period.

In addition to the above BMPs, the following erosion mitigation measures should also be considered during the design and construction of the project.

- Surface water and domestic discharge, either during or after construction, should not be directed onto sloping areas or randomly daylight on the project area. All devices used to collect surface runoff should be directed into tightlined systems that discharge into approved stormwater control facilities such as infiltration or detention ponds. Uncontrolled discharge on slopes would promote erosion and, subsequently, slope instability hazards.
- Clearing, excavation and grading should be limited to the minimum areas necessary for construction and original vegetation should be retained as much as possible, including buffer strips between construction disturbance zones and potential receiving waters.
- A geotechnical engineer should review the grading, erosion, and drainage plans prior to final plan design to further assist in mitigating erosion hazards during and after development. Additional erosion mitigation measures might be offered at that time to address site-specific issues.

3.1.5.2 Landslide Hazards

Construction of the proposed wind energy facility would not increase the existing landslide hazards, provided appropriate mitigation measures were implemented. To mitigate potential landslide hazards as a result of construction, the following setback distances for structures, infiltration systems, and detention ponds should be incorporated into the design plans, where appropriate. The setback distances are based on professional experience and standard practice with slopes of similar gradient, geology, and ground water conditions as those observed on the project area. As a result, the setback distances in this technical report are more stringent than those recommended in the 1997 *Uniform Building Code* (UBC). However, as mentioned below, the enclosed setback distances could be reduced in some instances depending on detailed design plans and additional, site-specific geologic hazard studies.

- Landslide Hazard Zone 1 is considered to possess a high risk of landslide hazard under existing conditions. The past landslide activity in the project area may have been seismically induced or it may have been caused by some other factor or event; the specific triggering mechanism for this slide is not clear. The risks of landslide hazard in this area are considered to remain high regardless of any future construction activities, and would persist with or without the Desert

Claim project. Therefore, a minimum setback distance of 125 feet should be maintained for turbines, underground cables, and roads proposed on lands within Landslide Hazard Zone 1. Based on the modified project configuration, three turbines and associated project access road and underground cables would be located within the setback area of Landslide Hazard Zone 1 in Section 9. Using micro-siting, it might be possible to relocate these turbines outside of the buffer. Site-specific geotechnical studies designed to evaluate landslide hazards would be required if these turbines were not or could not be relocated. Based on such studies, engineering measures would need to be applied to protect the stability and integrity of project facilities constructed within the buffer area. With such measures, the landslide hazard area would continue to be highly localized and would not be extended to off-site areas beyond the project area boundary.

- Landslide Hazard Zone 2 is considered to possess a moderate risk of slope instability under existing conditions. A minimum setback distance of 50 feet from the top or toe of these slopes should be maintained for structures. This setback distance might be reduced provided proper grading and drainage control measures were implemented as approved by a geotechnical engineer. Site-specific studies might be required to reduce this setback distance and might include performing additional subsurface explorations and slope stability computer modeling.

In addition to the above setback distances, the mitigation measures outlined below should be implemented.

- Stormwater from the construction site should be collected and tightlined away from the top of Landslide Hazard Zones 1 and 2. Uncontrolled discharge in these areas could cause erosion, oversteepening of the slope, and subsequent slope instability hazards. All stormwater runoff should be directed into tightlined systems that discharge into approved stormwater facilities. Erosion control measures as outlined above would also apply for all discharge points.
- No fill, topsoil, or other debris should be placed over the top of areas within Landslide Hazard Zone 1. Uncontrolled material placed on steep sloping ground is susceptible to movement. Any fill planned for slopes steeper than 5H:1V (Horizontal:Vertical) should be benched and compacted into the hillside as per the geotechnical engineer's recommendations. Site-specific studies might be required where filling is planned in Landslide Hazard Zone 2. Depending on the proposed slope gradients, the use of retaining or erosion control structures might be required in these areas.
- No cuts should be made on or at the toe of areas within Landslide Hazard Zone 1 unless approved by the geotechnical engineer. The geotechnical engineer should review any proposed cuts into Landslide Hazard Zone 2 areas to evaluate the risk of slope instability and provide specific mitigation recommendations designed to minimize landslide hazard potential.
- No vegetation should be removed from areas within Landslide Hazard Zone 1, with the exception of dead or diseased trees, unless approved by the geotechnical engineer. Vegetation removed from Landslide Hazard Zone 2 areas should be limited to the immediate vicinity of construction. The removal of vegetation might reduce the protective canopy and increase the risk of landslides unless otherwise mitigated.
- A geotechnical engineer should be given the opportunity to review all grading, erosion, and drainage control plans prior to construction to assist in reducing the landslide risks from and to the development.

3.1.5.3 Seismic Hazards

Appropriate 1997 UBC guidelines would be followed for siting and design of the proposed Desert Claim Wind Power Project. Following this guidance, turbines and buildings should be designed to be able to sustain some damage from ground motion during the design seismic event without causing life safety concerns. A Washington State-licensed engineer would select the appropriate design for each turbine location during the design phase of the project.

The provisions for seismic hazards in the 1997 UBC will continue to be updated in the future, and it is possible that the 1997 UBC will be replaced by the *International Building Code* 2000 (IBC 2000). The IBC 2000 requires seismic design to evaluate ground motions for a longer earthquake recurrence interval (lower probability event) than currently used in the 1997 UBC. Kittitas County may choose to adopt the seismic provisions of the IBC 2000 code as part of the County's building codes.

Avoidance is the primary mitigation measure for turbines or buildings sited in zones of potential surface rupture or seismically induced landsliding to prevent damage to proposed structures in case of a seismic event. Site-specific studies are recommended to determine the risk of fault rupture and seismicity of the eastern Thorp Gravel terrace and of seismically-induced landslide potential of the northern property in Section 9.

Development along slopes prone to seismically induced landslides should follow the appropriate mitigation measures outlined for Landslide Hazard Zones 1 and 2 as described above.

3.1.6 Significant Unavoidable Adverse Impacts

Unavoidable erosion impacts as a result of construction of the Desert Claim Wind Power Project would include some increase in soil loss during construction. Provided the mitigation measures offered in **Section 3.1.5.1** were properly followed, however, it is anticipated that erosion and sediment transport would be contained within the construction areas, and the resulting impacts would be insignificant. The risk of landslide activity in Landslide Hazard Zone 1 would remain high, but localized, regardless of whether the project were constructed. Construction of the project would not increase the existing landslide hazards on or immediately adjacent to the project area, however, provided that the mitigation measures presented in **Section 3.1.5.2** were implemented. With those mitigation measures, potential impacts associated with landslide hazards would be insignificant. Development of the project would have no influence on the level of seismic hazard applicable to the project vicinity. Based on project design features and standard measures for erosion control and stormwater management, no significant unavoidable adverse impacts to earth resources are expected.

3.2 AIR QUALITY

The proposed Desert Claim Wind Power Project would not involve the combustion of fossil fuels to generate electricity. Therefore, there would be no air quality impacts from the operation of the project to generate wind power. Any air quality impacts would be related to vehicle emissions and fugitive dust associated with construction of the project, or to maintenance activities throughout the life of the project.

3.2.1 Affected Environment

3.2.1.1 Regulatory Framework

The federal government and the Sate of Washington have varying responsibilities for regulating air quality. Under the federal Clean Air Act, the Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for pollutants of concern, including sulfur dioxide, particulate matter, nitrogen oxides, lead, carbon monoxide and ozone. Primary NAAQS are the levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health. Secondary NAAQS are the levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.

State-level responsibilities for administering air quality regulations are carried out by the Washington Department of Ecology (Ecology). In conformance with Section 110 of the Clean Air Act, Washington has adopted State Implementation Plans (SIPs) for maintaining air quality. SIPs establish limits or work practice standards to minimize emissions of criteria air pollutants or their precursors. Ecology has adopted ambient air quality standards that in some cases are more restrictive than the federal standards established by the EPA.

Ecology has also issued rules for permitting new stationary sources of air emissions, which establish new source performance standards for regulated pollutants. The new source performance rules do not include air emissions from construction activities. Wind turbines do not produce air emissions during operation, and therefore are not subject to the new source permitting process. Similarly, the Prevention of Significant Deterioration (PSD) regulations that govern proposed new or modified sources with the capability to emit pollutants above specified threshold values do not apply to wind energy projects because they do not burn fuel to produce electricity.

Washington regulates what are known as “fugitive” air emissions, which consist of pollutants that are not emitted through a chimney, smokestack, or similar facility. Blowing dust from construction sites, unpaved roads and tilled agricultural fields represents common sources of fugitive air emissions. Wind energy plants are not included in the facilities for which review and permitting of fugitive emissions are required (WAC 173-400-040). Nevertheless, the Washington rules require owners and operators of fugitive dust sources to take reasonable measures to prevent dust from becoming airborne and to minimize emissions.

3.2.1.2 Current Conditions

Under the provisions of the Clean Air Act, government entities must maintain levels of the pollutants of concern below the NAAQS. Failure to do so results in a designation of non-attainment. Non-attainment areas are defined as areas that do not meet (or that contribute to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for a pollutant. Areas that meet the national primary or secondary ambient air quality standard for pollutants are designated as attainment areas. Those areas that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standards are listed as unclassifiable.

Kittitas County is not currently designated as non-attainment for any of the pollutants of concern listed in the Clean Air Act (EPA 2003). Conversely, Kittitas County is presumably in attainment for all criteria pollutants. Because of the sparse population and rural nature of most the County, existing sources of air pollution are likely to be minimal.

Based on observations of existing uses in the local area and review of existing air quality documentation (EPA 2003), the two most prevalent sources of air pollution in the Kittitas Valley are fugitive dust and vehicle emissions. Windblown dust is prevalent in non-irrigated agricultural areas, such as the area around the Desert Claim site. Fugitive dust and combustion emissions are generated in such environments by agricultural activities, vehicles traveling on dirt roads, construction, and other activities that disturb the soils and utilize combustion engines.

Air quality monitoring data specific to Kittitas County are limited. In recent years, the only active Kittitas County site in Ecology's air monitoring network has been a station at the Hal Holmes Center in Ellensburg (Site Number 1922003A), which has only recorded measured levels of particulate matter of 10 microns or less in diameter (PM10). Annual arithmetic means for PM10 at this station for 1995 through 1998 (the most recent years reported) ranged from 21 to 29 micrograms per cubic meter of air, well below the primary standard of 50 micrograms per cubic meter (Ecology 2000). The 24-hour maximum levels for the same period ranged from 41 to 112 micrograms per cubic meter, also well below the primary standard of 112 micrograms per cubic meter. Because these readings were taken at a site 8 to 10 miles from the Desert Claim project area, they may not be an accurate indication of PM10 levels in the project area.

The climate in the Kittitas Valley is heavily influenced by the nearby Cascade Mountain Range. The Cascade Mountains form a north-south topographic and climatic barrier influencing prevailing wind direction, temperature and precipitation. As air masses rise over the western slope of the Cascades, cooling and condensation occur producing heavy precipitation in the mountains. Descending air masses along the eastern slope become warmer and drier. The results of these factors are a dry and windy climate in the Kittitas Valley. Average precipitation in Ellensburg is approximately 8.9 inches per year (WRCC 2003). Average temperatures range from the teens in the winter to the mid 80s in the summer (Kittitas County 2003). Wind conditions for the Desert Claim project area are summarized in **Section 2.2.1.2**.

Baseline air quality conditions for the Wild Horse and Springwood Ranch sites (the respective locations for Alternatives 1 and 2) are likely to be similar to those discussed above, which apply generally to the Kittitas Valley. The predominant emission sources near these sites are likely to include vehicle traffic (particularly for the Springwood Ranch site, adjacent to I-90) and sources typically associated with agricultural and rural residential land use, such as equipment operation and wood burning for space heating.

3.2.2 <u>Environmental Impacts of the Proposed Action</u>

Impacts to air quality would be considered high if the proposed project created noticeable or measurable emissions of criteria pollutants that exceed NAAQS. Impacts would be considered moderate if the proposed project created noticeable or measurable emissions of criteria pollutants that would exceed NAAQS, and which could be partially mitigated with standard control practices. Impacts to air quality would be considered low if the proposed project created small or negligible amounts of noticeable or measurable emissions of criteria pollutants which did not exceed NAAQS and could be mitigated through standard control practices (EPA 2003).

Air quality impacts resulting from the modified project configuration evaluated in the Final EIS would be essentially the same as for the proposed action evaluated in the Draft EIS. Construction and operation impacts would be the same in type, intensity and duration as described in the Draft EIS. As compared to the project layout evaluated in the Draft EIS, the modified project configuration analyzed in the Final EIS would result in very subtle shifts in the location or extent of potential air quality effects, with somewhat less project activity in the southeast corner of the project area and somewhat more activity in the northwestern portion of the project area. Despite this shift, construction and operation air quality impacts would remain insignificant with the modified project configuration.

3.2.2.1 Impacts During Construction

Overall impacts to air quality resulting from construction of the proposed project would be low. The primary sources of air pollution generated by construction would be vehicle exhaust emissions and fugitive dust particles from disturbed soils becoming airborne.

Sources of vehicle exhaust emissions would include heavy construction equipment operating on the site, trucks delivering construction materials and project components to the site, and vehicles used by construction workers to access the site. The amount of pollutants emitted from these sources would be relatively small, given the size of the construction work force and equipment fleet, and similar to other equipment commonly used for agriculture, transportation and construction in the Kittitas Valley. The emissions would generally be dispersed among multiple locations in and near the project area at any given time, rather than concentrated in a specific location, and would not likely reach significant concentrations at off-site locations. Such short-term emissions are exempt from air quality permitting requirements.

Similarly, review or permitting of fugitive emissions is not required for wind energy facilities. Construction activities that could create dust include clearing and grading for road improvements and turbine pads, clearing work areas around all types of project facilities, and underground utility cable trenching or plowing. As discussed in **Section 2.2.3.2**, project construction would temporarily disturb approximately 340 acres within the project area for project elements, including turbine pads, power collection system roads, trenching and staging areas. Transportation of materials and supplies would also produce dust emissions. Standard practices to control airborne dust would be employed during construction, however. These include:

- Watering exposed soil surfaces daily during dry weather, especially when blowing dust is visible.
- Covering construction materials that could be a source of dust when stored.
- Limiting vehicle speeds along non-gravel roads to 25 mph.
- Covering truck beds when transporting dirt/soil.
- Shutting down idling equipment when not in use.

Construction activities for the Desert Claim project are scheduled to take approximately 9 months, although much of the ground-disturbing activity and equipment operation would be concentrated within a several-month portion of the overall construction period. Given the relatively low magnitude, localized extent and temporary duration of the emissions, air quality impacts associated with project construction would not be significant; there is no basis to assume that these emissions would exceed the NAAQS.

For a number of reasons, including conditions applicable to approval of the project, it is possible the applicant would schedule project construction in multiple phases (such as 3 phases of 40 turbines each, for example). If phased construction occurred, each phase would likely be up to about 9 months long and the total duration of construction could be more than 2 years (although there would likely be intervals of at least several months between phases). The effect of phased construction on the level of air quality impacts would be to extend the total duration of temporary air emissions from project construction, but to reduce the intensity or magnitude of impacts for any phase. Whether the project were constructed in one or multiple phases, construction–related air quality impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant.

3.2.2.2 Impacts During Operation

Operation and maintenance impacts on air quality from the proposed project would be negligible. Emissions during the operating period would be limited to exhaust emissions and fugitive dust generated by vehicles traveling on project access roads to perform operation and maintenance functions. Areas disturbed in construction and not occupied by permanent project facilities would be revegetated and would not be sources of blowing dust. All permanent access roads would have paved or gravel surfaces, further reducing the potential for dust. The volume of operation and maintenance vehicle traffic would be very low; therefore, quantities of potential emissions generated by these vehicles would be very small, intermittent, and localized.

Scoping comments for the EIS indicated a concern that diesel generators would be used for power production during low-wind periods, as a back-up source of power. The Desert Claim project would not include any provision for fossil-fueled back-up power (see **Section 2.2**); at times when the wind was insufficient for the turbines to operate, the project simply would not generate electricity. During the operating period, the facility would use fossil fuels only for vehicles used by on-site employees for project maintenance.

Scoping comments also address the possibility that turning rotor blades would create turbulence that could increase dispersion of airborne dust and pollen, possibly causing a respiratory hazard or nuisance for nearby residents. The Draft EIS explained that because wind turbines remove energy from the air passing through the rotor blades, the air downwind of a turbine is actually moving more slowly than on the upwind side. Therefore, the wind turbines would not increase the normal dispersion of dust and pollen, and would not result in dust-related impacts for residents near the project area.

Several comments from the review of the Draft EIS essentially disputed the original discussion of this issue, based on the reported observation of dust clouds being stirred up by wind turbines at the Stateline project in Walla Walla County. While Kittitas County has no photo documentation or empirical evidence with which to address this reported dust observation, the question can be addressed through commonly accepted science, specifically theories from the field of physics. The appropriate reasoning is to apply the First Law of Thermodynamics (regarding conservation of energy) to a wind turbine, using the concept of a “control volume” that completely surrounds the turbine. At any given operating speed, the First Law requires that the sum of energy of all forms entering the control volume around the turbine must equal the sum of all energy leaving that volume and/or stored internally (Van Wylen and Sontaag 1969). Because the only energy entering the control volume is the kinetic energy ($=1/2\ mv^2$) of the air (wind) and the turbine converts some of that energy to electricity (which leaves through wires), exiting air (wind) must therefore have a lower kinetic energy than the air entering the control volume. Under the First Law, because the mass of the air leaving is the same, its velocity must be less. Therefore, the general tendency of a wind turbine is to remove energy from and to slow down the air traveling past the turbine.

Similarly, Manwell et al. (2002) provide documentation that supports the above reasoning. Specifically, Figures 8.6 and 8.7 on page 387 of the cited source present measured and predicted velocity profiles that show a substantial decrease in wind velocity downwind of various models of wind turbines. Subsequent discussion in the same source indicates that wind turbines sited downwind of other turbines can experience wake turbulence created by the upwind machines; this turbulence occurs at the elevation of the rotors, however, and does not extend to ground level where it would be capable of entraining surface dust. In summary, a belief that wind turbines act as fans and stir up dust in downwind areas is not consistent with applicable scientific principles.

3.2.2.3 Impacts During Decommissioning

Potential impacts to air quality from decommissioning the proposed project would be similar to those for construction of the project and would be very low. The proposed project is assumed to have a life of 30 years. Decommissioning at the end of the project life would consist of removing the wind turbine nacelles, blades, towers, foundations, cables, and other facilities to a depth of 4 feet below grade. Decommissioning would also include removal of project roads and restoration of disturbed land. The standard control practices employed during construction would also be applied to decommissioning as needed. Unavoidable impacts from decommissioning the project would include very low levels of combustion pollutants from vehicles, and dust from vehicles and ground-disturbing activities.

3.2.3 Impacts of the Alternatives

3.2.3.1 Alternative 1: Wild Horse Site

Air quality impacts from Alternative 1 would likely be essentially the same as those described for the proposed action in **Section 3.2.2,** although the localized effects would occur in a different area of Kittitas County. Development of a 180-MW wind energy project at the Wild Horse site would involve the same construction activities and procedures over approximately the same duration of time. The total project area and the area of construction disturbance for Alternative 1 would be virtually the same as for the proposed action. Therefore, overall air quality impacts from construction would also be low. Based on the land use pattern for the Desert Claim project vicinity, there is some potential for nearby residences to experience temporary increases in blowing dust from construction activities. Because there are no existing residences within 2 miles of the Wild Horse site, this condition would not apply to Alternative 1.

Operation and maintenance impacts on air quality from Alternative 1 would be negligible, as discussed in **Section 3.2.2.2** for the proposed action. Similarly, air quality impacts from decommissioning under Alternative 1 would be very low.

3.2.3.2 Alternative 2: Springwood Ranch Site

Potential impacts from Alternative 2 would be similar in type to those associated with the proposed action and described in **Section 3.2.2**. They would primarily include dust and vehicle emissions from construction, and similar impacts from decommissioning. Compared to the proposed action, the smaller site size, reduced number of turbines and lower levels of construction activity for Alternative 2 would generate lower air quality impacts that would likewise be insignificant. Operation and maintenance impacts would be negligible, as discussed for the proposed action and Alternative 1.

3.2.3.3 No Action Alternative

Under the no-action alternative, most of the land in the project area would likely remain in its current agricultural use. Some of the existing agricultural and range land could be converted to rural residential use over the next 30 years, as indicated by recent land use trends. Potential impacts to air quality from such low-intensity development would be negligible.

If the proposed wind energy project were not built, it is possible that some other energy facility of comparable capacity would be proposed in response to expected future energy demands. Based on recent conditions in the Northwest energy market, the most likely alternative source of electricity would be a combustion-turbine plant fueled by natural gas. Combustion-turbine projects have been proposed for many locations in the Northwest in recent years, and the location of such a replacement power source cannot be predicted. Regardless of location, such a power plant would burn substantial volumes of fossil fuel and would generate corresponding amounts of air pollutants such as carbon monoxide, carbon dioxide and nitrous oxides. Air quality impacts from these emissions would be a possible consequence of the no action alternative, and could be significant depending on the applicable local circumstances. As noted in **Section 2.3.3**, the No Action Alternative for the Desert Claim project does not include or preclude any specific action with respect to other energy generation projects that have recently been proposed or might be proposed in the future.

3.2.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.2.5 Mitigation Measures

Standard practices to control dust emissions during construction are identified in **Section 3.2.2**. The impact analysis assumes these measures would be implemented during project construction. Because the expected air quality impacts would be insignificant, no additional mitigation measures need to be considered. A possible additional measure that was identified through the review of the Draft EIS is the application of dust palliatives, such as calcium chloride, to road surfaces to reduce the amount of dust created by vehicle traffic on unpaved roads. Use of dust palliatives might obviate the need for repeated watering of project access roads. Conversely, some resource agencies have expressed concern over possible ecological impacts from dust-palliative compounds transported in stormwater runoff; this issue would need to be addressed before use of dust palliatives could be recommended.

3.2.6 Significant Unavoidable Adverse Impacts

Vehicle and fugitive dust emissions during construction are the only likely impacts to air quality associated with the proposed project. Both impacts would be temporary, limited to the expected 9-month construction schedule (or a longer construction schedule with multiple phases), and would be minor in the context of other rural-residential, industrial and agricultural activities in the Kittitas Valley. With application of the standard control measures typically used in large construction projects, air quality impacts during construction would be insignificant. Project operations and maintenance activities would produce minimal air pollutants and would result in insignificant impacts to air quality.

3.3 WATER RESOURCES

3.3.1 Affected Environment

3.3.1.1 Surface Water

The Desert Claim project area and the sites for Alternatives 1 and 2 are located within the central portion of the Upper Yakima River drainage basin. The Yakima River begins from the eastern slope of the Cascade Mountains at Keechelus Lake in the Upper Kittitas Valley and flows southeasterly through the lower plateau and river-bottom lands to the Columbia River (EES 2001).

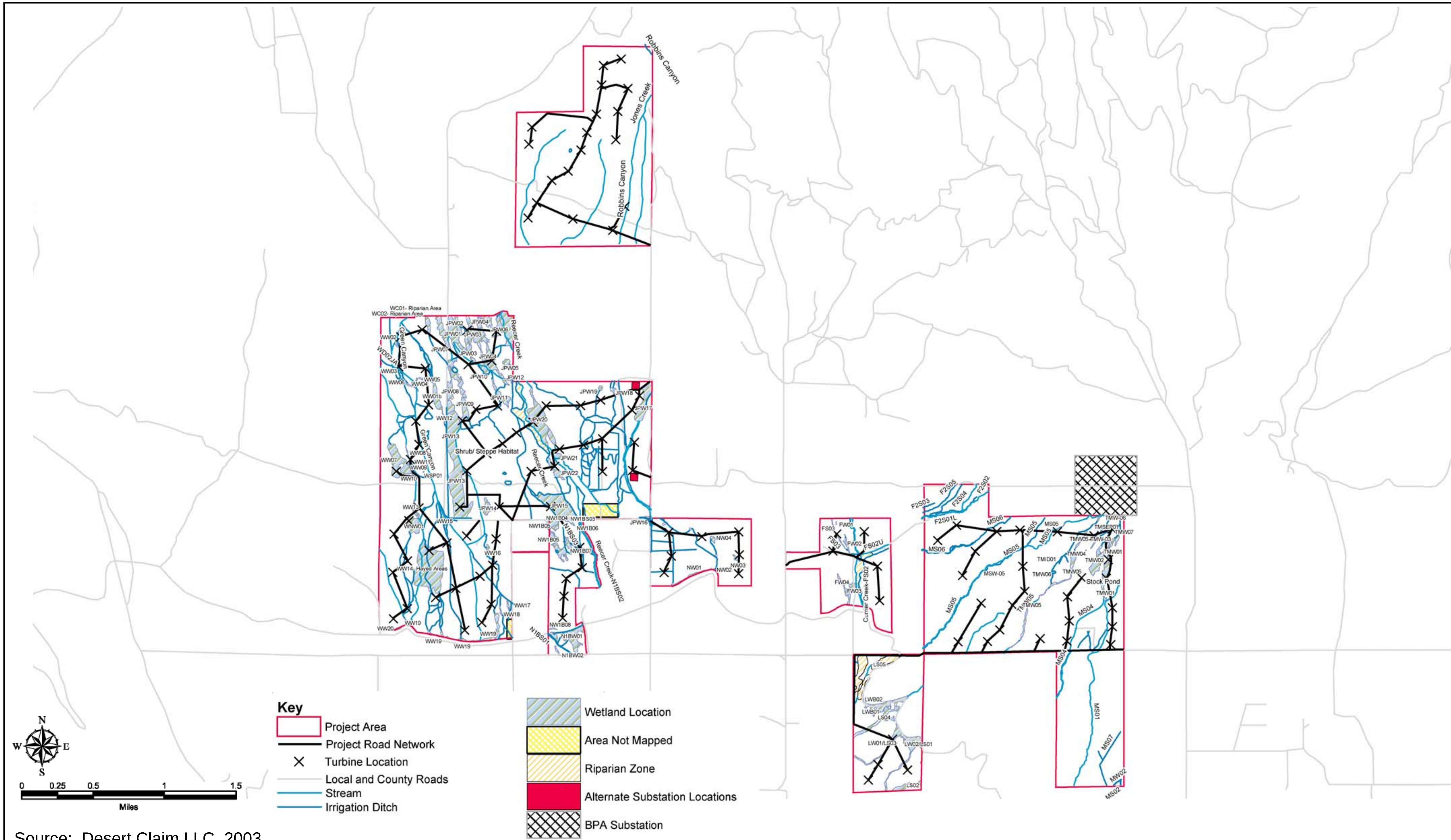
The Yakima River drains an area of 6,155 square miles. The USGS has a gaging station on the Yakima River close to the project area. The gaging station is 10 miles south of Ellensburg. An area of approximately 1,594 square miles is drained by the Yakima River at this point. The USGS has calculated an average discharge (for the period 1934 to 2002) for the river at this gage of 2,450 cubic feet per second (cfs). Average discharge for the 2002 water year was 2,308 cfs (Kimbrough et al. 2002).

Project area streams delineated during field surveys drain into the Yakima River upstream of Ellensburg, and approximately 40 miles downstream of the river's headwaters. Because the Yakima River Basin receives little direct precipitation (8.9 inches per year), these streams are primarily fed by snowmelt off the ridges to the north of the project area (WRCC 2003).

Project Area Surface Water Features

Perennial, intermittent, and ephemeral streams in the Desert Claim project study area were identified through map review and field survey during June and July 2003. **Figure 3.3-1** is a map of surface water hydrology, including streams and wetlands, in the project area. The Kittitas County Critical Areas Ordinance (KCC) classifies perennial and intermittent streams according to the definitions provided in WAC 222-16-030. The ordinance does not classify irrigation ditches, waste ways, drains, outfalls, operational spillways, channels, storm water runoff facilities or other wholly artificial watercourses as streams (KCC 17A.02.273).

Based on the map and field investigations, 19 streams were identified within the Desert Claim project area and the immediate vicinity. The streams were characterized as having perennial or intermittent flow, as indicated in **Table 3.3-1**. This table also provides information on the water body to which the stream drains and the stream classification according to the Washington water typing system. **Appendix B, Exhibit 1** provides more detailed information from the stream inventory of the project area.



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.3-1
Streams and Wetlands Identified in the Project Area

Table 3.3-1
Summary of Streams in the Project Area

Name	Flow Type	Waterbody Tributary To	Stream Classification*
unnamed stream	Intermittent	unnamed stream[1]	5
unnamed stream	Intermittent	Dry Creek	5
Green Canyon Creek	Perennial	Dry Creek	3
unnamed stream	Perennial	Green Canyon Creek	3
unnamed stream	Intermittent	Reecer Creek	5
unnamed stream	Intermittent	Reecer Creek	5
Robbins Canyon Creek	Intermittent	unnamed stream	5
Jones Creek	Intermittent	Currier Creek	4
unnamed stream	Perennial	Reecer Creek	3
Reecer Creek	Perennial	Yakima River	3
unnamed stream	Perennial	Jones Creek	3
Currier Creek	Intermittent	Reecer Creek	4
unnamed stream	Intermittent	unnamed stream	5
unnamed stream	Intermittent	Currier Creek	4
unnamed stream	Intermittent	Currier Creek	5
unnamed stream	Intermittent	Currier Creek	5
unnamed stream	Intermittent	Currier Creek	5
unnamed stream	Intermittent	Currier Creek	5
unnamed stream	Intermittent	Currier Creek	5

* Stream classification is according to the Washington water typing system.

From west to east, the following named streams bisect the project area:

- Green Canyon (perennial);
- Reecer Creek (perennial);
- Robbins Canyon (intermittent);
- Jones Creek (intermittent tributary to Currier Creek); and
- Currier Creek (intermittent).

Reecer Creek was identified as the highest-quality stream in the project area, with sustained flow throughout the year and riparian habitats along most of the channel. Reecer Creek drains to the Yakima River at a location just west of Ellensburg and about 6 miles south of the project area. Reecer Creek was studied by the Washington State Department of Ecology in a flow summary of streams and creeks to the Upper Yakima River. Daily average discharge of Reecer Creek determined in this study ranged from 68 ft^3/sec to 4 ft^3/sec (Ecology 2000). Jones Creek and Currier Creek are tributaries to Reecer Creek. Green Canyon is a tributary to Dry Creek, which also flows into the Yakima River.

The North Branch Irrigation Canal also crosses a portion of the project area. The canal runs generally from west to east, and conveys water supplied by the Kittitas Reclamation District.

Kittitas County uses Washington State's five-tier water typing system (WAC 222-16-030) to classify streams, lakes and ponds. Types 1, 2, 3, 4 and 5 waters are classified according to their flow and habitat quality. Using the stream inventory map published by the Washington Department of Natural Resources (WDNR 1974, modified November 1996), 5 streams in the project area were classified asType 3 waters, which are characterized as segments of natural non-shoreline waters that have a moderate to slight fish, wildlife, or human use. The remaining 14 streams in the project area exhibited characteristics of Type 4 or 5 waters, which do not have a moderate to slight fish, wildlife, or human use and are of varying widths.

As further described in **Section 3.4.4**, none of the streams within the project area are known to support indigenous fisheries. In addition, none of the streams are listed as impaired on the Washington State Clean Water Act 303(d) list of impaired water bodies (Ecology 1998).

Perennial Streams

Five perennial streams in the project study area were mapped and characterized as Type 3 waters. These streams normally have flow throughout the year. In addition to Green Canyon Creek and Reecer Creek, there are three unnamed perennial streams in the project area. Details on the location, widths, and receiving waters are provided in **Table 3.3-1** above and in **Appendix B**.

Intermittent Streams

Fourteen (14) of the streams mapped in the project study area are intermittent streams. Intermittent streams (seasonal streams) are dry for a large part of the year, generally in the winter and fall. Flow generally occurs for weeks and/or months in response to seasonal precipitation and groundwater recharge in the spring and early summer. Three of these project-area streams were classified as Type 4 waters, and 11 as Type 5 waters.

Ephemeral Streams

Ephemeral streams are not included in the WDNR stream maps and are not identified separately in **Appendix B**. Ephemeral streams convey runoff for only brief periods during or after rainfall events. These drainages typically have unconsolidated beds of silt, sand, gravel, cobble, or a combination of these substrate types. In general, mapped washes in the project area were characterized by a defined bed and bank. Some of these features had vegetated banks, while others were un-vegetated.

Irrigation Ditches

Many of the streams discussed above convey water to irrigation ditches located within the project area. These ditches are particularly prevalent on the western portion of the project area. Several stock ponds are also present within the project area. Detailed information regarding these features was not collected during the field surveys, as these artificial features are not regulated by Kittitas County.

Wetlands are discussed in **Section 3.4.2** of the EIS.

Surface Water Supply

Surface waters of the Yakima Basin that are used for water supply purposes include the main stem of the Yakima and Naches Rivers (Tri-County Water Resources Agency 2003). The water users in the Yakima Basin depend upon a variety of systems to meet their demands for water supply. These include municipal water supply systems, both large or small, irrigation systems and private wells.

The U.S. Bureau of Reclamation (Reclamation) provides the water supply for a majority of the water uses that divert surface water from the Yakima and Naches River. In addition, several tributary streams provide surface water in the Yakima Basin. Seasonal precipitation occurring from October to March supplies water to the rivers and tributary streams (Tri-County Water Resources Agency 2003), with high flows from April to June. The seasonal precipitation falls either as snow or rainfall, mostly in the Cascade Range. Winter snowfall is stored in the Cascade Range snow pack, which provides most of the high runoff in the Yakima Basin from April to June.

Reclamation delivers diverted surface water to a number of local irrigation districts and water companies in the basin, who in turn supply water to individual water users. The Kittitas Reclamation District (KRD) supplies water to irrigators and other users in a large portion of the Kittitas Valley. The North Branch Canal, one of the major water conveyance facilities in the KRD system, traverses the north side of the Kittitas Valley and passes through a portion of the Desert Claim project area.

Surface Water Quality

The Upper Yakima River and several of its tributaries are currently listed as impaired surface waters under Section 303(d) of the Clean Water Act. The 303(d) listing identifies the following parameters as the sources of impairment: fecal coliform bacteria, 4,4'-DDE, DDT, mercury, dieldrin, silver, copper, cadmium, temperature, dissolved oxygen (DO) and ammonia (Ecology 2003b). The water quality concerns reflected in the 303(d) listing are based on conditions in the mainstem river and some of the larger tributaries, and are not necessarily representative of conditions in smaller tributaries such as those near the project area.

Reecer Creek, a minor tributary to the Yakima River, is the largest stream that runs near or through the Desert Claim project area. Reecer Creek is not on the most recent (1998) 303(d) list (Ecology 2003b). The watershed assessment for the Yakima River Basin completed in January of 2003, however, found Reecer Creek to have reduced water quality for temperature, DO, total suspended sediment and fecal coliform (EES 2003). Water quality information for other surface waters in the Desert Claim project area is limited or nonexistent.

As is discussed in **Section 3.3.4**, existing water resource conditions in the project area reflect past activities and current land use. Potential pollutant sources for surface water and ground water that may be present in the project area include natural salts or minerals (such as arsenic) present in the soil, septic systems, underground storage tanks, applications of fertilizers and pesticides, application of animal manure, chemical or fuel spills, leaching from landslides, and burial or dumping of wastes (EES 2003).

Alternative 1: Wild Horse Surface Water Resources

The Wild Horse site, the project area for Alternative 1, is located on exposed ridge tops away from surface waters. Surface waters that are within one-half mile of the site include Whiskey Dick, Skookumchuck, and Whiskey Jim Creeks and their tributaries; the Wild Horse, Skookumchuck Heights, Dorse, Reynolds, Thorn, Government, Pine, and Seabrock springs; stock watering ponds; and unnamed ephemeral creeks. Whiskey Dick, Skookumchuck, and Whiskey Jim Creeks all originate within the project boundary for Alternative 1, 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 per 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 within each drainage.

Wild Horse, Skookumchuck Heights, Dorse, Reynolds, Thorn, Government, Pine and Seabrock springs and one unnamed spring are all identified on maps covering the Wild Horse area. Several of the springs have been developed by local ranchers to supply water for livestock. Observed flow rates at these springs were found to be in the range of 1 to 5 gallons per minute. The majority of the springs exist between the elevations of 3,300 and 3,400 feet. Because of the relatively short distance from the top of the ridges down to the position of the springs, the recharge areas are relatively small; consequently, it is anticipated that flows from the springs decrease later in the summer and fall.

Alternative 2: Springwood Ranch Surface Water Resources

The Yakima River bounds the Springwood Ranch site along most of its east and north sides. Taneum Creek, a tributary to the Yakima River, bisects the northern and southern portions of the site. No other perennial streams are located within or adjacent to the site defined for Alternative 2. An intermittent stream with two branches crosses the northern portion of the site and empties into the Yakima River. Another intermittent stream drains from the plateau area near the middle of the site and flows into the Yakima River north of Taneum Creek.

Two irrigation canals, the KRD Main Canal and North Branch Canal, cross the northwestern portion of the site. Two ponds near the Sunlight Waters community are located just to the west of the northwest corner of the Alternative 2 site.

Most of the shoreline of the Yakima River along the northeastern boundary of the Springwood Ranch site has been mapped as high erosion hazard and landslide hazard area. Most of the traverse of Taneum Creek through the site is bounded by soils with moderate erosion and landslide potential. Some soils with high erosion and landslide potential are also located at the mouth of Taneum Creek.

Ecology monitors water quality in the state's surface waters and maintains a list of water bodies that are characterized by impaired water quality or limited for various wildlife and habitat functions and values. The Yakima River downstream of the Springwood Ranch is listed by Ecology as impaired for fish rearing, harvesting, spawning and migration attributed to agricultural activities, habitat modification and removal of vegetation. Taneum Creek is listed as limited for instream flows and temperature.

3.3.1.2 Ground Water

Regional Hydrology

The project area is underlain by the Columbia Plateau regional aquifer system, which extends across portions of Idaho, Oregon, and Washington. The Ellensburg Basin of the Kittitas Valley occurs in three different geologic units:

- Grande Ronde Basalt
- Ellensburg Formation
- Undifferentiated alluvial and glacial deposits

Bedrock Aquifers

The Miocene-age rocks of the Columbia River Basalt Group (CRBG) are generally the major aquifers of the Columbia Plateau. The Grande Ronde Basalt is the largest series of basalt flows of the CRBG and is composed of approximately 120 flows that underlie the entire Columbia Plateau and Kittitas Valley. No other basalt flows of the CRBG extend as far west into the Yakima River Valley as the Grande Ronde, which therefore forms the only CRBG aquifers beneath the project area.

Basalt flows are typically permeable at the individual flow tops and bottoms because of rubble zones, vesicles, and fractures. Expected yields from wells that penetrate permeable zones are about 1.5 gpm for each foot of saturated material penetrated (USGS 1994).

The Miocene-age Ellensburg Formation is composed of unconsolidated and semi-consolidated sedimentary rocks that are interbedded with and overlie the basalt flows. The Ellensburg Formation and coeval deposits are areally extensive in the Columbia Plateau, however the Ellensburg is confined to the western Columbia Plateau in Washington. Sedimentary units that interfinger and lie on top of the CRBG units in the central and eastern Columbia Plateau are identified as separate units; however, there is ongoing research and revision over the naming and extent of Neogene (Late Tertiary) sedimentary units. The Grande Ronde Basalts are some of the oldest basalt flows of the CRBG, and were emplaced relatively rapidly. This limits the thickness of interbedded Ellensburg Formation units within the Grande Ronde Basalt. Suprabasalt sedimentary units (units overlying the basalt flows) may be more extensive along the western edge of the Columbia Plateau (in the project vicinity) than interbedded units. Highly productive aquifers may be encountered in the Ellensburg Formation units; however, a USGS study (1994) does not differentiate the Ellensburg Formation aquifers from Grande Ronde aquifers because interbedded Ellensburg Formation sediments occur near permeable flow tops and bottoms and can be relatively thin.

Alluvial Aquifers

In structural lows (basins and valleys) of the plateau, unconsolidated alluvial deposits (including glacial deposits) have accumulated over the Miocene bedrock. Deposits consist primarily of sand and gravel. The unconsolidated deposits form aquifers that can be productive aquifers for public-supply, domestic, commercial, and industrial purposes. They also are important sources of water for agricultural (primarily irrigation). Alluvial aquifer thickness exceeds 800 feet locally, within basins, as is the case in the deepest portions of Kittitas Valley. The hydraulic conductivity of these aquifers varies from less than 10 to greater than 2,000 feet per day. Well yields are generally up to 0.5 gpm for each foot of saturated material penetrated (USGS 1994).

Desert Claim Project Area Hydrology

Grande Ronde Basalt, Ellensburg Formation sandstone, and undifferentiated alluvial and glacial deposits also comprise the three main aquifer systems beneath the Desert Claim site and immediate surrounding areas. The Grande Ronde Basalt and Ellensburg Formation aquifers are generally characterized as relatively deep, confined to semi-confined aquifers. The undifferentiated alluvial/glacial aquifer is shallower and is interpreted to exhibit semi-confined to unconfined aquifer conditions.

The Desert Claim project area is located on the northern edge of the Ellensburg Basin. A north to south cross-section of the project area is presented as **Figure A-2** and located on **Figure A-1** (Cross-Section A-A'). Kittitas Drift and Quaternary-age alluvial material dominate the near-surface geology but pinch out to the north where Grande Ronde Basalt crops out. A review of area well logs reveals that most wells are producing water from fracture and flow top and bottom aquifers in Grande Ronde Basalt or Ellensburg Formation sandstones. The following sections summarize the hydrogeology of the Grande Ronde Basalt, Ellensburg Formation, undifferentiated alluvial and glacial aquifers, and interactions between ground water and surface water at the site.

Undifferentiated Alluvial and Glacial Aquifers

Alluvial aquifers are present throughout the project area; however, the majority of wells are withdrawing from bedrock aquifers. Alluvial aquifers are primarily gravel or sandy gravel, and some are reported as cemented gravel. Well yields are moderate and most range from 10 to 30 gpm, and peak at 40 gpm. A review of area well logs shows that the alluvial aquifers range from 40 to 400 feet thick in the project area. Static water levels are relatively shallow generally ranging from near surface to 250 feet below ground surface (bgs). The aquifers are generally unconfined and water levels follow the topography.

Grande Ronde Basalt Aquifers

The majority of wells in the vicinity of the project are completed in Grande Ronde Basalt aquifers. The depth of producing intervals varies from 70 to 1,000 feet bgs; the majority of wells are between 100 and 600 feet bgs. Static water levels vary greatly, ranging from artesian flow (wells 35 and 38) to 670 feet bgs (well 33). The majority of static water levels in Grande Ronde Basalt aquifers are between 300 and 500 feet bgs. Three wells (15, 16, and 37) were reported as dry upon completion of drilling. The significant variability in static water levels is caused by permeability barriers in the subsurface units. Low permeability barriers may be related to fracture filling by clay in basalt or fine-grained sedimentary interbeds. The low permeability zones or layers behave as barriers to ground water flow between aquifers and can result in a pressure gradient between aquifer intervals (**Figure A-2**). Grande Ronde Basalt aquifers exhibit confined to semi-confined behavior.

Well yields across the project area also vary greatly. A range of 1 to 85 gpm is reported on well logs, however, most yields are less than 40 gpm. One well located near the center of the project area (well 57) was reported as yielding 400 gpm.

Ellensburg Formation Aquifers

Ellensburg Formation aquifers are penetrated by wells throughout the project area. The majority of wells are extracting from Grande Ronde Basalt aquifers but often the Ellensburg Formation is associated with these aquifers. In general, static water levels of Ellensburg Formation aquifers are lower than basalt aquifers and most range from about 60 to 300 feet bgs. Well yields are moderate to high, the bulk ranging from 15 to 40 gpm and up to 85 gpm. Static water level and well yield variation of Ellensburg Formation aquifers is similar to Grande Ronde Basalt aquifers because the Ellensburg is generally located near the permeable flow tops and bottoms of the basalt, since sediments that make up the Ellensburg Formation accumulated between basalt flow emplacement. Water levels in wells that penetrate Ellensburg Formation aquifers in the project vicinity generally follow the topography, indicating the aquifers penetrated in the area are unconfined. Deep, semi-confined to confined Ellensburg Formation aquifers likely exist in the area, but are indistinguishable from Grande Ronde Basalt aquifers with available well log information.

The wells located on the southeastern portion of the project area, in the Green Canyon valley, are dominated by Ellensburg Formation aquifers. Wells numbered 100 and 104 are included in this grouping and appear on Cross-Section A-A’ (**Figure A-2**). Both of these wells are producing water from a sandstone formation interpreted to be Ellensburg Formation.

Ground Water Flow, Recharge and Discharge

The Cascade Range in Oregon and Washington is an important recharge area for the Columbia Plateau regional aquifer system. Ground water is little used in the Cascade Range; the Tertiary volcanic and sedimentary rocks are extremely permeable and readily accept large volumes of precipitation that recharge underlying aquifers (USGS 1994).

Geologic structures are important controls on ground water occurrence and movement in the Columbia Plateau. Folded and subsequently eroded layers of rock crop out in upland areas where water enters the aquifer system; the water then moves downgradient along permeable zones. Folding and faulting of rock layers can influence the movement of ground water by creating barriers to ground water flow, or alternatively by creating new or enhanced flow pathways through fracturing. The general movement of water in the aquifer system is from recharge areas near the edges of the plateau toward regional surface water drainages, such as the Columbia River (USGS 1994). Topography plays a dominant role in ground water flow direction in the project area. Ground water flow is generally north to south, following the topography toward the Yakima River in both the alluvial and bedrock aquifers.

Recharge to the alluvial aquifers is provided by infiltration of runoff from surrounding bedrock ridges, streamflow, direct precipitation, and leakage from irrigation sources (including ponds and the North Branch Canal). Regional ground water flow in the alluvial aquifers of Kittitas Valley generally corresponds to the topography, eventually flowing down the Yakima River Valley. Ground water flowing in the alluvial aquifer is interpreted to discharge primarily into the Yakima River, streams, irrigation lakes and the North Branch Canal, and underlying bedrock.

Recharge to bedrock aquifers is provided by overlying alluvial aquifers, flow from other bedrock aquifers, and direct precipitation. The up-folded limbs of Grande Ronde Basalt and Ellensburg Formation that crop out north of the project area also receive water from direct precipitation and stream flow. Ground water flow in the bedrock aquifers is typically controlled by the orientation of structures such as folds and fractures, and the physical characteristics and orientation of the individual stratigraphic layers. Water flowing in the various bedrock aquifers likely discharges to other bedrock aquifers (both shallower and deeper), overlying alluvial aquifers and surface water.

Ground Water - Surface Water Interaction

The Yakima River northern tributary streams that flow through the Desert Claim project area (Green Canyon, Reecer Creek, Robbins Canyon, Jones Creek, and Currier Creek), wetlands, irrigation ponds, and the North Branch Canal are surface water features that directly interact with ground water in the project area.

The tributary streams interact with ground water through three general processes: (1) streams gain water from inflowing ground water; (2) streams lose water to ground water by outflow through the streambed; or (3) streams vary between gaining water in some reaches and losing water in others. All of the project area streams vary between gaining and losing reaches. During a field drainage reconnaissance preformed in late summer of 2003, much of the tributary stream water eventually infiltrated through the underlying alluvium before reaching the Yakima River.

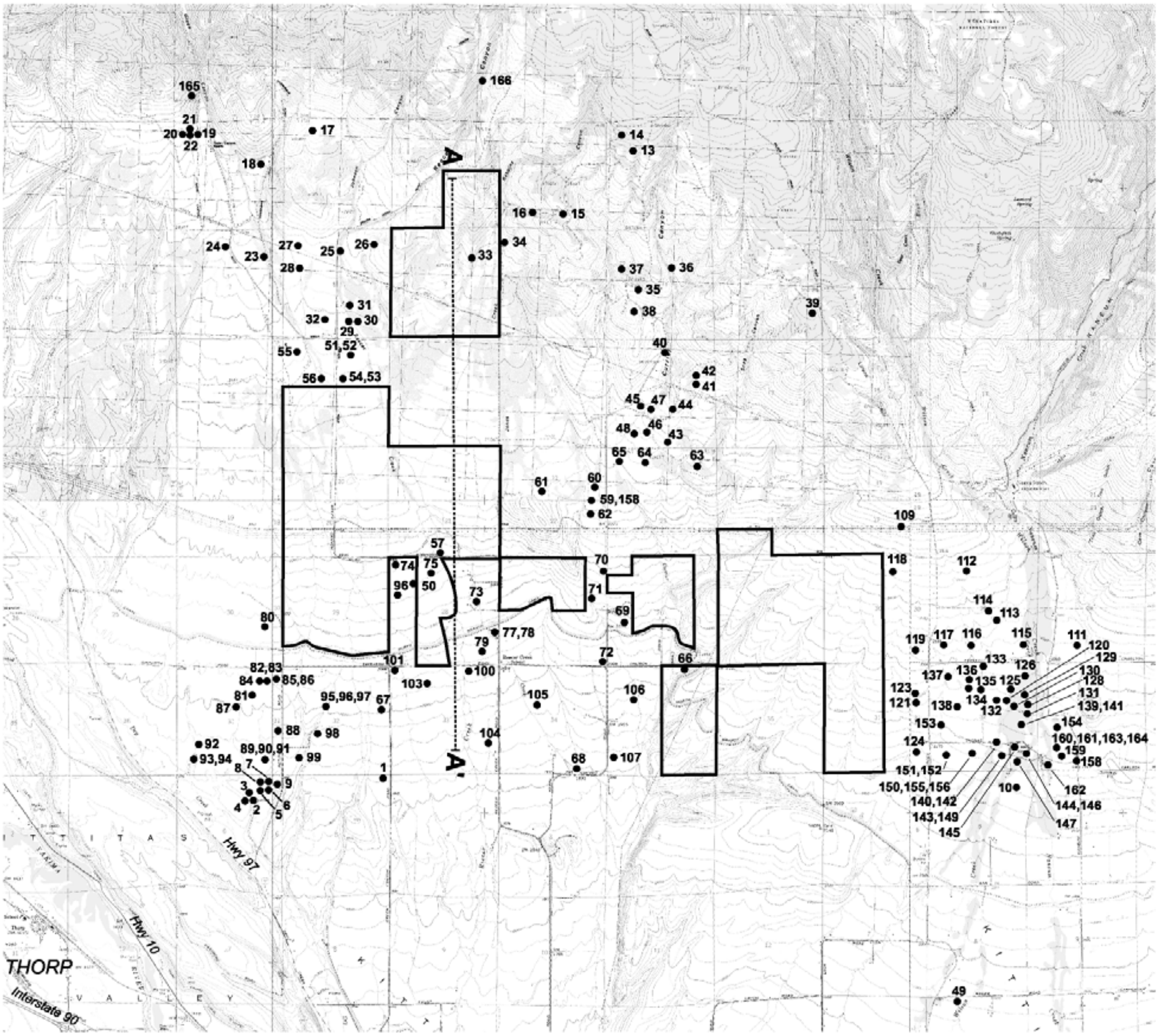
A review of area well logs shows that the majority of wells are withdrawing from Grande Ronde Basalt aquifers that are semi-confined to confined. As such, little interaction between surface water and these deeper aquifers is expected in the area. Conversely, the alluvial aquifers are in direct connection with surface water because they are shallow and permeable.

The existing condition of surface water flow on the Columbia Plateau has been dramatically affected by irrigation practices. Water diverted for irrigation from surface water sources (streams, ponds, and reservoirs) increases local recharge and, in effect, creates localized ground water table highs. Highs up to 300 feet have been recorded in Washington (USGS 1994). Ground water table rises have caused localized ponding, creating a need for drain installation. Conversely, irrigation using ground water has resulted in declines of local ground water tables of as much as 150 feet in Washington (USGS 1994). A review of well logs and water rights claims encompassing 92 square miles surrounding the project area identified only 5 wells that are used for irrigation, however water usage estimates from Ecology data show that irrigation uses about 7 times more water than domestic water uses.

Ground Water Supply

According to the U.S. Geological Survey (USGS 1994), large well yields are common in the Ellensburg area. Unconsolidated deposits in the Ellensburg Basin of Kittitas Valley are up to 1,000 feet thick and yield up to 3,200 gallons per minute (gpm) to wells for public supply, domestic, commercial, and agricultural (primarily irrigation) purposes. The Grande Ronde Basalt underlying the unconsolidated deposits yield up to 4,800 gpm (USGS 1994).

Water well logs obtained from the Washington Department of Ecology (Ecology) were reviewed and compiled for the area immediately surrounding the Desert Claim project site. The wells were located to the nearest quarter-quarter section, or by address when available, and a database was created to compile and retrieve pertinent drilling and well construction information. The wells are located surrounding and within (4 wells) the project area for a total of 166 wells, over 92 square miles. Five wells are used for irrigation purposes and the remaining wells are for single-family domestic use (according to well logs and water rights claims). The well locations are shown in **Figure 3.3-2**. Based on the tools and methods used by the sources reporting the well logs and the standard practice of reporting well locations only to the nearest quarter-quarter section, the locations shown in **Figure 3.3-2** should not be considered highly precise; location inaccuracies in the well logs are relatively common.



REFERENCE: TOPO MAP FROM DELORME.

LEGEND

1 ● Approximate location of water well, well locations based on 1/4-1/4 section description or address

Project Area

A------------A' Cross section location

N

0 4000

SCALE IN FEET

Source: Associated Earth Sciences, Inc.

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.3-2
Well Locations

A study of the hydrology of Kittitas Valley and a review of well logs for the EIS indicate that well yields average 20 to 23 gpm in the Desert Claim project vicinity (Owens 1995). The study concludes that ground water yield and flow in the Kittitas Valley is largely dependent on stratigraphic and structural controls and high well yields do not necessarily correlate to depth although on average yield increases with depth. Grande Ronde Basalt aquifers tend to produce higher yields than the Ellensburg Formation aquifers, probably because Grande Ronde Basalt aquifers are generally confined and have a larger recharge area in the mountains north and south of Kittitas Valley (Owens 1995).

Under Washington water law, small domestic, stock-watering, or industrial water wells may withdraw up to 5,000 gallons per day (gpd) of waterwithout requiring a ground water right permit (these are known as exempt wells). Ecology estimates that typical use for a single-family home is about 300 gpd. Assuming typical water use, the 166 existing domestic wells in the vicinity of the project withdraw approximately 50,000 gpd of water. All of the homes in the area use on-site septic systems to discharge waste water; therefore, a large portion of the water used is returned to the shallow subsurface. Water rights data obtained from Ecology indicate that irrigation in the project vicinity uses substantially more ground water than single-family residences. Approximately 350,000 gpd of water is used for irrigation (estimated from Ecology data). There are 32 claims for ground water rights in the area that are not quantifiable, according to Ecology. These claims could be for either domestic water use or irrigation, and therefore an estimation of the amount of water used by these claimants cannot be made.

Ground Water Quality

Washington State has ground water quality standards that are protected for beneficial uses by Chapter 173-200 of the Washington Administrative Code (WAC), and drinking water standards that are protected by WAC 246-290-300. Ground water quality standards are designed to protect ground water quality, and existing and future beneficial uses through an anti-degradation policy and by defining maximum contaminant level (MCL) criteria. The purpose of drinking water regulations is to ensure that health quality standards are maintained for public drinking water supplies. Drinking water standards established by the Washington Department of Health (WDOH) comply with the Federal Safe Drinking Water Act of 1974 and subsequent 1986 amendments. The standards outline monitoring protocols and MCLs for bacteriological, inorganic chemical, and physical characteristics.

The WDOH monitors several public drinking water supply wells in Ellensburg for constituents that include volatile organic compounds, inorganic compounds, and pesticides/herbicides. Recent ground water quality measurements were obtained from the WDOH. Most chemical constituents analyzed were below the state required detection limit of the laboratory analyses. The state required detection limits are well below the MCLs allowable for each contaminant. All detected concentrations of contaminants were below applicable MCLs. The following contaminants were detected in analyses: fluoride at 0.83 milligrams per liter (mg/L), magnesium at 3.6 mg/L, and calcium at 8.2 mg/L. The following physical parameters were measured and are all within acceptable ranges for drinking water: hardness at 36 mg/L and pH at 6.8.

Regional water quality studies have been performed in the Columbia Plateau aquifer system by the USGS. One study investigated a shallow alluvial aquifer in Kittitas Valley (Larson 1997). The following parameters were measured: pesticides, nitrogen, temperature, pH, and specific conductance. Detectable amounts of pesticides were found in some shallow wells (less than 50 feet below ground surface), however all contaminant levels were below the MCLs for public drinking water. Nitrate was also detected in some well samples, but only one (11.9 mg/L) exceeded the drinking water standard of 10.0 mg/L. A verification sample collected 7 months later had a concentration of 3.2 mg/L.

Alternative 1: Wild Horse Ground Water Resources

As noted in the Earth Resources section, the Wild Horse site is also located within the Yakima Fold Belt sub-province of the Columbia Plateau physiographic province. Numerous hydrologic units exist within the complex geology of the Yakima Fold Belt and the greater Columbia Plateau aquifer system. To simplify the description of the area's hydrogeology, the aquifers in the vicinity of the Wild Horse site have been grouped into two main hydrologic units: the overburden and the basalt aquifers.

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. 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. 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 the land surface (Whiteman, 1986; Lane and Whiteman, 1989; Hanson et al, 1994). Recharge is mainly from infiltration of applied irrigation water and from precipitation (USGS, 2000), with precipitation the predominant source of recharge (Bauer and Vaccaro, 1990). Discharge is to rivers, lakes, drains and waterways and the underlying basalt unit. Downward movement of water to the basalts is controlled by intervening fine-grained sedimentary layers and by head difference between the units (USGS, 2000).

Groundwater in the basalts occurs in joints, vesicles, fractures, and in intergranulated pores of the intercalated sedimentary interbeds. The basalt forms an extremely complex heterogeneous aquifer system with interflow zones that potentially function as small semi-confined to confined aquifers. 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 semi-confined (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).

Groundwater in the basalt aquifer system is generally suitable for most uses. However, groundwater has not yet been exploited for beneficial use via drilled wells within the Wild Horse area (Ecology, 2003). The groundwater wells mapped in the area are at least 2 miles from the site boundary, and at least 1,000 feet lower in elevation. Groundwater is vigorously used in the surrounding areas for domestic, irrigation, and other agricultural purposes, especially in the Kittitas Valley to the west.

Alternative 2: Springwood Ranch Ground Water Resources

Information on ground water resources for the Springwood Ranch site is largely incorporated from the MountainStar Master Planned Resort Draft EIS, Appendix C (Kittitas County, 1999).

The Springwood Ranch site shares the same regional hydrogeology as the Desert Claim and Wild Horse sites. Three main aquifers are present beneath the Springwood Ranch site and surrounding areas: (1) a shallow alluvial aquifer consisting of glacial outwash and alluvium; (2) the Ellensburg Formation; and (3) the Grande Ronde Basalt. Several wells are located near the southern and eastern property lines of the Springwood Ranch.

The shallow alluvial aquifer system provides significant quantities of water to several wells located downgradient of the site. Groundwater flowing in the shallow aquifer system beneath the upland terraces and moraines at the site likely flows generally toward the Yakima River. Local groundwater flow directions in the alluvial aquifer system are likely controlled by: (1) the presence and distribution of fine-grained sediments within the glacial outwash sequences; and (2) the shape of the underlying bedrock surface.

The Ellensburg Formation consists of poorly-consolidated to well-consolidated sandstone, siltstone and conglomerate, resulting in a range of permeabilities and potential groundwater yields. Groundwater flow in the Ellensburg Formation appears to be toward the Yakima River. Because of the limited thickness of the Ellensburg Formation in the immediate vicinity of the Springwood Ranch site, wells completed in this formation produce relatively low (5 to 15 gpm) groundwater yields.

Groundwater in the Grande Ronde Basalt is typically encountered in interflow zones, fracture zones and sedimentary interbeds. Groundwater flow in the Grande Ronde Basalt aquifer is controlled by the orientation of these water-bearing zones, and structural folds and faults. Converse (1989) estimated that groundwater in the Grande Ronde Basalt likely flows towards and along the axis of sub-basins such as Taneum Creek, and then towards the axis of Kittitas Valley, which corresponds to the axis of the Kittitas Valley syncline. Groundwater in the Grande Ronde Basalt generally occurs under confined hydraulic conditions, and reported yields from wells completed in the vicinity of the Springwood Ranch site ranged from less than 20 gpm to 700 gpm (Converse, 1989).

Most of the wells in the vicinity of the Springwood Ranch site were constructed for domestic use at single-family residences. The few wells near the site that are used for municipal or irrigation water supply withdraw the largest volume of groundwater in the area (Converse, 1989).

3.3.2 <u>Environmental Impacts of the Proposed Action</u>

3.3.2.1 Surface Water

The proposed project would result in an impact to surface water resources if it:

- Substantially altered the existing drainage pattern of the site or area;
- Substantially depleted surface water supplies;
- Substantially depleted groundwater supplies or interfered substantially with groundwater recharge;
- Violated any water quality standards or waste discharge requirements; or
- Conflicted with any local policies or ordinances protecting water resources, such as the Kittitas County Critical Areas Ordinance.

Appendix B, Exhibit 1 identifies the streams delineated in the study area and their location relative to the proposed layout of the project facilities (i.e., whether a turbine, access road location or other project facility intersects the drainage feature). The following discussion summarizes the potential water resource impacts associated with each type of project feature.

The activities associated with project construction that might have a potential adverse impact on streams include: disturbance of bed and banks of ephemeral, intermittent and perennial streams; removal of riparian vegetation adjacent to the stream banks; and the potential filling in and relocation of portions of ephemeral or intermittent streams. The impacts would result from road crossings and potential tower placement in or near streams or riparian areas. Additionally, if no mitigation measures were required, the proposed project could potentially affect the water quality of streams draining into the impaired reach of the Yakima River as a result of temporary exposures of soils during construction and placement of turbines, access roads, and other project facilities within streams and riparian areas. Disturbance of streambed and banks, removal of riparian areas adjacent to the stream banks, and the potential filling in and relocation of portions of ephemeral or intermittent streams also could contribute sediments to streams in the project area. Temporary exposure of soils during construction could also increase erosion in the project area. Erosion and sedimentation can alter the physical characteristics of stream channels, and can contribute to degraded water quality in the stream.

Table 6.1-2 in **Appendix B** identifies stream reaches that would be affected (a) temporarily by turbine and access road construction activities and (b) permanently by the presence of towers and access roads, based on the modified project layout as reflected in **Section 2.2** of the Final EIS. The expected temporary and permanent impacts on surface water resources are described below for each major facility component of the project. This is followed by a summary discussion that addresses the aggregate impacts.

Turbines

For purposes of calculating temporary disturbance impacts, it was assumed that construction crews would require an area around each of the turbines measuring 130 feet in radius for extra workspace, or about 1.25 acre per turbine. This temporary disturbance area would provide adequate space for the turbine tower and associated concrete pad, transformers, and the crane pad**.** Construction crews would use this area for constructing the tower foundation, erecting the tower, and installing the transformer. Topsoil, cleared vegetation and onsite supplies would also be stored in this workspace.

At each tower location, a smaller area measuring 120 feet long by 40 feet wide, or about 0.11 acres, would be constructed as a crane pad. For the purposes of calculating impacts to streams, it is assumed that the rectangular area would be oriented with the long side overlapping with the nearby road. This area would envelop the tower and transformer and would be backfilled with gravel or compacted soil, or otherwise altered to prevent full restoration. The turbine towers and transformer pads themselves would be permanent, impermeable, above-ground facilities. Based on the backfill or type of operations use, the crane pad area is not expected to revert to stream habitat and would therefore be considered permanently displaced.

The temporary disturbance zone around the modified turbine locations overlaps with 7 stream segments, including three different reaches of Reecer Creek. An estimated total of approximately 1,200 linear feet of stream channel would be within the temporary disturbance zone associated with turbine construction. In addition, three riparian areas would be impacted by temporary disturbance at the turbine locations, with the combined area of riparian disturbance estimated at 0.25 acres. Riparian areas are designated as priority habitat by the WDFW and are incorporated into **Table 6.1-2** in **Appendix B**. Streams and riparian areas within the temporary disturbance zone would be impacted by the clearing of vegetation and soil, compaction from construction equipment, and by vehicular traffic. Under the modified project configuration, one wind turbine pad would at least partially overlap a stream channel, permanently occupying an estimated 40 linear feet of stream channel and an estimated total of approximately 0.03 acres of riparian habitat. A foundation placed within the stream or riparian area would result in permanent filling-in of the feature in this area. Based on the extremely small area that would be affected by the turbine, however, it is quite possible that turbine impacts on streams and riparian areas could be avoided through micro-siting.

GIS analysis of project facility locations relative to surface water resources indicates that one proposed turbine location (in T19N R18E Section 20) is within an existing stock pond. This stock pond is the largest within the project area, so it is anticipated that this turbine would be relocated to avoid impacting the stock pond. Alternatively, it might be feasible and more efficient for the applicant to construct a new stock pond for the affected landowner.

Access Roads

A network of access roads would be developed for the project. Where possible, existing roads would be improved to accommodate project access needs rather than constructing new roads. Each access road is anticipated to be approximately 15 to 20 feet in width, with an additional 15 percent increase (2 to 3 feet) to accommodate intersections with non-project roads. Culverts would be installed at all stream crossings to ensure normal flow through the drainage, and would be sized to handle the significant sheet flow that occurs each spring in this area. Within the permanent road footprint, the surface of the road would be cleared of vegetation and graded to a safe slope. Construction crews would also use a narrow area on either side of the road for grading, widening, or otherwise improving existing roads or creating new roads. Cleared vegetation, soil, rocks and onsite supplies would be stored in the temporary disturbance zone. The temporary disturbance zone is anticipated to span 15 feet on either side of the road location, resulting in a temporary disturbance width of 50 feet (plus the 15 percent overall increase to account for intersections to non-project roads). Potential temporary and permanent impacts to streams and riparian areas from project roads were estimated based on these dimensions.

GIS analysis of the proposed access road layout (see **Figure 2-12**) indicates that access roads would cross 16 streams, 8 of which would be crossed at least twice. The temporary disturbance zone associated with access road construction overlaps with an estimated 2,400 linear feet of stream channel. In addition, three riparian areas would be impacted by temporary disturbance for the access roads, with a total disturbance area estimated at 2.7 acres. Streams and riparian areas within the temporary disturbance zone could be impacted by the clearing of vegetation and soil and potential subsequent erosion, and by compaction from construction equipment and vehicular traffic. The access road network would permanently occupy an estimated total of 1,100 linear feet of stream channel and 0.9 acres of riparian habitat. Permanent roads placed within streams or riparian areas would result in relocation and conversion of the stream bank and permanent displacement of the riparian vegetation.

GIS analysis indicates that one section of proposed access road (in T19N R18E Section 20) is within an existing stock pond. As noted above, this road segment could be relocated to avoid impacting the stock pond or a new stock pond might be constructed.

Substation

In the modified project layout, the proposed substation is located in the northeast corner of Section 21, T. 19N, R. 18E. Alternatively, the substation could be located further south in Section 21, near the BPA transmission lines. The substation would be approximately 300 feet by 300 feet in size, or approximately 2.1 acres. During construction an extra 50–foot-wide area on all sides of the permanent location would be utilized for construction activities and storage. The surface water inventory conducted for the EIS indicates that no water bodies are located within the area of either substation location or the surrounding temporary disturbance zone.

Power Collection System

A power collection system would be installed underground between each of the wind turbines to connect them with the project substation. (Exceptions to the underground location would occur only in locations where physical conditions [such as bedrock or sensitive environmental features such as a stream] made it infeasible to install underground cable; overhead power lines on wood power poles would be used in such locations.) Wherever possible, the power collection cables would be installed adjacent to the project access roads and within the disturbance zone for the roads. The cables would be installed by trenching or plowing at a depth of 4 feet below the ground surface. While there might be permanent impacts to streams from gravel fill, compaction, or operation activities in the area directly above the collection system.

Construction crews would use a 10-foot wide area centered on the collection system for digging a trench (or plowing) and installing the underground cables. Cleared vegetation, soil, rocks and onsite supplies would be stored in this narrow temporary disturbance zone. Once cable installation was completed the trench or plow furrow would be backfilled, topsoil would be replaced on the surface and the disturbed area would be reseeded with native plants. Consequently, there would be no permanent above-ground facilities associated with the power collection system (except in locations where conditions dictated use of overhead lines), and no permanent impacts to streams or riparian areas. There could be temporary impacts resulting from trenching or plowing, cable installation and backfilling activities, however. Stream channels and riparian areas within the temporary disturbance zone would be disturbed by the clearing of vegetation and soil and potential subsequent erosion, and by compaction from construction equipment and vehicular traffic.

Based on the disturbance zone width of 10 feet used for calculating temporary impacts, power collection cable locations outside of the project access road disturbance footprint would affect a minimal area of stream channel estimated at approximately 60 linear feet. This temporary disturbance area would be associated with the crossing of one Type 3 stream and would result in a total temporary impact of 0.03 acres. No areas of existing riparian vegetation would be impacted by temporary disturbance at this location. The underground power collection system would have no permanent impacts.

Above-ground power collection cables might need to be installed at selected locations in the project area where underground lines would not be feasible, such as crossings of streams, steep slopes or ravines or where bedrock existed at or close to the surface. Wood pole structures would be installed at regular intervals to support the overhead cables, as described in **Section 2.2.3.9**. Because there is considerable flexibility in the placement of the support structures and the stream channels in the project area are rather narrow,it is assumed that no overhead power collection structures would be placed in stream channel or riparian areas. The transmission alignment from either alternative substation location to the BPA or PSE transmission lines would not cross or adversely affect any stream channels.

Other Project Elements

The project O&M facility would be co-located with the project substation; as indicated previously, there would be no impacts to surface water resources at either alternative substation location. Similarly, the project communication lines would be co-located with the power collection cables and would not create any incremental impacts. The specific locations of construction staging areas have not yet been identified, although it should be possible to locate these facilities so as to avoid temporary or permanent impacts to streams and riparian areas.

Figure 2-8 identifies the locations for five proposed permanent meteorological towers. Two met tower locations in the western part of the project area are near, but not adjacent to Green Canyon Creek and irrigation ditches; two locations in the eastern part of the project area are near, but not adjacent to small wetlands; and the proposed tower location in the northern part of the project area is not near any identified surface water resources. Construction and operation of the meteorological towers in these locations are not expected to result in impacts to surface water resources.

Following installation of the wind power facility, original pre-construction contours and drainage patterns would be restored around the turbines, roads, and substations. Restoration would minimize loss of stream functions or associated wildlife habitat.

In addition to the potential physical changes to surface waters, project construction would entail some risk that hazardous materials could be spilled and, if uncontained, migrate to surface water bodies. This concern primarily applies to petroleum fuels used in construction equipment and vehicles. Project operation would involve similar use of fuels, on a much more limited scale, and use of lubricating oils in vehicles and mineral oil in electrical transformers. Spill prevention, containment and control (SPCC) plans are standard requirements of state and local agencies with jurisdiction over surface water. Implementation of such plans is typically sufficient to avoid significant water quality impacts from spills.

It is not anticipated that the project would require surface water withdrawals or diversions during construction or operation, and the applicant has not indicated it would seek to use surface water supplies. Some temporary water supply would be required for project dust control and other purposes during construction; this water would be obtained from a host landowner or purchased locally and transported to the site. If an on-site concrete batch plant were utilized during construction, to minimize the impact of transporting concrete to the project area, some temporary water supply would be required. Any such use would be subject to the requirements of the State Water Code. In addition, storm water would be controlled to prevent runoff of sediment-laden water to streams in the project area. After construction, the project would be designed to deliver storm water to its pre-existing discharge points. Project area storm water runoff volumes are not expected to increase as a result of the project.

Summary of Impacts to Surface Water Resources

The aggregated temporary disturbance impact from construction of the turbines, project access roads and power collection system would amount to nearly 3,700 linear feet of stream channel. Approximately two-thirds of the impact area would result from access road construction across stream channels. Five streams identified as Type 3 waters would be affected by this temporary disturbance; these include reaches of Green Canyon Creek, an unnamed stream that is a tributary to Green Canyon Creek, Reecer Creek, an unnamed stream tributary to Reecer Creek, and an unnamed stream tributary to Jones Creek. The remaining 11 streams subject to temporary construction disturbance were classified as Type 4 or Type 5 waters, which are not truly streams but are waterways that are intermittent and may be dry at any time of the year. As discussed in more detail in **Section 3.3.5**, it might be possible to avoid at least some of these disturbance impacts through micro-siting, and stream disturbance that could not be avoided would be subject to required Best Management Practices (BMPs) intended to control erosion and storm water runoff and thereby protect stream resources. Based on the classification of the project-area waters, the relatively small stream area disturbed, the temporary nature of the disturbance, use of BMPs during construction and restoration following construction, potential construction disturbance impacts to surface water resources are not expected to be significant.

The actual placement of tower foundations and access roads within or adjacent to stream channels would permanently affect a total of up to nearly 1,200 linear feet. Based on restoration of stream areas, use of appropriately-sized culverts and compensatory enhancement for unavoidable residual impacts, long-term impacts to surface water resources are also expected to be insignificant.

3.3.2.2 Ground Water

The proposed project would result in an impact to ground water resources if it:

- Substantially altered or impeded ground water flow, recharge or discharge;
- Substantially depleted ground water supply; or
- Substantially lowered ground water quality or violated water quality standards.

<u>Construction and Operation Impacts by Project Element</u>

Of the 5,237 acres within the Desert Claim project area, approximately 82 acres of permanently disturbed area would result from construction of the proposed wind energy facility, including impervious surfaces associated with turbine footings, transformers, the substation footprint, and the O&M building footprint. Approximately 63 acres of this would be gravel roads and lots associated with buildings. About 340 acres of land would be temporarily disturbed from the project, including construction of gravel roads and installation of underground cable.

Turbines

Construction of turbines and associated transformers would be spread across the project area, each creating approximately 480 square feet of impervious surface. Due to the very small impervious surface cover at individual turbine sites, amounting to a total project area of 13.2 acres, no impact is expected to ground water recharge.

Buildings

The co-located substation and O&M building would disturb a total area of about 4 acres of ground surface. The area around the buildings would be cleared, graded, and covered with gravel, rendering the entire footprint nearly impervious. This would result in a slightly greater volume of surface water runoff than the existing condition in the locations of the buildings. This would have minimal impacts to ground water recharge, and only in the immediate vicinity of the buildings. Given the nature of the alluvial and glacial outwash soils covering most of the site surface, most of the localized runoff would likely be conveyed to nearby permeable soils and infiltrate over a relatively short distance, resulting in a slight increase to ground water recharge.

Access Roads

Construction of roads would permanently occupy about 61 acres and temporarily disturb about 165 acres, including underground cable installation along the roads. The ground surface would be graded and compacted, and gravel would be installed for road construction. This would render the land area occupied by the roads nearly impervious. The disturbed acreage would be restored and revegetated at the end of construction. Nearly impervious surface created by the road installation would cover about 1 percent of the total project area and be spread across the project area. It is unlikely that road installation would result in a quantifiable impact to ground water recharge for the project. There could be localized areas of increased runoff due to the additional impervious surfaces. However, given the nature of the alluvial and glacial outwash soils covering most of the project surface, most of the localized runoff would likely be conveyed to nearby permeable soils and infiltrate over a relatively short distance, resulting in a slight increase to ground water recharge.

Other Project Elements

Blasting might be necessary to install turbine footings in bedrock areas. Vibration due to blasting and due to the operation of the wind turbines is not expected to significantly affect local ground water and/or wells in the project area. The impact of vibration on ground water flow to wells or withdrawal from water wells depends primarily on the well construction, geologic conditions and proximity to the vibration source. Strong vibration can impact ground water flow and water wells in the following ways: material on the inside of the well bore can slough or collapse, short-term turbidity can occur due to minor water level fluctuation during the blast and rock can fracture, causing increase or decrease of groundwater flow to the well.

The level of ground and structure/well vibrations caused by blasting depends on many factors including explosive type and weight, blasting technology, site geology, and distance between the blasting site and the structure/well. Washington State regulates the use of explosives (Chapter 296-52 of the Washington Administrative Code (WAC), Safety Standards For Possession, Handling, and Use of Explosives). Vibration and damage control is addressed directly in WAC 296-52-67065. The Washington standards are based on federal regulations developed by the U.S. Department of Interior, Office of Surface Mining (formerly the U.S. Bureau of Mines (USBM)). The codes provide methods for determining the maximum ground vibration at any dwelling, public building, school, church, commercial site, cofferdams, piers, underwater structures, or institutional building; however neither the Washington State nor federal regulations provide guidelines for safe blasting distance specifically from domestic water wells. Due to the proximity of existing water wells in the project area to structures that are protected by the regulations, blasting design for turbine installation is expected to be subject to the Washington state regulations.

According to WAC 296-52-67065, the maximum allowable peak particle velocity (PPV, a measure of vibration intensity) for ground vibration at a protected structure is 1.0 in/s (inch per second) for distances of 301 to 5000 feet from the blasting site (blasting for Desert Claim turbine installation would be at least 1000 feet from residences). The regulations also provide recommendations for determining the maximum explosive weight for each blast. Performance of blasting using these guidelines should produce vibration intensities at the water wells and existing protected structures below the standard of 1.0 in/s. Vibration research suggests vibration tolerance for buried utilities, including wells and pipelines, is as high as 5 in/s (Siskind 2000), or five times greater than the PPV recommendations for surface structures at this distance this condition indicates that wells have a higher threshold for vibration than do the surface structures.

A former USBM researcher performed a review of several studies of blasting and mining impacts on domestic water wells and well yields (Hawkins 2000). This research indicates that well sloughing or collapse only occurs when large explosive weights are used (in excess of the standard for protected structures) and the well is inherently weak (Hawkins 2000). This and other studies of blasting vibration indicate that blasting had no effect on wells or ground water flow to wells when it was performed at distances and with explosive weights that are in general compliance with regulations for protected structures (Hawkins 2000; Daniel B, Stephens & Associates, Inc 2002). Minor water level fluctuations have been noted in small to moderate blasts (that are expected to be in general compliance with the standard) that may cause short-term turbidity of the well water (Hawkins 2000). Hawkins' (2000) review of blasting studies suggests that documented long-term changes to well yield at mining sites are likely due to the opening of fractures caused by stress release that is due to the mining operations and removal of rock, and not due to vibration from blasting.

Existing water wells in the project area that are in the immediate vicinity of potential blasting sites are over 1,000 feet away from those blasting sites. Ground water aquifers that supply these wells range in depth from 127 to 895 feet below ground surface and are bedrock aquifers. The distance between the wells and the potential blasting sites and the depth of ground water aquifers should mitigate the possibility of adverse impacts on wells or ground water supplies. The likely potential impacts to water wells and ground water flow from blasting vibration at the project include minor water level fluctuations and minor short-term turbidity in some wells during blasts. Turbidity is not expected to be substantial or long-term. Well sloughing, well collapse or well yield fluctuations are not expected because of the distance between the wells and the blasting sites and the depth to aquifers in the potential blasting areas.

Locations of wells may differ from those provided by the Department of Ecology Water Well Reports. Well locations in proximity to blasting sites should be verified prior to blasting. Potential impacts from vibration due to blasting can be mitigated by following the appropriate regulations for blasting vibrations for protected structures and applying those regulations to water wells.

The wind turbines would generate a certain amount of vibration during operation. Vibration is expected to be far less than the vibration due to blasting and to dissipate quickly with depth beneath the ground surface. A seismic study was performed by the University of Oregon to determine the ground vibration caused by operation of wind turbines at a location in Washington State with geologic conditions similar to those at the Desert Claim site. The study provides information on the magnitude of ground motion caused by the operation of wind turbines. According to this study, for distances of approximately 1000 feet, vibrations caused by a wind turbine would be on the order of a million times less than the maximum allowable vibration intensity provided by the blasting regulations discussed above (Schofield 2002). In terms of human perception of vibration in the long term, the threshold for which people begin to perceive vibration is in the range of 0.01 in/s to 0.02 in/s PPV, which is on the order of 10,000 times greater than the vibration expected from a wind turbine 1000 feet away (Hendron 1976). No impacts to ground water or water wells are expected from vibrations caused by turbine operation.

Ground Water Supply

A limited amount of ground water would be needed for long-term operation of the project. This would be provided either by a participating landowner or through development of an exempt well, per the Washington State Water Code, Chapter 90.03 RCW. Less than 5,000 gpd would be extracted for domestic use for the O&M building, as allowed by Ecology for an exempt well. Restroom and kitchen facilities would drain into an on-site septic system, recharging the ground water in the vicinity of extraction. No quantifiable impacts to ground water supply would result from this usage.

Ground Water Quality

One on-site septic system would be developed to serve the proposed project O&M facility. The septic system would be treating and discharging up to 5,000 gpd of water, likely much less, from limited domestic kitchen and bathroom use. Assuming the on-site septic system is adequately maintained, no impacts to ground water quality are expected from wastewater generated by the proposed project.

Heavy equipment and vehicles would be used in the project area during the construction phase. On-site fueling and limited storage of products such as lubricating oil and hydraulic fluid would be expected. Unintended release of fuels, oil, or hydraulic fluid would be possible and could contaminate soils. If unattended or uncontrolled, spills could migrate to ground water or into surface water resources. The State Stormwater Construction Discharge Permit (SWPPP, discussed in **Section 3.3.5**) should also be used to plan control measures and spill response to prevent or control construction equipment leakage of fuel or other petroleum- based products, such as oil and hydraulic fluid. Water quality impacts from construction spills can typically be prevented or limited to very local areas by best management practices (BMPs) and accidental spill provisions as required by the National Pollutant Discharge Elimination System NPDES permit (discussed in **Section 3.3.5)**.

Minor short-term turbidity due to water level fluctuations in wells from blasting vibration is a potential water quality impact. Studies suggest that the amount of turbidity expected from the project is comparable to significant rainfall events or water level fluctuation due to heavy well pumping (Hawkins 2000). Adherence to state and federal regulations in regard to blasting distance and explosive weight limits should mitigate this potential impact, as discussed above.

Ground Water Conclusions

Potential impacts to ground water from the proposed project include disruption to ground water flow, recharge, or discharge, depletion of ground water supply, or lowering of ground water quality. Impervious surfaces would be created by the project, but they are limited in size and extent across the project area and are expected to have minimal impacts to recharge, discharge or ground water flow if recommended mitigations are followed. Impacts to ground water supply are not expected from the proposed project. Localized impacts to ground water quality are possible from wastewater and petroleum product spills, but can be avoided if recommended mitigations are followed. Minor short-term turbidity due to water level fluctuations in wells from blasting vibration is a potential water quality impact, but would be minimized by following the applicable regulations. Overall, the project is not expected to result in the potential for significant adverse impacts to ground water flow, recharge or discharge, ground water supply or ground water quality.

3.3.3 <u>Impacts of the Alternatives</u>

3.3.3.1 Alternative 1: Wild Horse Site

<u>Surface Water</u>

Impacts on surface water from Alternative 1 would be similar to those described in **Section 3.3.2** for the proposed action. Surface water runoff potential from precipitation would be greatest during the construction period, when large quantities of soil would be disturbed for development of roads, tower foundations and other infrastructure. However, impacts to surface waters in the project area are expected to be minimal, due to the relative distances between project facility locations and existing surface water sources. In addition, erosion and stormwater control measures for Alternative 1 would be essentially the same as those described for the proposed action. Construction of Alternative 1 would likewise require water use for road construction, wetting of concrete, dust control and other activities. The possibility of construction water discharge entering surface waters would also be remote. Water withdrawal for construction uses would not cause an impact to nearby surface waters because the contractor would arrange for delivery of water to the site via water trucks from an offsite source with an existing water right.

Operation of Alternative 1 would not require the use of any water for cooling or any other use besides the domestic well serving the limited needs of the operations and maintenance facility. Therefore, project operation is not expected to result in any discharges to surface water.

<u>Ground Water</u>

The tower foundations and other facilities would be sufficiently above the water table depth to avoid any significant impacts to subsurface hydrology. Construction of the foundations would likely begin during the dry season (July) and continue through the end of autumn (mid December); potential impacts to groundwater would likely be low because dry weather conditions and a low water table are typical in the region during this period.

Operation of the project would have minimal impacts to groundwater. A licensed installer would develop a domestic well to serve the operations and maintenance facility. This well would provide water for bathroom and kitchen use, which is expected to consume less than 1,000 gallons per day. It is anticipated this well would be installed to a depth well below the shallow groundwater that supports the springs in the area, and is likely to be disconnected from the same shallow aquifer that supplies the springs. There would be no discharges to groundwater from project operations. Wastewater from the O&M facility would be discharged to a domestic septic tank installed pursuant to the requirements of Kittitas County Environmental Health Department

3.3.3.2 Alternative 2: Springwood Ranch Site

<u>Surface Water</u>

Impacts on surface water from Alternative 2 would be of the same type as those described in **Section 3.3.2** for the proposed action. Alternative 2 would involve potential impacts over a smaller area and in fewer specific locations, however, because of the smaller site and fewer turbines associated with

Alternative 2. The possibility of construction stormwater discharge entering surface waters would also be small, because the site has few surface water features and because the erosion and stormwater control measures for Alternative 2 would be essentially the same as those described for the proposed action. In addition, most of the project facilities for Alternative 2 would be relatively distant from existing surface water features. Six to eight of the presumed turbine locations (and their associated access roads) would be within approximately one-quarter mile of the Yakima River, however, and are near slopes mapped as high erosion and landslide hazard areas. These physical conditions represent localized concerns for potential impacts to surface water during construction, and might warrant site-specific mitigation measures.

Operation of a wind energy project developed under Alternative 2 would create minimal demands for water supply and would have minimal influence on existing surface water runoff patterns for the site. Therefore, long-term operation would not result in significant impacts to surface water resources.

Ground Water

As discussed for the proposed action and Alternative 1, construction of a wind energy project under Alternative 2 would have minimal impacts on ground water. Wind turbines would be located at higher elevations within the project site, and construction of their foundations would not be likely to affect subsurface hydrology in the shallow aquifer underneath the site. Runoff from disturbed areas would be infiltrated on site, resulting in a minor temporary increase in groundwater recharge. Any blasting that might be necessary for construction of tower foundations would not be expected to affect local wells.

Operation of the project would likely have minimal long-term impacts to ground water. Impervious surfaces associated with turbines, roads and buildings would result in a minor increase in surface runoff volume, some of which could translate into a minor increase in groundwater recharge in the shallow aquifer(s) underlying the upland portions of the site. Water demands for project operation would be negligible and would have no impact on ground water supply.

3.3.3.3 No Action Alternative

Surface Water

Under the No Action Alternative, the proposed wind power facility would not be constructed and the potential surface water impacts identified in **Section 3.3.2** would not occur. Past and current effects to streams from existing land uses would continue for the foreseeable future. Additional land use conversion and low-intensity residential development would be possible over the long term, and could result in additional direct and indirect impacts to streams.

Ground Water

Impacts on ground water recharge under the no action alternative would be dependent on: (1) the amount of impervious surfaces resulting from future development of the individual parcels; and (2) the best management practices (BMPs) used to convey and discharge collected stormwater runoff. A maximum of about 400 developed parcels could result from future development of the project area, based on existing zoning provisions. Development of the parcels would likely occur on a lot-by-lot basis. The total amount of impervious surfaces resulting from this scenario would probably represent less than 1 to 2 percent of the total acreage. It is unlikely that this development density would result in a quantifiable impact to ground water recharge for the site. There might be localized areas of increased runoff due to the additional impervious surfaces. However, given the nature of the alluvial and glacial outwash soils covering most of the site surface, most of the localized runoff would likely be conveyed to nearby permeable soils and infiltrate over a relatively short distance, resulting in minimal impacts to ground water recharge.

Water supply for future development of individual parcels under the no action alternative would likely be provided using exempt domestic wells, with daily use limited to less than 5,000 gpd for each well. A maximum cumulative ground water extraction rate of 2.0 million gallons per day (MGD) might occur if each of 400 exempt wells were to pump water at the maximum rate of 5,000 gpd. However, the actual ground water extraction rate would likely be less than this amount because some lots might be developed as recreational residences and would likely not be occupied year-round, and total ground water needs for individual residences typically average much less than 5,000 gpd. Some of the withdrawn ground water would be returned to the subsurface through use of individual on-site septic systems.

Potential impacts to aquifers would be minimal as a result of ground water pumping from 400 exempt wells dispersed across the 5,237-acre project area. Based on the relatively small fraction of water withdrawn for domestic use, the no action alternative is expected to have an insignificant impact on the quantity of water available from aquifers underlying the project area.

3.3.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.3.5 Mitigation Measures

3.3.5.1 Surface Water

Micro-Siting

Specific locations of wind farm project components are often shifted somewhat during project planning and prior to final design, in a process known as micro-siting. To a degree, the modified project configuration evaluated in the Final EIS already reflects a level of micro-siting to avoid or reduce resource conflicts identified in the Draft EIS. The applicant proposes to conduct further micro-site analyses of turbine and project access road locations during the Critical Areas review process to avoid and/or minimize impacts to water bodies and/or wetlands identified in **Section 3.3.2.1**. In addition, in some locations it might be possible to shift the temporary disturbance zone, which has been calculated as a 100-foot radius buffer around each turbine, to avoid placing these directly in surface water or riparian areas or to reduce the extent of overlap. Project construction and access roads would be designed to avoid stream crossings wherever possible.

Erosion and Storm Water Runoff Control

If temporary and/or permanent access roads must be constructed across streams and drainage ways for the project, these roads would be designed so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. Erosion control measures would be installed prior to construction and maintained throughout construction until disturbed areas have been successfully revegetated.

Any creek crossings or work adjacent to creeks and wetlands would adhere to applicable federal and state regulations that would be addressed in the State Stormwater Construction Discharge Permit, Surface Water Pollution Prevention Plan (SWPPP), and Temporary Erosion and Sedimentation Control Plan (TESCP). Other measures to reduce or control impacts include compliance with applicable requirements of Kittitas County Critical Areas regulations (KCC Title 17A), the State Water Code (RCW chapter 90.03), and the State Water Pollution Control Act (RCW Chapter 90.48).

A NPDES Construction Stormwater Permit would be obtained prior to the construction of the wind turbines and project access roads. On-site erosion control measures as outlined in the State NPDES Construction Stormwater Permit, SWPPP, and TESCP would be implemented to control project-related surface water runoff.

Best Management Practices (BMPs) would be incorporated into the NPDES Construction Stormwater permit, SWPPP and TESCP, including:

- Appropriate sized culverts would be installed at stream crossings;
- Sedimentation fences, certified weed-free straw bales or other control devices would be placed in areas of bare excavated soil, and in roadside drainage ditches and streams downstream of the work sites, to reduce surface runoff velocities and to protect stream channels;
- Erosion control measures would be implemented and would employ the use of water bars, slope breakers (silt fence, staked hay or straw bales, or sand bags), and mulch (straw, hay, erosion control fabric, or some functional equivalent) as necessary; and
- Project staging areas would be not be located within 100 feet of drainages or any other body of water, or wetland or riparian areas, to reduce the potential contamination from spills.

Section 3.1.5.1 also discusses erosion and sedimentation control measures that would be required under terms of the applicable permits.

<u>Waste Materials</u>

It is not anticipated that waste materials would enter ground or surface waters. Best Management Practices would be used to control the use and disposal of waste materials during and following project construction, including implementation of a spill prevention, containment and control plan. Waste materials from construction equipment would be minimal and are not expected to impact ground or surface waters. Hazardous materials, such as lubricants, would be stored in approved containers and storage facilities. Use of hazardous materials would follow prescribed procedures intended to prevent accidents and spills, and to control and limit the consequences of any spills that might occur.

3.3.5.2 Ground Water

Mitigation measures to minimize potential adverse impacts to ground water flow, recharge or discharge include the following.

- Infiltrate water within or as close as possible to facilities that would generate surface water runoff from the impervious surfaces.
- Use biofiltration swales, surface dispersion and infiltration through roadside ditches.

Roof runoff would be infiltrated into subsurface soils surrounding the substation and O&M buildings.

Mitigation measures to minimize potential adverse impacts of vibration on ground water flow to wells or to water wells operation due to the use of explosives for turbine installation includes the following.

- Verification of water well locations in the vicinity of blasting sites
- Compliance with all existing regulations in regard to blasting design, including allowable distances to existing protected structures, including wells, and allowable explosive weights.

Mitigation measures to minimize potential adverse impacts to ground water quality include the following.

- Control all pollutants on-site, including removal and legal disposal of construction waste or soils contaminated by construction activity or accidental spills.
- Prepare and maintain accidental spill response plans, on-site clean-up materials storage, and worker training.
- Inspect and maintain on-site septic systems annually.

3.3.6 <u>Significant Unavoidable Adverse Impacts</u>

The analysis of surface water resources identified several types of potential impacts to surface water bodies and associated riparian areas from the modified project layout. The existence of these potential surface water impacts relates primarily to access road crossings of streams, and secondarily to several mapped turbine locations that are near streams. Ground disturbance at streams would be small in extent, and most of the disturbance would be temporary; disturbed stream bank areas would be restored with native vegetation. Permanent culverts of sufficient size would be installed at all stream crossings, resulting in no long-term changes to stream character, discharge capacity or flow patterns. Potential surface water impacts associated with erosion and sedimentation would be avoided or minimized through use of best management practices that are standard requirements for construction activities. With appropriate mitigation that would be required under the terms of the applicable permits, all of the potential temporary and permanent surface water impacts identified in **Section 3.3.2** would be avoided, counteracted through restoration, or offset through provision of compensatory stream enhancement or development. Similarly, there would be no significant, unavoidable adverse impacts to ground water recharge, discharge or supply from the project. Impervious surfaces resulting from construction of permanent facilities would be small in extent and would have a negligible effect on local runoff and ground water recharge patterns. Project construction and operation would not result in discharges that degraded ground water quality. If blasting were necessary in some locations for construction of project facilities, it would be conducted according to regulations that protect wells and structures from significant impacts. Therefore, no significant unavoidable adverse impacts to water resources are expected as a result of the proposed project.

3.4 PLANTS AND ANIMALS

3.4.1 Vegetation

3.4.1.1 Affected Environment

Desert Claim Project Area

Vegetation Types

Vegetation in the project area was mapped according to "vegetation types" (Young et al. 2003). For vegetation mapping, the "project area" included the parcels totaling 5,237 acres on which Desert Claim has landowner permission to develop the project. "Vegetation types" are considered to be generally recognizable assemblages of plant species that occur in a pattern across the landscape. Vegetation types were determined based on visual assessment of dominant plant species. Due to the scale of the aerial photos used for mapping vegetation, fine-scale intermingling in transition areas and small inclusions of one vegetation type within another were not shown. Acreages calculated for each vegetation type may not sum to equal the total project area acreage indicated by tax records (**Table 3.4-1)**.

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

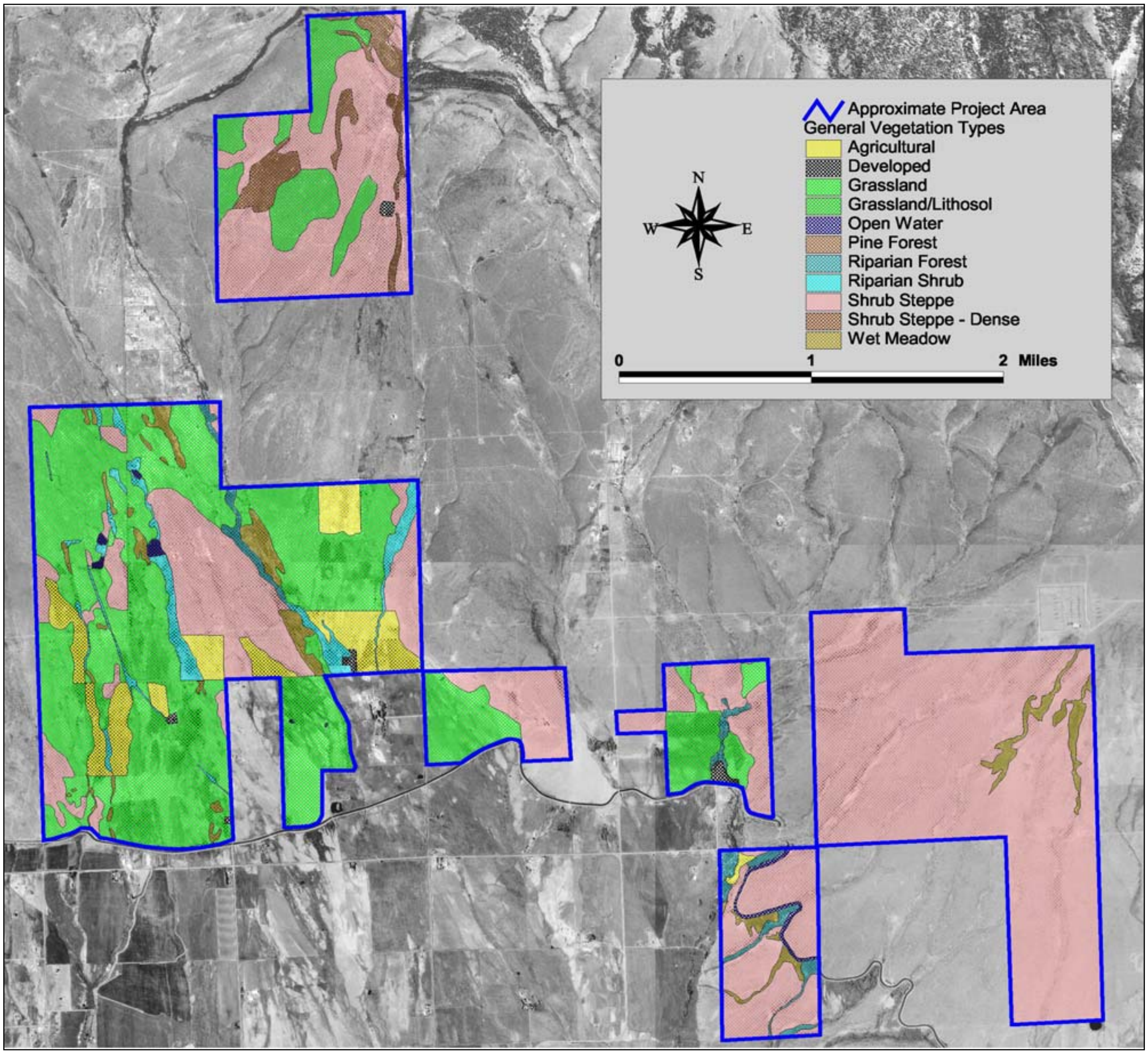
The vegetation in the project area was mapped and classified into 10 types (**Figure 3.4-1**). The primary vegetation type is shrub-steppe, comprising just over half of the project area (53.4 percent), primarily in the eastern and northern parcels. Grasslands are the second most common vegetation type (30.2 percent of the project area), followed by agricultural areas (4.8 percent). For the purposes of the vegetation map, the agricultural areas consisted of those areas where the vegetation is actively managed (e.g., irrigated and/or mowed) for agricultural purposes, however the shrub-steppe and grassland types are also used for agriculture (i.e., cattle grazing). Other vegetation types mapped in the project area include grassland/lithosol (3.8 percent), wet meadow (2.9 percent), riparian shrub (2.1 percent), riparian forest (1.4 percent), pine forest (0.6 percent), open water (0.5 percent) and developed areas (0.3 percent).

The *shrub-steppe* type consists of upland areas dominated by shrubs, primarily bitterbrush (*Purshia tridentata*), rigid sagebrush (*Artemesia rigida*), and big sagebrush (*A. tridentata*) with an understory of mixed grasses and forbs. Rigid sagebrush is found on the ridge-tops and exposed areas. Bitterbrush is also common in these areas, but dominates in the drainages and swales where it is generally denser and larger (up to approximately 6 feet tall). Areas of dense shrub steppe in the northern parcel dominated by mature bitterbrush were mapped separately (**Figure 3.4-1**). Interspersed within the shrub steppe are lithosol habitats (areas of exposed shallow, rocky soils) dominated by Sandberg's bluegrass and scattered rigid sagebrush. These inclusions were too small and numerous to be delineated separately from the shrub steppe at the scale of aerial photography used.

Table 3.4-1
Vegetation Types in the Project Area

Vegetation Type	Approx. Acres	Percent of Project Area	General Habitat Description
Agricultural	252.3	4.8	Agricultural areas are sites used for irrigated hay meadows that are periodically mowed.
Developed	16.5	0.3	Areas where human activity has removed or altered natural vegetation, such as residential homes and farm buildings and yards.
Grassland	1,578.7	30.2	Areas dominated by grass species, primarily bunchgrasses bluebunch wheatgrass, Sandberg's bluegrass, cheatgrass, and bulbous bluegrass.
Grassland/ Lithosol	199.8	3.8	A subset of the grassland habitat type found on exposed ridges in shallow soils (lithosol) in the northern-most parcel. Sparse grasses (Sandberg's bluegrass) dominate, along with scattered forbs and occasional shrubs.
Open Water	23.4	0.5	Areas of open water including natural ponds, stock ponds, and the irrigation canal.
Pine Forest	33.4	0.6	Pine forest dominated by Ponderosa pine found in the higher elevations of the northern most parcel.
Riparian Forest	70.5	1.4	Riparian zones dominated by trees and tall shrubs, located in drainages with perennial or intermittent streams. The dominant species include cottonwoods and various willows. In some locations, the shrub understory is very dense, limiting herbaceous growth.
Riparian Shrub	108.6	2.1	Riparian areas adjacent to streams or irrigation ditches where shrubs are common, but often scattered. Common shrub species include black hawthorn and coyote willow. Various herbaceous species are present in the understory. Weedy species, including and knapweed were often observed.
Shrub Steppe	2,794.5	53.4	Upland areas dominated by shrubs, primarily bitterbrush and rigid sagebrush, with an understory of mixed grasses and forbs. A few weedy species, such as cheatgrass and knapweed, were observed, but weedy species in general were not found over large extents of the area.
Wet Meadow	149.6	2.9	Areas dominated by hydrophytic vegetation, including various sedges, grasses, and rushes and other herbaceous species. These areas appear to be saturated or inundated most of the year, either from leakage from the irrigation canal or stockponds, or due to high groundwater in low spots and swales. Weeds were observed in some of the wet meadows, primarily chicory.
Total[1]	5,227.3	100	

[1] Acreage total based on GIS mapping and tabulation; 10-acre difference from 5,237-acre figure likely associated with roads, other unmapped areas, and digitizing error.



Source: Western Environmental Services, Inc.

Huckell/Weinman Associates, Inc. HWA	Kittitas County Desert Claim Wind Power Project EIS	**Figure 3.4-1** Vegetation Types in the Project Area

The lithosol was primarily found on exposed sites. Cattle graze in most of the shrub steppe areas and cattle trails were common; however, the shrubs did not appear stressed or in otherwise poor condition due to cattle grazing. Grass species and grass cover were less common than would be expected though, presumably due to livestock grazing. Livestock grazing has been observed to result in a decline in large perennial grasses and an increase in annual cheatgrass in shrub steppe habitat (Daubenmire 1970). A few weedy species, including cheatgrass and knapweed (*Centaurea* sp.), were observed in the shrub-steppe type, but native species dominate.

Grasslands are found primarily in the western portion of the project area. The grasslands are areas dominated by grasses and a variety of forbs. Common species include bluebunch wheatgrass, Sandberg's bluegrass, cheatgrass, bulbous bluegrass (*Poa bulbosa*), and forbs such as lupines (*Lupinus spp*), balsamroots (*Balsamorhiza hookeri* and *B. sagittata*), Hood's phlox (*Phlox hoodii*), and various lomatiums (*Lomatium nudicaule, L. canbyi,* and *L. dissectum*). Soils range from shallow and rocky to moderately deep. The shallow-soiled lithosols are common and are interspersed throughout the grasslands. Sandberg's bluegrass dominates the lithosols and plant cover is sparse. Where larger expanses of lithosol occur, they were mapped separately as Grassland/Lithosol. The grassland vegetation types are primarily used for cattle grazing.

For this project, areas classified as *agricultural* were those areas used for irrigated hay meadows that are routinely cut for hay production. While other lands, primarily shrub steppe and grasslands, are used for agricultural purposes (i.e., cattle production), these areas were not mapped as "agricultural" because they consist primarily of native vegetation that has not been modified for agricultural purposes.

Wet meadows are found scattered throughout the project area in drainages and swales, and along the North Branch Canal and around stock ponds. These areas are dominated by various sedges (*Carex spp.*), grasses, rushes (*Juncus spp.*) and other herbaceous species such as smartweed (*Polygonum lapathifolium*), monkeyflower (*Mimulus guttatus*), and speedwell (*Veronica* sp.). These areas appear to be saturated or inundated most of the year, either from leakage from the canal or stockponds, surface water flow, or high groundwater. Evidence of cattle use was observed; however, these areas did not appear adversely affected by cattle. Weeds were observed in some of the individual wet meadows, primarily chicory (*Cichorium intybus*). See **Section 3.4-2** for more specific information on wetlands.

The *riparian shrub* type consists of riparian areas adjacent to perennial or intermittent streams or irrigation ditches where shrubs are common, but often scattered. Common shrub species include black hawthorn (*Crataegus douglasii*) and coyote willow (*Salix exigua*). Various herbaceous species are also present including grasses such as blue grass (*Poa pretensis*), rushes, and forbs such as curly dock (*Rumex crispus*). Weedy species, including chicory and knapweed, were also observed.

The *riparian forest* type is similar to the riparian shrub type, but the overstory consists of a mix of trees and tall shrubs. The dominant tree and shrub species include cottonwoods (*Populus balsamifera* spp. *trichocarpa*) and various willows (*Salix* spp.). In some locations, the trees and shrub understory are very dense, limiting herbaceous growth. Animal trails were noted through some of these areas, and these areas probably receive use by livestock and wildlife for shade and water.

A small amount of *pine forest* occurs in the upper elevations of the northern most portion of the site. The dominant species in these forests is Ponderosa pine (*Pinus ponderosa*).

Small areas of *open water* are scattered throughout the project area. Included in this mapping unit are natural ponds, stock ponds, and a portion of the North Branch Canal that occurs within the project area.

Developed areas are areas where human activity has removed or altered natural vegetation, such as residential homes, farm buildings, and yards.

The above descriptions characterize the vegetation types observed and mapped within the 5,237-acre project area. Daubenmire (1970) provides a more generalized description of vegetation zones and associations of the eastern Washington shrub steppe based on climate, vegetation structure, and floristics. These vegetation zones and associations represent climax communities, which typically develop over time in the absence of anthropogenic disturbance and may represent the vegetation that would be present in the project area in the absence of past agricultural practices.

The project area is within Daubenmire's *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. 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*). 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). The soils in this zone are mostly loams or stony loams.

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 is found in 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.

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 and other agricultural practices have resulted in a shift in plant community composition in the project area from the climax communities described above. Notable in the project area are a low percentage of native grass species and grass cover in general and some non-native species and weedy species throughout much of the project area.

The Washington Department of Fish and Wildlife (WDFW) publishes a Priority Habitats list. The list is a catalog of habitats considered to be priorities for conservation and management. Priority habitats are those habitat types or elements with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type or dominant plant species, a described successional stage, or a specific structural element. Within the south-central WDFW region, which includes Kittitas County, priority habitats include freshwater wetlands, riparian areas, and shrub-steppe habitats; these habitats occur within the project area.

Rare Plants

Review of federal and state lists of rare plant species suggest that 21 species could occur in the project area based on the type of habitats present. The potential occurrence of these species is addressed in more detail in **Exhibit 1** of **Appendix C**. Of the 21 rare plant species, one (Ute ladies'-tresses) is a federally-listed threatened species, with a state ranking of endangered. Five are federal 'species of concern', with state rankings of threatened or sensitive. The remaining 15 are listed at the state level as either sensitive or review species. The WNHP database has records for two state sensitive species in or adjacent to the project area. One historic record (1959) for Piper's daisy includes the western portion of the project area, and one current record (1991) for long-sepal globemallow is located adjacent to the eastern end of the project area.

In the project area, the wet meadows provide potential habitat for the federally-listed Ute ladies'-tresses orchid, which was listed as a threatened species in 1992 (USFWS 1992). This orchid has a close affinity with floodplain areas where the water table is near the surface during the growing season, providing continuous sub-irrigation, and where the vegetation is relatively open and not overly dense (USFWS 1995). Ute ladies' tresses tolerate areas with some disturbance such as flooding, grazing, or haying to reduce overstory cover from competing plants (USFWS 1995). The wet meadow habitats in the project area were searched for Ute ladies'-tresses orchid in early September 2002. No Ute ladies'-tresses were found (Young et al 2003).

Surveys for the other rare plant species were focused on areas of likely disturbance from the proposed project. The field surveys did not locate any federal species of concern or state listed plant species that might occur in the project area (Young et al, 2003).

Noxious Weeds

During surveys for rare plants species in the project area, all vascular plant species observed were recorded, including several non-native species and noxious weeds (Young et al 2003). Non-native species observations include knapweed (*Centaurea sp.*), chicory (*Cichorium intybus*), thistle (*Cirsium*), blue mustard (*Chorispora tenalla*), tumble mustard (*Sisymbrium altissimum*), filaree (*Erodium cicutarium*), cheatgrass (*Bromus tectorum*), plantain (*Plantago lanceolata*), and ladysthumb (*Polygonum lapathifolium*). Of these non-native species known to occur in the project area, knapweed and thistle are considered noxious in Kittitas County.

Wild Horse (Alternative 1) Site

The Wild Horse site is located within the general shrub-steppe region of central Washington. The area was studied in a similar fashion to the Desert Claim baseline studies, in support of the Zilkha proposal for the Wild Horse Wind Power Project. In an undisturbed condition, this area is usually distinguished by big sagebrush (*Artemisia tridentata*) as the principal shrub and bluebunch wheatgrass (*Agropyron [Pseudoroegeneria] spicata*) as the principal grass. Within the project area, vegetation was mapped according to "vegetation types," based on visual assessment of dominant plant species.

Seven types were mapped in the project area for Alternative 1, including the following:

- *Shrub-steppe* – 5,042 acres (88 percent)
- *Grassland* – 525 acres (9 percent)
- *Grassland/Talus* – 97 acres (1.7 percent)
- *Pine Forest* - 31 acres (0.5 percent)
- *Woody Riparian* – 26 acres (0.4 percent)
- *Talus* – 5.6 acres (0.1 percent)
- *Seasonal Water Body* – 1.7 acres (0.03 percent)

The primary habitat type in the area, shrub-steppe, was broken down and mapped into three sub-categories based on relative spatial density of the shrub layer – dense, moderate, and sparse. In general, areas with a dense shrub layer were found on deep-soiled sites on slopes and dominated by big sagebrush, antelope bitterbrush, or squaw current. Areas with a moderate shrub layer were flat to gently sloping, and typically dominated by big sagebrush or stiff sagebrush. In addition to shrub steppe, lithosol and talus slopes are prevalent in the area, especially along the primary ridgeline of Whiskey Dick Mountain. These areas generally have sparse shrub cover, are found on exposed ridgetops and knolls and were dominated by low-growing bunchgrass, stiff sagebrush or various buckwheats. For the Wild Horse project studies, lithosol was mapped as a soil type as opposed to a vegetation type.

Quality of the vegetation types that would be disturbed by project facilities was determined by comparing the existing plant species and their composition (in terms of percent cover) to climax community composition as reported by the Natural Resources Conservation Service (NRCS) for a given soil type. Results of the assessment show that vegetation quality ranges from "fair" to "good" throughout the project area. Good rangeland is defined as rangeland with 50 to 75 percent of its climax vegetation and fair rangeland has 25 to 50 percent of its climax vegetation. The project area does contain some non-native species and weedy species, however, native species overwhelmingly dominate the project area (Erickson et al., 2003).

A list of 29 rare plant species (including federal and state listed species) potentially occurring in the Wild Horse area was compiled and surveys were conducted in spring 2003 for these species. The survey area included all lands that would be occupied by proposed facilities and a 164-foot (50 meter) buffer. One plant species on the Washington State 'Review' list, hedgehog cactus, was found. Much of the suitable habitat present in the project area (lithosol habitats and sparse shrub-steppe) contained scattered individuals.

Springwood Ranch (Alternative 2) Site

The Springwood Ranch property is situated in the ecotone between open ponderosa pine woodlands, which occur on the eastern edge of the Cascade Range, and the rolling grasslands and shrub steppe of the dry interior Columbia Basin. The property is dominated by grazed grasslands and agricultural lands. Agricultural fields are located along the Yakima River and in the portion of the property that extends onto the Kittitas Valley floor. Alfalfa and hay are the major crops on the site and throughout the Lower County. No known noxious weed management is being conducted on the property.

Major plant communities include coniferous woodlands, deciduous woodlands, grasslands and meadows, shrublands, and wetlands and streams. The Singing Hills, in the northwestern corner of the property, are dominated by open ponderosa pine woodlands (with a minor component of Douglas-fir) and communities of understory shrubs. Grasses common to the area also occur in the understory of the coniferous stands where there are openings in the canopy. Mixed ponderosa pine and Douglas-fir stands with varying understory shrub communities can be found in north-facing draws of Thorp Prairie as well. There are mixed stands of deciduous forest and shrub communities found at higher elevations in the Singing Hills, on the bluffs above the Yakima River, along the draws extending from Thorp Prairie to the river, along Taneum and Swauk Creeks and along the steeper slopes adjacent to the Taneum Creek corridor.

A few wet meadows are located in depressions in the Singing Hills and along the Yakima River. Some native grass species still persist and sometimes dominate portions of the prairie, whereas big sagebrush dominates the scattered patches of shrub steppe found on the property. Rainfall on the property is sufficient to encourage the growth of grasses over shrub steppe. Deciduous shrub communities also occur along the Yakima River and along Taneum Creek. These communities are interspersed with deciduous woodlands and major shrub species. Noxious weeds such as chicory and spotted knapweed have invaded much of this community. On some rocky slopes, dryland forbs such as wild buckwheat, phlox, balsam-root, asters, and other forbs dominate over the grasses.

DNR's Kittitas County Rare Plant List indicates that 6 plant species of federal concern, 1 federally proposed endangered species, and 32 state-listed plant species may occur in the types of habitats found on the Springwood Ranch property. No on-site survey of the property to identify rare plants has been conducted for this EIS.

3.4.1.2 Impacts of the Proposed Action

Vegetation Types

Impacts to vegetation would include both temporary, construction-related impacts and long-term impacts in those areas where project facilities are permanently located. Temporary impacts include:

- temporary removal of the vegetation
- possible erosion of disturbed soils

Long-term project impacts include:

- replacement of vegetative cover with project facilities
- potential change in the fire frequency of the area (e.g., if shrub-steppe habitats are converted to cheatgrass)
- potential for soil erosion

Based on GIS analysis of the proposed project layout, an estimated 88 acres of vegetation in the project area would be permanently occupied by project facilities and 322 acres would be temporarily disturbed (see **Table 3.4-2**). These calculations do not account for the construction staging/storage areas that have not yet been sited, which would add approximately 20 acres of disturbed area.

Table 3.4-2
Summary of Impacts by Vegetation Type

Project Facility	Habitat Type	Approximate Area of Impact (acres) Temporary	Permanent
Wind Turbine Pads[1]	Agricultural	6.9	0.6
	Grassland	49.5	4.5
	Grassland/Lithosol	6.0	0.5
	Open Water	1.0	0.1
	Pine Forest	0.5	*
	Riparian Forest	0.3	*
	Riparian Shrub	0.7	0.1
	Shrub Steppe	74.0	6.7
	Shrub Steppe – Dense	1.0	0.1
	Wet Meadow	5.7	0.5
Underground Collection System[2]	Agricultural	0.3	*
	Grassland	1.7	0.1
	Grassland/Lithosol	0.2	*
	Open Water	*	*
	Pine Forest	*	*
	Riparian Forest	0.1	*
	Riparian Shrub	0.1	*
	Shrub Steppe	2.7	0.2
	Shrub Steppe - Dense	*	*
	Wet Meadow	0.2	*
Substation[3]	Agricultural	2.0	1.0
	Shrub Steppe	3.6	2.8
Transmission and Above Ground Collection System[4]	Grassland	0.2	*
	Riparian Forest	*	--
	Riparian Shrub	*	--
	Shrub Steppe	0.1	*
Access Roads[5]	Agricultural	7.5	3.2
	Grassland	53.8	22.7
	Grassland/Lithosol	6.0	2.5
	Open Water	0.9	0.3
	Pine Forest	0.1	*
	Riparian Forest	3.3	1.5
	Riparian Shrub	2.8	1.2
	Shrub Steppe	86.7	36.7
	Shrub Steppe - Dense	0.6	0.2
	Wet Meadow	5.3	2.3
Permanent Meteorological Towers	Grassland	0.35	0.04
	Grassland/Lithosol	0.28	0.02
	Riparian Shrub	0.07	--
	Shrub Steppe	0.63	0.04
	Wet Meadow	0.07	--
		322.4	87.9

* Area impacted less than 0.1 acres

[1]Assumes temporary construction disturbance for each turbine pad and transformer in a 130- ft radius around the tower (1.25 acre); permanent impact area based on 120 by 40 ft. crane pad (0.11 acre, or 9% of the temporary disturbance); 120 total turbines

[2]Assumes an 8-foot wide temporary disturbance corridor and 2 feet of permanent disturbance. A 20% factor is applied for temporary disturbance and a 5% factor for permanent disturbance because the underground collection system would be generally located within the access roads.

[3] Assumes substation is located near the proposed location at the northeastern corner of Section 21, T 19 N, R 18E.

[4]Assumes 8-foot wide temporary disturbance corridor for construction of overhead collection line and 8 feet of permanent disturbance with a 5% factor applied since the permanent disturbance would only be associated with the wood poles.

[5]Assumes 50-foot wide temporary disturbance corridor and a 20-foot wide permanent corridor for access roads.

NOTE: The construction staging areas have not yet been sited and the vegetation impacts for these facilities are not included in the table.

Of the disturbed areas, the access roads account for most of the permanent impacts to vegetation (70.6 acres). Most facilities would be located in shrub steppe and grassland habitat types. An estimated 46.7 acres of shrub steppe would be impacted, primarily from access roads (36.9acres) and turbine pads (6.8 acres), as well as from the substation and O&M facility (2.8 acres). An estimated 30.4 acres of grassland (including the grassland/lithosol type) would be impacted, including 25.2 acres from access roads, 4.8 acres from turbine pads and 0.1 acres from the underground collection system. In addition, an estimated 4.8 acres of agricultural lands would be permanently impacted, as well as 1.3 acres of riparian shrub, 1.4 acres of riparian forest, 0.4 acres of open water and 2.8 acres of wet meadow. No permanent impacts would occur in the pine forest vegetation type.

Although three priority habitats occur in the project area (wetlands, riparian areas, and shrub-steppe) and would be affected by the project, the WDFW has developed management recommendations only for riparian habitats. An estimated 3.1 acres of riparian habitat would be permanently impacted and 8.0 acres would be temporarily impacted by the project, primarily due to access roads and the underground and overhead collection systems. The impacts due to the access roads, collection systems and the turbine pads would likely be avoided by micro-siting of each turbine during final project layout. To minimize impacts to riparian habitats, WDFW management recommendations for road and utility crossings of riparian habitat include:

- Roads and utility crossings should be perpendicular, rather than parallel, to streams to minimize riparian vegetation loss and reduce habitat fragmentation.
- Use bridges instead of culverts. If culverts are used, they should be designed to carry a minimum of 100-year peak flow event and allow passages of both juvenile and adult fish.
- Design and construct new roads according to current best management practices.

Impacts to vegetation from the proposed action are not considered significant because they would not result in any of the following:

- The elimination of an entire vegetation type in the project area;
- Loss of at least 10 percent of a priority habitat in the project area; or
- A decrease in species richness resulting from the loss of a plant population in the project area.

If any of the above conditions were to result from the project, it would change the character of the existing vegetation community in the project area. Priority habitats are considered rare and unique by definition. Loss of more than 10 percent of a priority habitat is considered an impact that would presumably increase the risk to the remainder of the priority habitat. The project is not expected to cause any of the above conditions to occur and therefore would not have significant impacts to the vegetation in the project area.

Rare Plants

Due to the absence of known populations within the project area, no project-related impacts are anticipated to rare plant species. These include federally listed endangered, threatened, proposed, or candidate plant species and Washington State endangered, threatened, sensitive, or review plant species.

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 or near 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 and crop production;
- displacement of native plant species;
- reduction in plant diversity;
- changes plant community functions;
- increased soil erosion and sedimentation;
- reduction in recreational value and use;
- control and eradication costs to local communities; and/or
- reduction in land value (Sheley et al. 1998).

3.4.1.3 Impacts of the Alternatives

Alternative 1: Wild Horse Site

Vegetation impacts from Alternative 1 would be similar in type to those described for the proposed action and Alternative 2. A portion of the existing vegetation on the site would be temporarily disturbed for construction, while a fraction of that area would be permanently displaced by constructed project features. The undeveloped vegetation types that would be permanently displaced by Alternative 1 project facilities include shrub-steppe (including dense, medium, and sparse) and grassland. Lithosol and talus habitats would also be affected. A total of 104 acres of these vegetation types would be permanently impacted, with the majority (86.9 acres or 84 percent) in shrub-steppe habitat. An additional 294 acres would be temporarily disturbed; 240 acres (82 percent) in shrub-steppe habitats. A breakdown of permanent and temporary impacts by vegetation type is shown in **Table 3.4-3**.

Table 3.4-3
Summary of Impacts by Vegetation Type, Alternative 1

Vegetation Type	Impacted Area (acres) Permanent	Temporary
Grassland	16.6	53.7
Shrub-steppe Dense	0.8	8.0
Shrub-steppe Medium	62.6	167.1
Shrub-steppe Sparse	23.5	64.8
Talus	0.4	0.3
Woody Riparian	0.0	0.1
Total	104.0	294.0

Due to the absence of any known populations within the project area for Alternative 1, no project-related impacts are anticipated to any federally-listed endangered, threatened, proposed, or candidate plant species. Likewise, no project-related impacts are anticipated 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 Alternative 1 could cause direct adverse impacts to individual plants if they are located within the impact footprint. Due to their frequent occurrence in the area and the high likelihood that many more individuals occur in the area adjacent to the impact corridors, Alternative 1 would not be expected to significantly impact the species' viability in the area. Approximately 10 percent of the individuals in the project area are estimated to be directly impacted by Alternative 1. 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.

Alternative 1 would provide similar opportunities for the introduction or spread of noxious weeds as described for the proposed action.

Alternative 2: Springwood Ranch Site

Vegetation impacts from Alternative 2 would be similar in type to those described for the proposed action and Alternative 1. A portion of the existing vegetation on the site would be temporarily disturbed for construction, while a fraction of that area would be permanently displaced by constructed project features. Grasslands (generally used for grazing now) and shrublands currently dominate the Springwood Ranch site and would be the vegetation communities most affected by Alternative 2. These communities have already been altered from historic conditions. Portions of the small ponderosa pine woodlands in the northwest corner of the site could be affected by clearing for construction of project facilities. Riparian shrub, riparian mixed and deciduous woodlands, and wetlands would be largely protected from development as a result of required shoreline setbacks along rivers and streams, as well as avoidance of adjacent wetlands.

Overall, the extent of vegetation impacts from Alternative 2 would be considerably less than those for the proposed action or Alternative 1, because of the substantial difference in capacity and number of turbines for Alternative 2. The total area of temporary disturbance for Alternative 2 would likely be approximately 110 acres, while approximately 28 to 30 acres of existing vegetation would be removed to accommodate permanent wind energy facilities. Alternative 2 would not result in adverse impacts to shrub-steppe habitat, as this vegetation community is very limited on the site. Alternative 2 would provide similar opportunities for the introduction or spread of noxious weeds, although the degree of risk would be correspondingly less based on the smaller size of the project in this case.

If the identified aspen stands, cliffs and talus areas within the Springwood Ranch site are found to meet the definition of priority habitats, avoidance of development-related impacts to these features would likely be sought. Instream, riparian and freshwater wetland habitats and riparian vegetation would be buffered. Some snags and down woody material might be eliminated by development within the limited woodlands on the site. White oak stands identified by IES (1990) in the northeastern part of the site should be avoided if possible. A white-oak woodland identified in the State priority habitat and species database as a high-quality ecosystem lies off-site and would not be affected by Alternative 2.

Based on information currently available, no impact to either federal or State threatened, endangered, or sensitive plant species would be expected to occur as a result of Alternative 2.

No Action Alternative

Under the No Action Alternative, the existing vegetation conditions would remain generally as they are, subject to ongoing agricultural operations and rural residential development. No impacts are expected to vegetation as a result of the No Action alternative. The existing vegetation communities in the project area would remain and be subjected to existing land management influences such as livestock grazing, other agricultural practices, and rural residential development.

Under the No Action alternative, no impacts to rare plant species would occur as a result of wind power development at the project area. Existing threats to rare plant species (i.e., from agricultural practices or rural residential development) would continue.

Noxious weeds could be introduced or spread through existing land use practices (e.g., agriculture, housing developments, road, etc). The degree of impact may be minimized or reduced through control measures implemented by Kittitas County and individual landowners.

3.4.1.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.4.1.5 Mitigation Measures

Vegetation Types

During project construction, Best Management Practices would be employed to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint. In addition, the project proponent would coordinate with the WDFW to mitigate for impacts to shrub steppe and grassland habitat. WDFW (2003) mitigation guidelines are expected to consist of acquisition of replacement habitat at a 2:1 ratio for permanent impacts to shrub steppe, a 1:1 ratio for permanent impacts to grassland, a 0.5:1 ratio for temporary impacts to shrub steppe and a 0.1:1 ratio for temporary impacts to grassland. Alternately, the project proponent could elect to contribute funds to a WDFW program to protect and manage shrub steppe vegetation, as outlined in the guidelines. To the greatest extent possible, mitigation for shrub steppe and grassland impacts would occur within the project area. The project proponent would also follow the management recommendations listed above for roads and utility crossings of riparian habitat to the greatest extent possible.

WDFW also identified several site reclamation or restoration measures that might further reduce vegetation impacts. A detailed reclamation and site restoration plan will be developed in consultation with the TAC and incorporated into the overall mitigation plan. The following measures could be incorporated into the mitigation plan to facilitate restoration of temporarily disturbed areas in the project:

- To the extent possible, construction should be timed to correspond with the late spring through fall period when soil moisture is lowest to prevent damage to soils and plants in temporary disturbance areas and thus facilitating reclamation efforts in these areas.
- Standards for site restoration should be established to evaluate success of reclamation measures and site restoration. The standards should be based on undisturbed reference areas of the different vegetation types within the project boundaries. The post construction restoration or

reclamation plan for the temporarily disturbed areas should include provisions for continuing active restoration until site stability or the reference standards are achieved.

- Site reclamation and reseeding should occur during the time of year when seed germination and establishment is most likely to be successful, or the next suitable planting period following disturbance. Temporary erosion control measures should be incorporated during reseeding to facilitate establishment of new seedlings.

Rare Plants

Due to the absence of known populations of rare plant species within the project area, no impacts are likely to occur and no mitigation measures are warranted.

Noxious Weeds

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

- The contractor should be required to clean construction vehicles prior to bringing them in to the project area from outside areas.
- Disturbed areas should be revegetated as quickly as possible with native species.
- Revegetation seed mixes and monitoring should be developed in consultation with WDFW, Kittitas County Weed Control Board, and other interested agencies.
- If hay is used for sediment control or other purposes, hay bales should be certified weed free.
- Noxious weeds that have established themselves as a result of the project should be actively controlled in consultation with the Kittitas County Weed Control Board.

3.4.1.6 Significant Unavoidable Adverse Impacts

There would be approximately 88 acres (less than 2 percent of the project area) of unavoidable displacement of existing vegetation in the project area. These impacts are not considered significant because they would not result in elimination of an entire vegetation type in the project area, loss of 10 percent or more of a priority habitat in the project area, or a decrease in species richness resulting from the loss of a plant population in the project area. No significant unavoidable adverse impacts to rare plants from construction, operation or decommissioning of the proposed project are expected. Similarly, the project is not expected to result in significant unavoidable adverse impacts related to potential introduction or spread of noxious weeds.

3.4.2 Wetlands

Affected Environment

Ecology & Environment, Inc. conducted a detailed wetland survey of the Desert Claim project area in June 2003. Wetland features within the area were identified and evaluated, and wetland boundaries were delineated. **Appendix B** provides detailed documentation of the methods used for the survey and the results compiled from the field records and subsequent analysis.

<u>Project Area Wetland Features</u>

Seventy-six (76) wetlands were delineated as wetland features within the study area. The wetlands were characterized by vegetation, soils and hydrology, as indicated in **Table 3.4-4**. **Figure 3.3-1**, a map of local hydrologic features, indicates the locations of wetlands in the project area (see **Section 3.3**).

Most of the wetlands identified were palustrine or fresh water emergent wetlands (National Wetland Inventory [NWI] code PEM) or palustrine scrub-shrub wetlands (PSS). Some were riparian wetland communities that are located around streams and other bodies of water where groundwater is close to the soil surface. The wetlands support a variety of emergent vegetation and willow shrubs.

Table 3.4-4
Summary of Wetlands in the Project Area

NWI Classification	Number of Wetlands by Hydrology			Total Number by NWI Classification
	Artificial Lower Quality Wetlands	Natural – Medium Quality Wetlands	Combination – Medium-Low Quality Wetlands	
PEM	53	9	7	69
PFO	2	1		3
PSS	3		1	4
Total Number	58	10	8	76

Palustrine Emergent Wetlands

Palustrine wetlands include all non-tidal wetlands which have a salinity due to ocean derived salts below 0.5 ppt. Palustrine emergent (PEM) wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens, that are present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. Sixty-nine of the total 76 wetlands in the project area exhibited characteristics of PEM wetlands.

Several stock ponds were also identified during the surveys. Those stock ponds with associated wetland vegetation outside the defined pond bed and bank were delineated as PEM wetland features. If the vegetation was confined to the pond banks, the feature was considered an isolated, non-jurisdictional surface water feature.

Vegetation in these wetlands consisted primarily of the following hydrophytic vegetation: Baltic rush (*Juncus balticus*), spike rush (*Eleocharis palustris*), slough sedge (*Carex obnupta*), red fescue (*Festuca rubra*), and monkey flower (*Mimulus guttatus*). These species constituted 80 to 100 percent of the vegetative cover and were present in many of the wetlands. Other dominant vegetation found in delineated wetland areas included Forget-me-nots (*Myosotis laxa*), White clover (*Trifolium repens*), and Iris (*Iris missouriensis*). These species constituted 50 percent or lower vegetative cover, but were present in a majority of the wetlands.

Palustrine Scrub-Shrub Wetlands

Palustrine scrub-shrub (PSS) wetlands are non-tidal, freshwater wetlands that are dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions. Four wetlands in the project area exhibited characteristics of PSS wetlands (FW-04, JPW-18, LD-01, and TWM-02). Willows (*Salix lucida* and *Salix exigua*) dominated the shrub layer in these wetlands. Two PEM wetlands also had portions within the wetland boundary that could be classified as PSS wetlands (LW-01 and LW-02). Cottonwoods (*Populus sp*.), willows, and nootka rose (*Rosa nutkana*) plants dominated these shrubby areas. Vegetation in the herbaceous layer of the PSS wetlands consisted of the following hydrophytic vegetation: bulrush (*Scirpus microcarpus*), spike rush, rushes (*Juncus sp*.) and sedges (*Carex sp.*).

Palustrine Forested Wetlands

Palustrine forested (PFO) wetlands are nontidal, freshwater wetlands that are characterized by woody vegetation that is 6 m tall or taller. Three PFO wetlands were delineated in the project area (Wetlands FW-03, NW-04, and MSW-05). Tall willow (*Salix nigra* and *Salix lucida*) and black hawthorn (*Crataegus douglasii*) trees dominated the tree layer in these wetlands. Vegetation in the herbaceous layer was dominated by the following hydrophytic vegetation: common horsetail (*Equisetum arvense),* spike rush, grasses and rushes *(Juncus balticus)*. Willows were also present in the shrub layer of MSW-05. NW-04 had some open water dominated by duck weed (Lemna minor).

The majority of wetlands in the study area contained hydric soil indicators, such as gleyed and low-chroma colors, and reducing conditions, such as mottling.

Upland Areas

Nine areas delineated within the project area were determined to be non-wetland areas based on unmet wetland criteria such as non-hydric soils. Most of these areas did not support hydric vegetation and were sampled to determine the boundaries of other wetland areas. These areas are considered upland because they do not meet one of the three criteria for delineating wetlands.

Wetland Habitat Quality

While no wetlands in the project area support fisheries or other protected species, some wetlands were hydrologically connected to perennial streams such as Reecer Creek and/or associated riparian corridors. Wetlands JPW-06, JPW-12, JPW-15, JPW-20, JPW-21, and JPW-22, which are located on the western portion of the project area, are saturated wetlands adjacent to Reecer Creek. Wetland JPW-06 receives water from both an irrigation ditch and Reecer Creek. Other wetlands are also located along Green Canyon Creek, and the other perennial streams listed in table 6.2-1. Leaks from the North Branch Irrigation Canal also contribute water to wetlands on the western portion of the property south of the canal. Wetland JPW-17 receives water from the intermittent Jones Creek.

While the above wetlands were connected to perennial streams, many of the remaining wetlands delineated within the project area are fed by artificial irrigation. Numerous irrigation ditches flow from the North Branch Irrigation Canal across the properties to supply water to agricultural fields and/or grazing areas. During the delineation, it was noted where artificial irrigation supplied the only hydrology for the wet areas.

Development of the proposed project would require submittal of a Joint Aquatic Resource Permits Application (JARPA) for coordinated review of permits needed for project activities affecting aquatic resources such as stream channels and wetlands. It is conceivable that the agencies reviewing the JARPA documentation (the U.S. Army Corps of Engineers, Washington Department of Fish and Wildlife, Washington Department of Ecology and Kittitas County) would determine that some or all of the irrigation-fed wetlands are not jurisdictional wetlands.

The Kittitas County Critical Area Ornidance (KCCAO) defines wetlands into four categories (Section 17A.02.310), using the Department of Ecology wetland rating system. Category I, II, III and IV wetlands are classified according to the presence of protected species, high-quality plant communities, wetland functions and the level of hydrologic isolation. Category I or II wetlands provide documented habitat or contain federal or state listed or priority species, significant functions that may not be adequately replicated through creation or restoration, or high habitat value. No wetlands in the project area are known to provide habitat for federally listed species or significant functions or habitat value. Wetlands in the project area exhibit features characteristic of Category III or IV wetlands, which provide a moderate to low level of functions, have been disturbed by surrounding land-use activities, and provide less wetland vegetation diversity.

Wild Horse (Alternative 1) Site

Field surveys conducted in support of Zilkha's proposal for the Wild Horse project indicated that no wetlands (as defined by the U.S. Army Corps of Engineers) occur in areas that would be occupied by Alternative 1 project facilities or a 164-foot (50 meter) buffer around each facility.

Springwood Ranch (Alternative 2) Site

NWI maps (USFWS, 1987) identify 20 wetlands on the Springwood Ranch property that are classified as palustrine emergent, forested, open water and scrub-shrub systems, as well as riverine upper perennial habitats. Wetlands are found along the Yakima River, Taneum Creek, the eastern and northern slopes of Thorp Prairie, and along the valley floor in the southeast portion of the property. The wetlands are each less than 3 acres in size, with the exception of two larger wetlands of 8 acres each. Most are associated with irrigation channels or excavated ponds.

Approximately seven of the on-site wetlands are located on the western portion of the site, where wind turbines could be located (see Figure 4-2 in MountainStar DEIS, Vol. III, App. F, p.4-31). These identified wetlands are each less than 3 acres in area.

3.4.2.2 Impacts of the Proposed Action

Project activities would result in impacts to wetlands if they caused any of the following conditions:

- Disturbance to vegetation, soils, and hydrology as a result of vehicular traffic;
- Clearing of vegetation and soils, and the potential for increased erosion;
- Alteration of contours and subsequent hydrologic changes;
- Soil compaction from construction equipment;
- Buffer encroachment;
- Permanent filling-in of wetlands for turbine towers, transformers, or other above ground facilities;
- Permanent conversion of forested wetlands to emergent or scrub-shrub wetlands; and
- Permanent conversion of wetlands to roads.

As discussed in **Section 3.4.2.1**, 76 areas within the project area were identified as meeting all three wetland parameters. The wetlands delineated were identified as palustrine, emergent or scrub-shrub wetlands that support hydrophytic vegetation. Expected wetland impacts have been identified by comparing wetland locations mapped from the field survey results against the graphical layouts for the project systems documented in **Chapter 2**. Temporary wetland impacts were assumed to occur where the envelope of construction disturbance around various types of project facilities overlapped with mapped wetland area. Similarly, permanent wetland impacts were assumed to occur where the permanent footprint for various types of project facilities overlapped with mapped wetland area. The analysis method allows the areas of project facility overlap with wetland features to been calculated in terms of square feet or hundredths of an acre, but that level of detail should not be interpreted as the true level of precision embodied in current project plans.

The analysis indicated that the proposed construction areas would temporarily affect a total area calculated at 17.1 acres (based on the assumed dimensions for construction disturbance around tower foundations, around other project facilities such as the substation, and along access road and power collection alignments). The permanent footprint of the project facilities, including the turbines, permanent access roads, and the substation, would overlap with a wetland area calculated at 3.2 acres. **Table 3.4-5** provides a list of the individual wetlands within the project area that coincide at least partially with areas of construction disturbance and/or permanent project facilities. For each affected wetland, the table identifies (a) the total wetland acreage that would be temporarily affected by construction and (b) the wetland acreage that would be occupied by permanent project facilities. Field data sheets, photographs and other supporting documentation are included in **Appendix B**.

The activities associated with construction that might have a potential adverse impact on wetlands include: the temporary clearance of wetland vegetation, exposure of soil, and changes to contours and hydrology during construction; and the potential filling in or conversion of wetlands for permanent facilities. Temporary disturbance and filling in of wetlands could potentially affect the quality of wetlands and the overall wetland habitat in the project area.

Following installation of the wind power facilities, original contours and drainage patterns would be restored around the turbines, roads, and substations, thereby minimizing loss of wetland area or hydrological functions or associated impacts on wildlife habitat within the temporary disturbance zone. As such, it is assumed that all functions and values of emergent wetlands within the construction disturbance areas would be restored.

Table 3.4-5
Calculated Wetland Impacts

Property Legal Description/ Wetland ID	Temporary Impacts (acres)					Permanent Impacts (acres)				
	Turbines	Roads	Power Collection System	Substation	Total	Turbines	Roads	Power Collection System	Substation	Total
T19N R18E Sec 17 SE 1/4 ; T19N R18E Sec 20 E ½; T19N R18E Sec 21										
JPW-03	0.59	0.72	0.00	0.00	1.31	0.06	0.27	0.00	0.00	0.33
JPW-04	1.13	0.78	0.00	0.00	1.91	0.11	0.30	0.00	0.00	0.41
JPW-06	0.54	0.18	0.00	0.00	0.71	0.05	0.05	0.00	0.00	0.10
JPW-07	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
JPW-09	0.50	0.06	0.01	0.00	0.56	0.05	0.02	0.00	0.00	0.06
JPW-13	1.26	0.46	0.00	0.00	1.72	0.11	0.17	0.00	0.00	0.28
JPW-15	0.91	0.05	0.00	0.00	0.96	0.07	0.00	0.00	0.00	0.07
JPW-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JPW-17	0.00	0.25	0.00	0.00	0.25	0.00	0.10	0.00	0.00	0.10
JPW-18	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01
JPW-20	1.14	0.96	0.00	0.00	2.10	0.11	0.36	0.00	0.00	0.48
JPW-21	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
JPW-22	0.66	0.26	0.00	0.00	0.92	0.04	0.10	0.00	0.00	0.15
T19N R18E Sec 35 E ½										
LW-01	0.80	0.98	0.00	0.00	1.78	0.11	0.39	0.00	0.00	0.50
LW-02	0.00	0.09	0.00	0.00	0.09	0.00	0.03	0.00	0.00	0.03
T19N R18E Sec 28; T19N R18E Sec 27 N ½										
NW-03	0.01	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
NW-1B-07	0.33	0.29	0.00	0.00	0.63	0.00	0.12	0.00	0.00	0.12
T19N R18E Sec 25; T19N R19E Sec 30 W ½; T19N R19E Sec 31 W ½										
TMW-01	1.11	0.11	0.00	0.00	1.22	0.06	0.01	0.00	0.00	0.08
TMW-05	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01
T19N R18E Sec 4 SE ¼; T19N R18E Sec 9; T19N R18E Sec 17 SW 1/4; T19N R18E Sec 20 W ½; T19N R18E Sec 29										
WC-02	0.00	0.07	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.02
WW-01	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
WNW-01	0.80	0.00	0.00	0.00	0.84	0.10	0.00	0.00	0.00	0.10
WW-06	0.25	0.17	0.00	0.00	0.47	0.03	0.09	0.00	0.00	0.12
WW-07	0.96	0.12	0.00	0.00	1.09	0.11	0.04	0.00	0.00	0.15
WW-08	0.06	0.05	0.00	0.00	0.12	0.02	0.02	0.00	0.00	0.04
WW-09	0.01	0.08	0.00	0.00	0.10	0.00	0.01	0.00	0.00	0.01
WW-10	0.00	0.03	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.01
WW-13	0.00	0.15	0.00	0.00	0.18	0.00	0.05	0.00	0.00	0.05
Total Acreage	11.10	5.94	0.02	0.00	17.06	1.04	2.19	0.00	0.00	3.23

Table Notes:
This table only lists wetlands that have the potential to be impacted by construction or operation. For all other wetlands, there would be no impacts.

Turbines

For purposes of calculating temporary impacts, it is assumed that construction crews would require an operating area measuring 130 feet in radius around the base of each turbine. This factor translates into a total area of temporary construction disturbance of approximately 1.25 acres per turbine. Construction crews would use this area for constructing the tower foundations and storing topsoil, cleared vegetation and onsite supplies. Each wind turbine and associated tower is 12 feet in diameter. Permanent wetland impacts associated with turbine locations coinciding with wetland boundaries were calculated using a rectangular zone of permanent disturbance at each turbine location, measuring 120 feet long by 40 feet wide or 0.11 acres for each of the subject proposed turbine points; this corresponds to the area of the crane pad that would need to be constructed at each turbine location. Pad-mounted transformers would also be installed at the base of each turbine. This includes the impacts from the pad-mounted transformers. The turbine towers and transformers would be permanent, impermeable, above ground facilities.

The assumed envelope of construction disturbance around the proposed turbine locations overlaps with the mapped boundaries of 18 wetlands. Wetlands within the temporary disturbance zone could be impacted by the clearance of vegetation and soil, alteration of contours and therefore hydrology, compaction from construction equipment, and vehicular traffic. A total of 12.5 acres of wetland area would be temporarily affected by construction disturbance for the turbines. For 14 of the 18 wetlands, map analysis indicates that the permanent footprint of the turbine pad itself would extend into the mapped wetland area. The permanent project facilities would displace a total wetland area estimated at 1.2 acres. Foundations placed within wetland areas would result in permanent filling-in of the feature in this area and loss of the wetland function in this area.

One turbine location in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the turbine would be re-located to avoid impacting the stock pond. Alternatively, it might be feasible and efficient to construct a replacement stock pond.

Access Roads

Each project access road is anticipated to be approximately 15 feet in width with a 2-foot shoulder on each side, and 20 feet plus shoulders on the curves. As such, permanent impacts to wetlands located coincident within the road system layout were calculated using a 19-foot road width, plus a 15 percent overall increase to account for curves and intersections to non-project roads. Within the permanent road footprint, the surface of the road would be cleared of vegetation and graded to a safe slope. For purposes of calculating temporary impacts, it was assumed that construction activity would occur within a 15-foot area on either side of the road alignment, for a total construction disturbance width of 50 feet, plus a 15 percent overall increase to account for curves and intersections to non-project roads. Construction crews would use this area for grading, widening, or otherwise improving existing or creating new roads. Cleared vegetation, soil, rocks and onsite supplies would be stored in the temporary disturbance zone. Where possible, existing roads would be improved to accommodate project access needs, rather than constructing new roads. As such, the 50-foot construction disturbance width might not be used to its entirety and impact calculations for areas of disturbance may overstate the actual extent of impact to some degree.

The assumed disturbance envelope for the access road layout overlaps the mapped boundaries for 25 wetlands, for which the area of temporary construction impact was calculated at 6.5 acres. Wetlands within the temporary disturbance zone could be impacted by the clearance of vegetation and soil and potential subsequent erosion, as well as compaction from construction equipment and vehicular traffic. The map analysis indicated that 2.4 acres of wetland area would be occupied by permanent access roads. Permanent roads placed within wetlands areas would result in conversion of wetland areas to roads.

Substation

The proposed substation in the northeastern corner of Section 21 would be approximately 300 feet by 300 feet in size or approximately 2.1 acres. During construction an extra 50 feet would be utilized on all sides for construction activities and storage. No wetlands are located within proximity of the proposed substation.

Power Collection System

The power collection system would be installed underground where reasonably possible within the project area. Wherever possible, the power collection cable would be installed adjacent to existing access roads, to minimize the extent of disturbance. The modified layout indicates there would be collection system crossings of 7 wetlands. While there would be no permanent above ground facilities associated with this collection system, there would be temporary impacts to wetlands from soil compaction, vegetation clearing or operation activities.

Construction crews would use a 10-foot wide area centered on the collection system for digging the trench and installing the underground cables. Therefore, a corridor of 10 feet was used for temporary impacts calculations on those areas outside of the access road blueprint. Map analysis indicates that a total area estimated at 0.02 acres would be within the temporary disturbance zone associated with the underground collections system. Wetlands within the temporary disturbance zone would be disturbed by the clearance of vegetation and soil and potential subsequent erosion, as well as compaction from construction equipment and vehicular traffic.

Other Project Elements

The O&M facility would be co-located with the project substation, which is not located near wetlands and would have no wetland impacts. The internal project communication lines would be installed in the same trench or furrow as the power collection cables, and would have no incremental impacts on wetlands. The five proposed permanent meteorological towers for the project would be free-standing structures with a narrow base and small permanent footprint of several feet square, with a surrounding temporary disturbance zone with a radius of approximately 50 feet. None of these facility locations are near wetlands, and construction of the met towers would have no temporary or long-term impacts on wetlands. The project visitor facilities, which would consist of a small roadside turnout and an information kiosk, would be constructed at an appropriate site along Smithson Road that would avoid impacts to wetlands. and the specific locations of the construction staging areas have not yet been determined, but it is assumed these facilities would be located so as to avoid impacts to wetlands. Consequently, all project impacts to wetlands would be associated with the turbines, access roads and power collection system.

Summary of Wetland Impacts

Determination of total wetland impacts for the modified project layout involved aggregating the calculated wetland impacts for the turbines, access roads and power collection system. As indicated by the entries in **Table 3.4-5**, the total area of temporary wetland impacts from construction disturbance has been calculated at 17.1 acres. The permanent footprint of the project as modified would displace existing wetland area estimated at approximately 3.2 acres. Required mitigation for these wetland impacts is discussed in **Section 3.4.2.5**.

Virtually all of the temporary and permanent wetland impact would occur in Category III wetlands. Of the 76 wetlands present onsite, 70 are Category III (average value) wetlands and 6 are Category IV (less than average value) wetlands. Twenty-eight wetlands would be affected by the project. Only one Category IV wetland, NW-03, would experience temporary impacts to 0.03 acre; there would be no permanent impacts to this Category IV wetland. The rest of the temporary impacts (17.03 acres) and all of the permanent impacts (3.2 acres) would occur in Category III wetlands.

3.4.2.3 Impacts of the Alternatives

Alternative 1: Wild Horse Site

No wetlands (as defined by the U.S. Army Corps of Engineers) occur in areas that would be occupied by Alternative 1 project facilities or a 164-foot (50 meter) buffer around each facility. Therefore, no wetland impacts would be expected for this alternative.

Alternative 2: Springwood Ranch Site

Development of a wind energy project on the Springwood Ranch property could affect existing wetland habitats, primarily as a result of access road and collection cable routes through or near wetland areas. All or portions of 7 of the identified 20 wetlands on the site (Wetlands 1, 2, 4, 5, 6, 7 and 10) occur in areas along the Yakima River and likely would not be disturbed by construction activities. Similarly, all or portions of eight of the identified wetlands (Wetlands 11, 12, 15, 16, 17, 18, 19 and 20) are in the southern part of the site, in which no wind turbines would be located. The remaining wetlands lie in the northern and western portions of the site and would be subject to temporary disturbance by construction activity or displacement by permanent project facilities. Careful micro-siting might be able to avoid some potential wetland impacts. Wetlands 4, 6, 9, and 15 traverse nearly the entire width of the Springwood Ranch property, however, and required access roads and construction circulation patterns would likely result in some direct impacts to these wetlands and their buffers. The total area of potential wetland impact cannot be determined, due to the conceptual nature of the site plan for Alternative 2 and the general nature of the existing information on wetland locations and characteristics.

Potential indirect impacts to wetlands would be similar to those described for the proposed action. Increased impervious surfaces could result in increased water level fluctuations and pollution and sediment loading to retained wetlands. Loss of pervious surfaces could result in decreased water levels to wetlands that rely on groundwater discharge. The net change in impervious surface cover would be quite small in relation to the total area of the site, however, and it is unlikely that indirect impacts to wetlands would be significant. Application of construction BMPs and careful site planning could minimize or avoid some of the potential indirect impacts to wetlands.

No Action Alternative

Under the No Action Alternative, the proposed wind power facility would not be constructed. As such, the No Action Alternative would result in no new predictable impacts to wetlands within the project area. Past and current effects to wetlands from existing land uses would continue for the foreseeable future. Additional land use conversion and low-intensity residential development would be possible over the long term, and could result in additional direct and indirect impacts to wetlands.

3.4.2.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.4.2.5 Mitigation Measures

The applicant proposes to conduct a micro-site analysis for the turbines and project access roads during the JARPA and Critical Areas review process to avoid and/or minimize impacts to water bodies and/or wetlands. In addition, the area of temporary construction disturbance, which has been calculated as a 130-foot radius around each turbine, would be shifted to the extent possible to avoid construction impacts in wetlands. The project access road system would be designed to use existing roads where possible.

Any work adjacent to wetlands would adhere to applicable federal and state regulations and would be addressed in the Washington Department of Ecology Stormwater Construction Discharge Permit, Stormwater Pollution Prevention Plan (SWPPP), and Temporary Erosion and Sedimentation Control Plan (TESCP). Other measures to reduce or control impacts include compliance with applicable requirements of KCCAO regulations (Title 17A), the State Water Code (RCW chapter 90.03), and the State Water Pollution Control Act (RCW chapter 90.48).

Furthermore, if wetland communities were disturbed during construction, the following measures would be implemented:

- Site conditions would be restored and disturbed areas revegetated, as appropriate.
- Areas requiring revegetation would be identified by a qualified restoration ecologist in conjunction with landowners and interested agencies; and
- If needed, a revegetation plan would be developed for wetland and riparian communities. The revegetation plan would include mitigation requirements, design specifications, an implementation plan, maintenance requirements, and a monitoring program.

Temporary impacts would be restored, and permanent impacts replaced through wetland creation or enhancement in accordance with the Kittitas County Critical Area Ordinance (KCCAO Section 17A.04.050, Ord. 94-22 (part), 1994). Wetland creation, restoration, and enhancement ratios based on the wetland categories are summarized in **Table 3.4-6**. These ratios are general guidelines that are adjusted up or down based on the likelihood of success of the proposed mitigation and the expected length of time needed to for the wetlands to reach maturity.

Table 3.4-6
Wetland Mitigation Ratios

Wetland Category	Creation and Restoration	Enhancement*
Category I (all types)	6:1	12:1
Category II or III		
▪ Forested	3:1	6:1
▪ Scrub/Shrub	2:1	4:1
▪ Emergent	2:1	4:1
Category IV	1.25:1	2.5:1

* For wetland enhancement, the ratios are doubled. Enhancement as compensation for wetland losses results in a net loss of wetland area and the net gain in wetland function from enhancement is usually less than from creation or restoration.
Taken from Washington State Department of Ecology, How Ecology Regulates Wetlands, March 1998, Publication No. 97-112.

If turbine and road locations cannot be shifted through the micro-siting analysis to avoid permanent impacts to wetlands, a specific mitigation plan would be developed in conjunction with the U.S. Army Corps of Engineers, Department of Ecology and Kittitas County. Replacement ratios are determined by the quality of the wetland impacted, or the wetland category. The actual replacement, enhancement or creation ratio would be determined during the permitting process with those same parties, which would take into account the wetland function, acreage, category and location. Through this required mitigation process, all permanent project impacts to wetlands would be mitigated through avoidance of wetland areas, enhancement of existing wetlands to improve their function and value, restoration of affected wetland areas, and/or creation of replacement wetland habitat.

Because essentially all of the identified impacts would occur in Category III wetlands, the applicable mitigation ratios would be 2:1 for wetland creation and restoration and 4:1 for wetland enhancement; none of the forested wetlands in the project area would be affected. If the calculated permanent wetland impacts could not be avoided and mitigation occurred in the form of wetland creation/restoration, the mitigation plan would address the creation and/or restoration of approximately 6.4 acres of wetlands.

3.4.2.6 Significant Unavoidable Adverse Impacts

With appropriate mitigation, all potential temporary and permanent wetland impacts identified in **Section 3.4.2.2** would be avoided, counteracted through restoration, or offset through provision of compensatory wetland enhancement or development at the appropriate ratios. Therefore, no significant unavoidable adverse impacts to wetlands are expected as a result of the proposed project.

3.4.3 <u>Wildlife</u>

3.4.3.1 Affected Environment

The U.S. Fish and Wildlife Service (USFWS) has the primary responsibility for compliance with federal wildlife laws including the Endangered Species Act (ESA), Fish and Wildlife Coordination Act, Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act (MBTA). The Washington Department of Fish and Wildlife (WDFW) is responsible for protecting and perpetuating state fish and wildlife resources. WDFW has identified those fish and wildlife resources that are a priority for management and conservation. These records are maintained in a priority habitats and species database (PHS) and are defined geospatially and by status. *Priority habitats* are habitat types with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type or dominant plant species, a described seral (successional ecological community) stage or a specific structural element. *Priority species* are fish and wildlife species requiring efforts to ensure their perpetuation because of their low numbers (e.g., State Endangered, Threatened, Sensitive and Candidate Species), sensitivity to habitat alteration, tendency to form vulnerable aggregations, or because they have commercial, recreational or tribal importance (Washington Department of Fish and Wildlife 1996; Knutson and Naef 1997). In Washington, state-listed animal species are not specifically protected by statute or regulation, but are listed to assist with agency wildlife management efforts and decision-making.

<u>Desert Claim Project Area</u>

The study area for the Desert Claim EIS is located in the extreme west central region of the Columbia Basin physiographic province and immediately adjacent to the southeastern reach of the Northern

Cascades province. This land platform consists of incised rivers, extensive plateaus and ridges, and basaltic outcrops and cliffs (Lasmanis 1991). The study area historically was a transition zone between grassland/shrub-steppe and coniferous vegetation zones, dissected by small streams and patches of deciduous trees and shrubs (Franklin and Dyrness 1988). While coniferous forest still remains to the north, agriculture and livestock grazing have converted the lower-elevation valley to a land-use mosaic of grazed shrub-steppe, pastures, and hay and crop fields. The study area primarily consists of grassland and shrub-steppe habitats ranging from poor to moderate quality for wildlife. The majority of the riparian areas reflect channelized or ditched streams for irrigation purposes.

Information about wildlife populations and species of state or federal status potentially occurring in the study area were obtained from WDFW and USFWS. These agencies were also an integral component to the preparation and augmentation of the final study plan and protocols used in the 2002-03 avian baseline surveys. The overall objectives of the baseline avian studies conducted at the Desert Claim site were twofold: 1) to gather information that could be used to describe or predict potential impacts from the wind plant; and 2) to gather information that could be used to assist in design of a wind plant that would reduce or minimize risk to wildlife resources. The surveys included: (1) fixed-point counts to estimate temporal and spatial use of the study area by birds, game species, and other wildlife (March 2002 through March 2003)); (2) incidental wildlife observations recorded while traveling between point counts; (3) aerial raptor nest surveys documenting nest locations and activity (May and June 2002)); and (4) winter bald eagle driving surveys (2002 and 2003). A summary of results from these surveys is presented here and supplemented with information from the WDFW PHS database and GAP analysis program (GAP 1999). The GAP project is based on 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. Detailed results of the baseline studies are presented in a technical report (Young et al. 2003a) included as **Exhibit 2** to **Appendix C**.

Birds

A full description of the study design and analysis, results, tables and figures, and maps of avian-use (raptors), are provided in the final report (Young et al. 2003a). From the fixed-point surveys, avian-use estimates of the study area by species and groups were standardized by calculating the number of detections per survey (30 minutes) to a fixed plot (800 m radius). Frequency of occurrence was calculated as the percent of surveys where a particular species was observed, and species composition was the mean use for a species divided by the total use for all species and multiplied by 100 to provide percent composition. A relative exposure index was calculated as the product of the mean relative use for a species times the proportion of all observations of that species flying times the proportion of all flight height observations of that species within the rotor-swept area.

Table 3.4-7 presents a summary of the fixed-point surveys by bird group (e.g., waterfowl), species, total number of individuals seen, mean use, percent composition, frequency of occurrence, and relative exposure index. Passerines comprised 48 percent of all groups observed and 72 percent of the total number of birds observed. Raptors comprised approximately 23 percent of all groups but only 5 percent of all birds observed. Waterfowl comprised only 3 percent of all groups but 13 percent of all birds observed, corvids (magpies, crows, and ravens) comprised approximately 14 percent of all groups and 5 percent of all birds observed, and other birds (upland gamebirds, shorebirds, doves, and other non-passerine species) comprised approximately 12 percent of all groups and 5 percent of all birds observed.

Table 3.4-7
Avian Species Observed On-Site Between March 2002 and March 2003

Group/Species	Total Observations	Average Use	Percent Composition	Frequency of Occurrence	Exposure Index
Waterfowl/Waterbirds	**532**	**2.605**	**11.38**	**12.08**	
Canada goose	32	0.160	0.70	1.02	0.065
mallard	492	2.399	10.48	8.98	2.194
northern pintail	4	0.019	0.08	0.46	0.019
great blue heron	4	0.028	0.12	2.08	0.014
Shorebirds	**84**	**0.576**	**2.52**	**22.45**	
killdeer	64	0.438	1.91	21.76	0.092
common snipe	20	0.139	0.61	9.03	0.097
Corvids	**193**	**1.102**	**4.82**	**46.57**	
American crow	8	0.044	0.19	3.01	0.000
black-billed magpie	100	0.572	2.50	30.32	0.064
common raven	85	0.487	2.13	25.23	0.149
Upland Gamebirds	**94**	**0.549**	**2.40**	**13.06**	
California quail	84	0.494	2.16	10.05	0.000
gray partridge	7	0.037	0.16	1.16	0.000
ring-necked pheasant	3	0.019	0.08	1.85	0.000
Doves					
mourning dove	5	0.035	0.15	2.78	0.000
Raptors	**193**	**1.151**	**5.03**	**58.61**	
Accipiters	9	*0.057*	*0.25*	*5.05*	
sharp-shinned hawk	3	0.021	0.16	3.66	0.014
Cooper's hawk	6	0.037	0.09	1.39	0.012
Buteos	*96*	*0.563*	*2.46*	*36.34*	
red-tailed hawk	60	0.370	1.62	29.54	0.212
rough-legged hawk	34	0.193	0.84	13.52	0.078
Eagles	*14*	*0.054*	*0.23*	*3.89*	
bald eagle	13	0.049	0.21	3.43	0.026
golden eagle	1	0.005	0.02	0.46	0.005
Falcons	*26*	*0.178*	0.78	14.12	
American kestrel	23	0.162	0.71	12.50	0.049
prairie falcon	3	0.016	0.07	1.62	0.011
Other Raptors					
great-horned owl	7	0.045	0.20	4.49	0.000
northern harrier	23	0.142	0.62	11.44	0.019

Table 3.4-7
Avian Species Observed On-Site Between March 2002 and March 2003

Group/Species	Total Observations	Average Use	Percent Composition	Frequency of Occurrence	Exposure Index
turkey vulture	18	0.111	0.49	9.03	0.068
Passerines	**2875**	**16.774**	**73.29**	**79.17**	
American goldfinch	127	0.662	2.89	10.51	0.073
American pipit	11	0.076	0.33	1.39	0.076
American robin	535	3.214	14.04	22.73	1.340
bank swallow	4	0.037	0.16	1.85	0.019
barn swallow	26	0.192	0.84	4.63	0.059
black-capped chickadee	19	0.097	0.42	4.26	0.000
Brewer's blackbird	109	0.833	3.64	14.12	0.145
Brewer's sparrow	3	0.021	0.09	1.39	0.000
Bullock's oriole	8	0.067	0.29	4.86	0.000
cedar waxwing	27	0.192	0.84	4.40	0.036
chipping sparrow	1	0.007	0.03	0.69	0.000
dark-eyed junco	115	0.584	2.55	4.21	0.000
eastern kingbird	6	0.044	0.19	4.40	0.007
European starling	1210	6.464	28.24	16.02	3.830
golden-crowned kinglet	4	0.028	0.12	0.69	0.000
gray-crowned rosy finch	9	0.063	0.27	1.39	0.063
horned lark	53	0.321	1.40	14.68	0.024
house finch	78	0.431	1.88	1.02	0.000
house wren	1	0.007	0.03	0.69	0.000
lark sparrow	2	0.014	0.06	0.69	0.000
Lincoln's sparrow	1	0.007	0.03	0.69	0.000
mountain bluebird	13	0.093	0.40	4.17	0.000
Nashville Warbler	3	0.021	0.09	0.69	0.000
northern shrike	10	0.052	0.23	5.23	0.000
orange-crowned warbler	2	0.014	0.06	0.69	0.000
red-winged blackbird	49	0.329	1.44	4.86	0.020
ruby-crowned kinglet	3	0.019	0.08	1.16	0.000
sage thrasher	13	0.097	0.42	8.10	0.000
savannah sparrow	8	0.056	0.24	1.39	0.000
song sparrow	3	0.021	0.09	2.08	0.000
spotted towhee	10	0.065	0.28	3.24	0.000
tree swallow	7	0.053	0.23	3.01	0.000
unidentified empidonax	2	0.014	0.06	0.69	0.000
unidentified finch	127	0.604	2.64	1.16	0.571
unidentified passerine	3	0.017	0.07	0.56	0.017
unidentified swallow	4	0.028	0.12	1.39	0.021
varied thrush	1	0.006	0.02	0.56	0.000
vesper sparrow	64	0.479	2.09	20.37	0.000
violet-green swallow	2	0.014	0.06	0.69	0.014
western kingbird	11	0.086	0.37	3.70	0.047
western meadowlark	159	1.127	4.93	38.89	0.007
western tanager	4	0.030	0.13	1.66	0.000

Table 3.4-7
Avian Species Observed On-Site Between March 2002 and March 2003

Group/Species	Total Observations	Average Use	Percent Composition	Frequency of Occurrence	Exposure Index
white-crowned sparrow	14	0.097	0.42	2.08	0.000
winter wren	1	0.005	0.02	0.46	0.000
yellow-rumped warbler	13	0.090	0.39	1.39	0.000
Other Birds					
common nighthawk	1	0.007	0.03	0.69	0.007
downy woodpecker	1	0.007	0.03	0.69	0.000
northern flicker	13	0.074	0.32	6.94	0.000
unid'd. hummingbird	1	0.007	0.03	0.69	0.000
Total	**3992**				

Source: Young et al 2003a (see **Appendix C**)

Use of the study area varied among bird groups across seasons. For spring, based on use, the four most abundant species in the study area were American robin (4.58 detections/30-minute survey), western meadowlark (2.66 detections/survey), European starling (2.13 detections), and Brewer's blackbird (1.36). Together these species comprised approximately 52 percent of the total bird use during the spring. During the summer, the four most abundant species were European starling (2.37 detections/survey), Brewer's blackbird (2.22), western meadowlark (1.02), and American goldfinch (0.56). These species comprised approximately 49 percent of the total bird use during the summer. In the fall, the four most abundant species were European starling (5.81 detections/survey), American robin (3.76), California quail (0.93), and Western meadowlark (0.87), which comprised more than 62 percent of the total bird use. In the winter, the four most abundant species were European starling (13.45), mallard (6.74), American robin (3.73), and unidentified finch (1.82). These species comprised more than 72 percent of the total bird use for the winter. Overall seasons, European starling was the most common bird observed with 6.46 detections per survey, followed by American robin (3.21), mallard (2.40), and western meadowlark (1.13). These four species comprised more than 57 percent of all bird use of the site for the year.

Only two species, western meadowlark (38.9 percent of surveys) and black-billed magpie (30.3%) were observed in more than or roughly one-third (33%) of the surveys. Five other species, red-tailed hawk (29.5%), common raven (25.2%), American robin (22.7%), killdeer (21.8%) and vesper sparrow (20.4%) were observed in approximately one-quarter (25%) of the surveys. Together, these seven species made up approximately 30 percent of all bird use (29.2%). In contrast, European starling alone made up 28.2 percent of all bird use at the site but was only observed in 16 percent of the surveys. The high bird use for starling was due to the majority of observations being large flocks. Eight other species, European starling (16.0%), horned lark (14.68%), Brewer's blackbird (14.1%), rough legged hawk (13.5%), American kestrel (12.5%), northern harrier (11.4%), American goldfinch (10.5%), and California quail (10.1%) were observed in more than 10 percent of the surveys. The majority of species were observed in less than 5 percent of the surveys.

Bald eagle was the only federally listed species observed in the study area (see threatened and endangered species section). Four Washington State candidate species, golden eagle, sage thrasher, loggerhead shrike, and northern goshawk, were also recorded during the study (addressed in threatened and endangered species appendix). A single golden eagle and numerous sage thrashers were observed during the point count surveys. The northern goshawk and loggerhead shrike were observed during bald eagle roadside surveys. The PHS database contains records of long-billed curlews, northern goshawks and golden eagles within 2 miles of the study area.

Raptor Nests

Two aerial surveys for raptor nests were conducted within the study area plus a 2-mile radius buffer. The total area searched was approximately 52 square miles (134 km^2). A total of 29 raptor or large stick nests were located, 18 of which were classified as active raptor nests during the first survey (**Table 3.4-8**). Nest density for buteos, red-tailed hawk and unidentified buteo was 0.28 nest/mi^2 (0.11 nest/km^2). Nest density for all raptors located, buteos and owls, was approximately 0.34 nest/mi^2 (0.13 nest/km^2). The PHS database contains records of northern goshawks and golden eagles within 2 miles of the study area.

Table 3.4-8
Raptor and Large Bird Nests Located in The Raptor Nest Survey Area
(Study Area Plus Area Within a 2-Mile Radius Buffer).

Species	Number Active Nests	Number of Nests Which Produced Young	Total Young Observed (young per successful nest)
Red-tailed hawk	12	8	18 (2.25)
Unknown buteo	3	0	unk
Great horned owl	3	2	7 (2.3)
Inactive nests	11	N/A	N/A

Mammals

Eight species of mammals were recorded in the study area; mule deer, elk, porcupine, raccoon, long-tailed weasel, yellow-bellied marmot, least chipmunk, and coyote (Young et al. 2003a). Big game issues are addressed below. Other species of mammals that may occur in the study area include California ground squirrel, deer mouse, Great Basin pocket mouse, western harvest mouse, vole species, northern pocket gopher, bushy-tailed woodrat, Nuttall's cottontail, striped skunk, badger, bobcat, muskrat, beaver, and a variety of bat species. One historic gray wolf observation, located approximately 1.5 miles to the northeast of the northern boundary of the study area, is recorded in the PHS database. One whitetail jackrabbit PHS record exists about 3 miles east of the study area. All other relevant PHS records (gray wolf, grizzly bear, wolverine, fisher, western gray squirrel) occur much farther to the north in the Wenatchee National Forest.

Factors influencing the possible occupancy of the study area by bat species include the presence of suitable forage and roost sites, and/or the area's location with respect to a migratory pathway. Attributes of these factors vary among species. Fourteen bat species have the potential to occur in the region of the study area (based upon predicted distributions from GAP). The likelihood of such occurrences, based upon species locality records and habitat affinity, is summarized in **Table 3.4-9**. Results from more intensive inventories of the Hanford Site's Arid Lands Ecology Reserve (ALE), located in the northwest region of Benton County, were also reviewed.

Table 3.4-9
Bat Species Potentially Occurring on or Near the Study Area

Common and 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; records in adjacent N Yakima county and ALE	GAP 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; records near Yakima, along Columbia river of E Kittitas county, and on ALE	GAP 1999; England 2000; West *et al.*, 1998, 1999
long-eared myotis *Myotis evotis*	Primarily forested habitats and edges, juniper woodland, mixed conifers, riparian areas; roosts snags, crevices, bridges, buildings, mines	Possible; record(s) in S Douglas county	GAP 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; records in adjacent S Chelan county and on ALE	GAP 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	Unlikely; no records from adjacent counties, few records in state, not documented on ALE	GAP 1999; England, 2000; TNC, 1999
long-legged myotis *Myotis volans*	Coniferous and mixed forests, riparian areas; roosts caves, crevices, buildings, mines	Possible; records from S Douglas county and on ALE	GAP 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; records from near Yakima, N Yakima county, W Grant near Columbia river, and on ALE	GAP 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	GAP 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	GAP 1999; England, 2000; West *et al.*, 1998, 1999
western pipistrelle *Pipistrellus hesperus*	Primarily desert lowlands; desert shrublands; canyons; roosts under rocks, crevices and possibly in sagebrush	Unlikely; core habitat and records restricted to Columbia and Snake river ecosystems	GAP 1999; England, 2000; West *et al.*, 1998, 1999

Table 3.4-9
Bat Species Potentially Occurring on or Near the Study Area

Common and Scientific Name	Typical Habitat	Expected Occurrence in Project Area	Occurrence Documentation
big brown bat *Eptesicus fuscus*	Generally deciduous forests; buildings; roosts in buildings, trees, crevices; hibernates in caves, mines	Possible; records in NE and S Kittitas county, and adjacent counties and ALE	GAP 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; core habitat restricted to Columbia and Okanogan river ecosystems	GAP 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	GAP 1999; England, 2000; TNC, 1999
pallid bat *Antrozous pallidus*	Generally occurs in arid regions, desert scrub habitats; roosts in cliff faces, buildings, but seldom in caves or mines	Unlikely due to lack of suitable habitat; records restricted to Columbia river system	GAP 1999; England, 2000; West *et al.*, 1998, 1999

Reptiles and Amphibians

Twenty-seven species of reptiles and amphibians occur in Kittitas County, however this number also represents records from the Cascade foothills, Wenatchee Mountains, and the Columbia basin. Two species of reptiles were recorded in the study area (short-horned lizard and western terrestrial garter snake). The study area of the intermontane Kittitas Valley (valley) may also harbor the common garter snake, Great Basin gopher snake, western yellow-bellied racer, rubber boa, northern Pacific rattlesnake, northwestern fence lizard, and western skink. Although in the peripheral zone of the species core habitat, a record of the sharptail snake does exist along the Yakima River in the western part of the valley. The nightsnake, sagebrush lizard, and side-blotched lizard, all likely occur out of the valley to the east in the arid, low-elevation habitats adjacent to the Columbia River.

The Columbia spotted frog and Pacific treefrog may occur in the study area. A record of the Great Basin spadefoot toad exists in the valley; however, this species is probably restricted to the sandy habitats of the Yakima River floodplain. The western toad and long-toed salamander are unlikely to occur in the study area based upon the predicted distribution of their peripheral zone, however these species do have patchy records in other regions of the county where isolated suitable habitats occur. Therefore, these species may exist in the canyons and ravines to the north of the study area.

Big Game

Mule deer was the only species of big game commonly observed in the project area (Young et al. 2003a). Observations occurred during all seasons, however there was an increase during winter. Mule deer were somewhat evenly distributed over the study area, exhibiting some affinity toward sagebrush steppe. The majority of the study area is within the Ellensburg mule deer winter range; the Dry Creek mule deer wintering concentration area is about 1.5 miles to the southwest, and the Dunning mule deer wintering concentration area is about 1 mile northeast of study area. During March 2002 and March 2003, two groups of elk were observed incidentally (one group per year) between Johnson and Reecer Canyons within the Quilomene elk migration corridor. No elk were observed within the study area, although increased levels of scat during early spring were noted near an avian fixed-point location in the Currier Creek riparian area.

Threatened and Endangered Species

The potential occurrence of threatened, endangered and sensitive wildlife species in the Desert Claim project area is discussed in detail in **Appendix C, Exhibit 1**.

Wild Horse (Alternative 1) Site

The Wild Horse site is also located within the general shrub-steppe region of central Washington. In an undisturbed condition, this area is usually distinguished by big sagebrush as the principal shrub and bluebunch wheatgrass as the principal grass. A baseline study similar to that conducted for the Desert Claim project area has also been performed for the Wild Horse site. The following discussion is based primarily on the report from that study (Erickson et al. 2003).

Many of the bird species observed at the project site are typical of shrub-steppe and grassland-steppe habitats (Erickson et al. 2003). Small passerine species such as horned lark, western meadowlark, vesper sparrow, Brewer’s sparrow, and sage thrasher were commonly observed on the site. Other small passerine bird species commonly observed were mountain bluebird and American robin. European starlings, gray-crowned rosy finches and snow buntings (winter) were observed less frequently, but in large groups. Common ravens were also frequently observed on site. The most commonly observed raptors were red-tailed hawk, American kestrel, golden eagle, and northern harrier, with infrequent or single observations of prairie falcon, sharp-shinned hawks, rough-legged hawk, merlin and bald eagle. Very few active raptor nests were observed within the project site, and no nests were found within ½ mile of proposed turbines.

Sage grouse have historically been observed on the Wild Horse site during the spring and winter, although apparently no leks have been confirmed. Surveys conducted in 2003 did not confirm any lek activity.

The potential for bats to occur is based on key habitat elements such as food sources, water, and roost sites. Due to the dominant vegetation type and terrain, potential roost structures such as trees or talus slopes are limited within the Wild Horse site. Trees exist near the “the Pines” area near Government Springs and within the riparian corridors along Whiskey Dick and Skookumchuck Creeks. The various springs within the area may be used as foraging and watering areas. There are some talus slopes and rocky outcrops scattered throughout the site that could also provide roosting opportunities for bats.

Little is known about bat species distribution, but several species of bats could occur in the Wild Horse 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. California bat, small-footed myotis, little brown bat, long-legged myotis, Yuma myotis, western pipistrelle, big brown bat, pallid bat, hoary bat, and silver-haired bat have all been documented on the nearby ALE Reserve (TNC 1999). Both hoary bats and silver-haired bats, two common fatalities at other wind plants, are expected to migrate through the study area. Other mammals that likely exist within the Wild Horse site include, badger, coyote, pocket gopher, Paiute ground squirrels and other small mammals such as rabbits, voles and mice.

The Wild Horse site 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 site is approximately ½ mile (0.80km) from the Colockum elk calving area. The Quilomene elk winter range is approximately 83,000 acres in size and winters approximately 1500-2000 elk. The Quilomene mule deer winter range is approximately 40,000 acres in size and winters approximately 700-800 deer. The site 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 Wild Horse site, and extends to the east towards the Columbia River. The site is also not located within the Quilomene primary elk 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 green up with fall and winter rains, while mule deer likely utilize more shrub species in the 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 other seasons and some individuals are likely year-round residents. 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 historically been allowed on the Wild Horse lands.

Twenty-seven species of reptiles and amphibians occur in Kittitas County and could potentially be present in the Wild Horse area depending on habitat preferences. Short-horned lizards were commonly observed within the project area (Erickson et al 2003). Other reptiles that may likely occur on the site include snakes such as the yellow-bellied racer and rattlesnakes. Amphibian and aquatic reptile habitat is minimal within the area. Many amphibians migrate short distances during spring or fall breeding periods to and from suitable wetlands and during fall dispersal of juveniles; however, there are no known amphibian migration corridors in the area.

<u>Springwood Ranch (Alternative 2) Site</u>

Baseline studies comparable to those reported for the Desert Claim and Wild Horse sites have not been conducted for the Springwood Ranch site. The following discussion is based on existing published information (primarily the MountainStar Resort EIS [Kittitas County, 1999] and existing data sources such as the WDFW PHS database. In general, animals adapted to open grasslands, or the ecotone between forest and grasslands, would be expected to occur on the Springwood Ranch site. The open, grass-dominated habitats that form the bulk of the site limit its use by forest wildlife. Animals dependent on extensive forest cover would not occur on this site.

Reptiles and Amphibians

The site is most likely host to several species of lizards, snakes, toads, frogs, and salamanders. Short-horned lizards, western skink, and western fence lizards could be found in most habitats on the site, and Northern alligator lizards may be found in the forests or forest openings habitat. Several garter snake species, ringneck snake, rubber boa, gopher snake, yellow-bellied racer, western rattlesnake and possibly sharp-tailed snake may also be found on site based on habitats present. Amphibians require wetlands or aquatic habitats for their occurrence and would be far more limited than reptiles. Bullfrogs, spotted frog, western toad, Pacific tree frogs, and rough-skinned newts are likely the most common amphibians in the area.

Birds

A wide variety of bird species are likely to inhabit the site. The vegetation distribution for the site suggests the overall bird community at the site is likely very similar to that of the Desert Claim project area. Of the raptor species, a large number of bald eagles, few golden eagles, red-tailed hawks, rough-legged hawks, northern harriers, turkey vultures, American kestrels, owls (most likely short-eared), and falcons have been observed on the site. Of game bird species, ring-necked pheasant, California quail, chukar, gray partridge, mallards, and green-winged teal have all been observed. Crow, raven, black-billed magpie, meadowlarks, black birds, starlings, house sparrows and great blue herons were also determined to be present.

Mammals

A number of mammal species are likely to use the habitats found on the site. The Joe Watt/Robinson sub-herd of the Yakima elk herd can be found to the south of this area, and some elk activity has been detected along the Yakima River and the John Wayne Trail on the property. An elk fence along the south side of I-90 largely prevents the animals from crossing the highway. A small herd of deer was noted using the bluffs on the south side of the Yakima River, as well as the flats off the property on the east. Several species of bats are also likely to use the site, similar to the Wild Horse and Desert Claim sites.

Endangered, Threatened, and Sensitive Wildlife Species

Neither the federally listed gray wolf nor the northern spotted owl are likely to occur within the site due to the lack of suitable habitats. Bald eagle has been observed using the Springwood Ranch site during the winter and is a relatively abundant winter resident of the Yakima River riparian corridor east of the site.

Federally listed Species of Concern which could occur in suitable habitats on the site include the tailed frog, Columbia spotted frog, northern goshawk, western burrowing owl, olive-sided flycatcher, loggerhead shrike, Townsend's big eared bat, and five species of *Myotis* bats. The sage grouse, northern sagebrush lizard, and Larch Mountain salamander are unlikely to occur on the Springwood Ranch site due to the lack of suitable habitat.

Merriam's shrew, ferruginous hawks, flammulated owls, pileated woodpeckers, Lewis' woodpeckers, white-headed woodpeckers, and black-backed woodpeckers could also occur in suitable habitats on the Springwood Ranch site. Golden eagles possibly occur in small numbers in the area and could potentially nest on cliffs or in trees along the Yakima River nearby. The striped whipsnake, Vaux's swift, sage thrasher, and sage sparrow are unlikely to occur on the Springwood Ranch site due to the lack of suitable habitat.

Nine priority species potentially use suitable habitats on the Springwood Ranch site: sharp-tailed snakes, great blue herons, cavity nesting ducks, osprey, great gray owls, western bluebirds, big brown bats, pallid bats, and Rocky Mountain mule deer. Turkey vultures have been observed foraging over the Springwood Ranch site.

3.4.3.2 Impacts of the Proposed Action

Impacts to Birds from Construction and Operation

Impacts for the proposed project are projected primarily based on data collected at existing wind power facilities – the Vansycle Wind Plant (Erickson *et al*. 2000), the Foote Creek Rim Wind Plant (Young *et al*. 2003b), the Buffalo Ridge Wind Plant (Johnson *et al.* 2000a), and the more recently studied Klondike (Johnson *et al.* 2003) and Stateline (Erickson et al. 2003) Wind Plants, where mortality estimates have been made for all birds and adjusted for scavenging and searcher efficiency. An extensive post-construction study of two wind plants on Buffalo Ridge (MN) with 350 total turbines was conducted from 1996 through 1999. Total annual mortality was estimated to average approximately 2.8 birds per turbine. Based on a three-year study at Foote Creek Rim (WY), the total annual mortality associated with 69 turbines was estimated to be approximately 1.5 birds per turbine per year. At the Vansycle Wind Project (OR), total estimated mortality for 38 turbines was approximately 0.6 birds per turbine per year. Based on one year of study, estimates from the Klondike Wind Plant (OR) were 1.42 birds per turbine per year, and estimates for the Stateline Wind Plant (WA/OR) for all birds was 1.7 birds per turbine per year based on the first 18 months of study.

Wind plant construction could affect birds through loss of habitat, potential fatalities from construction equipment, and disturbance/displacement effects from construction and human occupation of the area. Potential mortality from construction equipment on site is expected to be quite low and similar to other wind projects. 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 might move to areas with less disturbance, however, breeding effort might be affected and foraging opportunities altered during the life of the construction.

Risk of Turbine Collision

Those species with the highest exposure indices for the proposed project were European starling, mallard, and American robin (**Table 3.4-8**). European starling was the most abundant species observed and was observed flying in the zone of risk about two-thirds of the time. Mallards were observed flying in the zone of risk most of the time. American robins, while observed flying in the zone of risk less than half the time, were one of the most common species on site (Young et al. 2003a). Monitoring studies at other wind plants have found fatalities represented by these species, but not in high numbers (see Erickson *et al.* 2001). European starling, a non-native species, is not protected and there is little or no concern over potential fatalities of this species. Potential impacts to bald eagles, which were observed foraging in the project area, are addressed in a subsequent discussion specific to threatened and endangered species. There have been no reported bald eagle fatalities at any wind plants in the U.S.

Based on the avian studies, use by birds of the project area is similar to other wind plants studied. The species diversity of the site was higher than some other wind resource areas, but overall avian use estimates were similar. Collision related impacts (fatalities) would not be expected to exceed what has been observed at other wind plants in the northwest. Impacts would be considered significant if they substantially exceeded the level of mortality (based on post construction monitoring) of individual bird (or bat – see below) species at similar wind plants in the northwest (e.g., Vansycle, Stateline, Klondike, Nine Canyon wind plants).

Waterfowl

Very little waterfowl mortality has been documented at other wind plants. The Klondike Wind Plant had relatively high use by Canada goose and two fatalities were found in the first year of monitoring. The Buffalo Ridge Wind Plant also had relatively high waterfowl use, but with few fatalities. The most common waterfowl species observed in the project area was mallard, although Canada goose and northern pintail were also seen in winter, and a variety of other species were seen incidentally in the study area. Waterfowl mortality could be expected, likely comprised mostly of mallards, however the total number of fatalities anticipated is low. While mallards were seen year round, the majority of waterfowl use was during winter. Based on wind monitoring data from the site, the winter months are the least windy and therefore the turbines would be operating less than in the spring, summer, and fall. For example, on average during the months of December, January, and February, the percent of hours when turbines would be operating at 100 percent capacity is approximately 14.9 percent. In contrast, during the months of June, July, and August the percent of hours of 100 percent operation would be approximately 45.5 percent, on average. Based on this, winter birds in the project area would presumably be at less risk of collision with a turning turbine blade.

Passerines

Passerines have been the most abundant avian fatalities at other wind plants studied (see Johnson *et al.* 2000a, Young *et al.* 2003b, Erickson *et al.* 2000), often comprising more than 80 percent 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 on-site, it is expected that passerines would make up the largest proportion of fatalities. Common species such as European starling, western meadowlarks, and American robin (all confirmed fatalities at other wind plants) would be most at risk. Nocturnal migrating species might also be affected, but would not be expected in large numbers based on data collected at other wind plants (i.e., no large [> 50 birds] mortality events have been documented (Erickson *et al.* 2001).

Raptors

Compared to other wind plants that have been studied, raptor use for the Desert Claim site is above average, with slightly more than one raptor (1.15) observed each survey. The majority of the raptor sightings were red-tailed hawks during the spring, summer, and fall, and rough-legged hawks during the winter. For comparison, raptor use was generally lower at several existing wind plants studied with the same methods. For example, raptor use at the Vansycle Wind Plant was 0.55, 0.49 at the Condon Wind Plant (OR), 0.90 at the Stateline Wind Plant, 0.70 at the Klondike Wind Plant, 0.74 at the Buffalo Ridge Wind Plant, and 1.10 at the Foote Creek Rim Wind Plant. However, raptor mortality at other newer generation wind plants is very low. The estimate of raptor mortality at the Foote Creek Rim Wind Plant is approximately 0.03 raptors per turbine per year based on a three-year study of 69 turbines. No raptor mortality was observed at the Vansycle Wind Plant or the Klondike Wind Plant during the first years of study. During a four-year study, 0.001 raptors per turbine per year were found at the Buffalo Ridge Wind Plant (Erickson *et al*. 2001). Raptor mortality at the Stateline wind project is one of the highest observed and is approximately 0.05 raptors per turbine per year based on an 18 month study.

Considering mortality results and raptor use estimates at these wind plants, it is estimated that potential raptor mortality at the proposed project would be approximately that of the Foote Creek Rim Wind Plant, or approximately 0.03 raptors per turbine per year. The Foote Creek Rim wind plant is the most similar to the Desert Claim site in terms of raptor use and it also has some similar topographic features. Using the Foote Creek Rim raptor mortality rate, a range of approximately 3 to 4 raptor fatalities could occur per year at the Desert Claim wind project if 120 turbines are constructed.

Raptor Nesting

Nest density for buteos (red-tailed hawk) within 2 miles of the EIS study area was 0.28 nest/mi^2 (0.11 nest/km^2), and 0.34 nest/km^2 (0.13 nest/km^2) for all raptors (buteos, owls). These densities are similar to the Stateline Wind Plant, 0.20 nest/mi^2 (0.08 nest/km^2), and the Combine Hills Wind Plant (Umatilla County, Oregon), 0.24 nest/mi^2 (0.09 nest/km^2) (Young *et al.* 2002).

Good raptor nesting habitat is located along the Wilson Creek riparian corridor east of the site and along the numerous power transmission lines within the project area. Nests closer to proposed turbines within the site are more likely to be affected by project activities, and may promote displacement effects such that raptors do not return and use nests. However, this potential impact is considered low because of the primary species involved (red-tailed hawk), proximity of proposed wind turbines to power lines, and being located more than one mile from the Wilson Creek riparian area.

Estimated Mortality

Actual levels of mortality that would result from the proposed project are unknown and could be higher or lower depending on patterns of movements through the area. The bird mortality rate for the proposed project is expected to be in the middle of the range, approximately 1.2 to 1.8 birds per turbine per year. If these estimates were applied to the proposed project, the range of potential bird mortality would be expected to fall between approximately 140 and 220 birds per year if 120 turbines are constructed. Because of the high use and diversity estimates by passerines in the study area, passerine fatalities are expected to comprise the majority of the avian mortality for the project.

Carcass searches at Foote Creek Rim have found passerine casualties associated with guyed met towers. Based on searches of five permanent guyed met towers at Foote Creek Rim over a three-year period, it was estimated that these towers resulted in approximately 8.0 avian casualties per tower per year, the vast majority of which were passerines. During searches of a freestanding met tower at the Klondike Wind Plant (OR), no avian fatalities were found after one-year of study. No avian fatalities were found during searches of a free-standing met tower at the Nine Canyon wind plant in Benton County, Washington, during the first year of operation (Erickson et al. 2003). As currently planned, the proposed project would have 5 permanent free-standing met towers. Based on the result of the above studies, no avian fatalities are expected that would be associated with these met towers.

<u>Impacts to Mammals from Construction and Operation</u>

Direct impacts to ground-dwelling mammals occurring on site would include fatalities from construction activities for turbine pads, roads, batch plant, substation, lay down areas, O&M facility, underground utilities, overhead power lines, and other facility development. Indirect impacts from these activities that would potentially affect mammals include loss of habitat important for inhabitance, foraging, and reproduction. However, mammals are expected to repopulate impact areas after construction activities cease and reclamation is complete. Some small mammal fatalities can be expected from O&M vehicle traffic. Overall, impacts are expected to be low and not significant.

Some comments submitted during scoping for the EIS expressed concern that the project might result in declines in the raptor population that would lead to an increase in the population of rodents that are prey species for raptors. Because certain rodents such as deer mice are carriers of hantavirus, which is an airborne pathogen that can be contracted by humans, the concern was that this indirect impact on rodents could result in increased risk of human exposure to hantavirus. The impact analysis for raptors (see previous discussion) determined that the Desert Claim project could have a low mortality rate for raptors. The level of raptor mortality associated with the project would not have a measurable effect on the raptor population. Consequently, there is no basis to assume there would be a corresponding increase in the rodent population or more widespread exposure to hantavirus. In addition, rodent populations are highly dynamic and annual fluctuations in populations are closely associated with habitat conditions and resources rather than predator populations.

Bat research at other wind plants indicates that migratory bat species are at risk of collision with wind turbines primarily during the fall season (see review in Johnson *et al.* 2003b; Erickson et al. 2003, Young et al. 2003). Most bat fatalities found at wind plants have been tree-dwelling bats, with hoary and silver-haired bats being the most prevalent Pacific Northwest fatalities. Although bat fatalities have typically been few in number, in some cases they have exceeded the number of avian fatalities (Johnson et al. 2003). During construction, impacts to bats and bat habitat on the EIS site are unlikely. Hoary and silver-haired bats may use forested habitats to the north and may migrate through the project area. If so, bat fatalities are anticipated during facility operation and would likely have an estimated mortality range similar to, or lower than, what was presented for birds. The WDFW has no data for bats in the project area (L. Stream, personal communication), and sparse information exists regarding bat populations in the region (**Table 3.4-9**). However, non-migratory and migratory resident bat populations do not appear to be negatively impacted by wind turbines (Johnson *et al.* 2003b, Johnson 2003, Gruver 2002). Additionally, hoary and silver-haired bats are broadly distributed in North American, occurring coast to coast, with the hoary bat having the largest distribution of any North American bat.

Impacts to Reptiles and Amphibians from Construction and Operation

Aquatic or moist habitats for amphibians and reptiles are restricted to a few riparian, wetland, and pond areas within the EIS study area. Impacts to these areas are not anticipated, and effective erosion and sedimentation prevention methods are expected in adjacent development locations. No herpetofaunal migration corridors are known to be present. As with ground-dwelling mammals, fatalities to snakes and lizards that are in burrows during construction are expected. If construction occurs during non-winter months, aboveground fatalities of the short-horned lizard are expected due to the slow moving nature of this species. Impacts from habitat loss to terrestrial reptiles are anticipated to be localized and temporary considering the vast adjacent area that is undeveloped shrub-steppe, and the eventual reclamation of areas disturbed only during initial construction activities. Again, some reptile fatalities can be expected from O&M vehicle traffic, but likely will mostly be garter snake species associated with varying hydroperiods of irrigation ditches and canals. Overall, impacts are expected to be low and not significant.

Impacts to Big Game from Construction and Operation

The study area is within habitats designated by WDFW as winter range for mule deer. The majority of the project area is within the Ellensburg mule deer winter range. Two high-density deer wintering areas –the Dry Creek and Dunning mule deer wintering concentration areas (each overwintering approximately 200 deer) – occur within 1.5 miles of the project,. The Quilomene elk migration corridor is an important spring pathway that encroaches upon the project's north boundary in T19R18 Sec. 4 and 9.

The WDFW has expressed concern over the potential effects of wind project construction and operations on wintering big game. Winter is a crucial time period for survival of many big game species. For example, deer cannot maintain body condition during winter because of reduced forage availability and increased costs of thermogenesis (Reeve and Lindzey 1991). Therefore, as deer expend more energy, body condition gradually declines throughout winter (Short 1981). Unnecessary energy expenditures may reduce body condition to a critical point determining winter survival, especially for fawns (Wood 1988). Overwinter fawn survival may decrease in response to human activity or other disturbances (Stephenson *et al.* 1996). Facility infrastructure may fragment suitable habitat, creating patches that effectively decrease the winter range available for big game. Habitat fragmentation 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). An associated WDFW concern is that habitat fragmentation and/or the physical construction and operations of the wind facility may displace big game and promote damage to agricultural crops within the project area and associated laterals. In contrast, if facility operations do not displace big game and hunting is not allowed, the WDFW is concerned that agricultural damage will occur and the project area will provide a big game sanctuary from hunters. No agricultural damage has occurred in the project area since the early to mid-1990's, which has been attributed to the allowance of hunting initiated at that time (R. Essman, personal communication).

There is limited information regarding wind plant effects on big game species. The Foote Creek Rim Wind Plant, Wyoming, appeared to have no effect on pronghorn (Johnson *et al.* 2000b). Pronghorn occurred in the area in low numbers and continued to use the wind plant area following construction. The potential effects of wind plant development on mule deer are even less well known. While Rost and Bailey (1979) showed that wintering mule deer in Colorado avoided a well-used road by 200 meters, Wisdom et al (2002) report that traffic and roads did not appear to be an important factor in spring distribution of mule deer in Oregon, and that selection of areas near roads with medium-level traffic occurred.

During the construction period, deer would likely be temporarily displaced from the project site due to the influx of humans and heavy construction equipment and associated noise and disturbance. Temporary loss of habitat from project construction is considered a minor impact due to vegetation reclamation and the vast expanse of suitable habitat for mule deer in the region. Once construction is complete, it is expected that deer would become habituated to wind turbines and again occupy areas within the wind plant. There will be intermittent disturbances from vehicle and human traffic during regular operations and maintenance (O&M) of the facility and also from turbine noise output and shadow flicker of moving blades. It is unknown if the level of traffic associated with O&M activities of the wind plant will reach mule deer tolerance thresholds. However, if at times thresholds are surpassed, it is expected that mule deer will be resilient and seek remote areas of nearby ravines or riparian areas. Should the facility eventually result in a sanctuary for deer due to reduced hunting pressure, seasonal use of the wind plant by big game may increase. Due to the current matrix of roads and increasing residential development, hunting in surrounding areas, and limited areas of hay production on the project site, it is expected that the wind facility will have little impact on the area's agricultural damage claims. In any event, should the facility result in a redistribution of deer in the area, it is likely that, over time, deer would become habituated to noise, human disturbance, and shadow flicker associated with the operating wind plant and repopulate areas within the project.

Van Dyke and Klein (1996) report that wintering elk shifted use of core areas out of view of human related activities associated with an oil well and access road. During spring, Wisdom et al. (2000) suggest that elk habitat selection may be negatively related to traffic and other human disturbance. However, Van Dyke and Klein (1996) concluded that if drilling activities occupy a relatively small amount of elk home ranges, elk are able to compensate by shifting areas of use within home ranges. The northernmost region of the project area overlaps approximately 320 acres of the southern edge of the Quilomene elk migration corridor. It is unknown to what extent this area is used by elk, or whether or not all of the project's acreage is within view. If this area of the project influences use by elk during construction or continued O&M activities, it is expected that elk would shift their path to the north without migratory hindrance due to the large size of the corridor.

Impacts to Threatened and Endangered Wildlife Species from Construction and Operation

Potential impacts from the Desert Claim project on threatened, endangered and sensitive wildlife species are addressed in detail in **Appendix C, Exhibit 1**. The analysis determined that the project would have no effect for most of the species listed as potentially occurring in or near the project area. Resource information indicated that gray wolf, northern spotted owl, western sage grouse, and western yellow-billed cuckoo are not likely to occur in the project area and that essential habitat for these species is lacking within the project area. For the majority of the state listed species, available information also indicates that they are unlikely to occur in the project area. Of the remaining state or federally listed species, bald eagle (federal and state threatened) and golden eagle, northern goshawk, loggerhead shrike, and sage thrasher (all state candidate species) were documented on or near the site and were considered in detail in the analysis. In addition, the WDFW provided information that indicated that due to diversion of water from First Creek into Green Canyon and eventually to the Reecer Creek subbasin, steelhead could possibly occur in Reecer Creek which flows through the western half of the project area (personal communication, B. Renfrow, WDFW, Ellensburg, Washington, January 16, 2004; see discussion in **Section 3.4.4**).

Based on species population factors and/or habitat use, the level of risk associated with the project for all five of the avian species was considered to be either low or very low. For bald eagle, project construction activity would be at least 3 miles from the Yakima River riparian corridor and would be unlikely to cause any temporary disturbance and habitat loss to eagles occurring along the river. Temporary loss of potential roosting habitat (scattered patches of trees) due to construction disturbance would be for the short duration of the construction period (9-12 months) and would affect only a minor portion of available roosting habitat. While bald eagles flying within the project area would have some exposure to turbine mortality, there have been no documented bald eagle fatalities at wind energy plants. Any mortality that might occur over the project life would be at a very low level and would not have a measurable effect on the bald eagle population. Operation of the project should have minimal disturbance effect on bald eagles, based primarily on their relatively low use of the project area (see Youn et al. 2003a).

There would be little potential for direct or indirect effects from construction of the wind plant (mortality, disturbance or displacement effects) on golden eagles; given the current use of golden eagles of the proposed wind project site, mortality for this species due to the project is expected to be nearly zero. Northern goshawks appear to be a rare migrant or transient through the project area, and there is little potential for direct or indirect impacts on goshawks from construction or operation of the wind plant. The loggerhead shrike and sage thrasher are possible breeding residents in the study area and were observed in low numbers during the spring and summer. Development of the project facilities would result in the loss of a small amount (approximately 38 acres) of shrub steppe vegetation type, which is considered breeding (nesting, foraging, loafing) habitat for sage thrashers and loggerhead shrikes. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur.

Loggerhead shrikes and sage thrashers in the area might be at risk of collision with turbines; however, due to the low level of use of the project area by these species, mortality impacts are not expected to be substantial.

3.4.3.3 Impacts of the Alternatives

Alternative 1: Wild Horse Site

Some impacts to wildlife species, in particular avian and bat species, are expected to occur from Alternative 1. These would include direct impacts such as mortality and 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 and operation impacts are discussed, and would likely be very similar to the impacts of the Desert Claim project because of the similar vegetation types and avian species at these sites.

Birds

Construction: Wind plant 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. Potential mortality from construction equipment on site is expected to be quite low and similar to the other two projects. 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 might move to areas with less disturbance, however, breeding effort may be affected and foraging opportunities altered during the life of the construction. No disturbance or displacement impacts to raptor nests are anticipated, since no active raptor nests were identified within ½ mile (0.80km) of Alternative 1 facilities.

Operations: The most probable impact to birds resulting from Alternative 1 is direct mortality or injury due to collisions with the turbines or guy wires of temporary or permanent meteorological towers. Most of the fatalities would likely involve resident songbirds such as horned lark, vesper sparrow, and western meadowlark, and other common species such as European starlings. 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 low (Erickson *et al.* 2001). Waterfowl and other waterbird (e.g., gulls) mortality is estimated to be low, given the low use of the project area by these groups. Raptor mortality is expected to be similar to, or lower, than the Foote Creek Rim Wind Project (0.03 raptor fatalities per turbine per year).

Based on the available information, it is probable that some disturbance or displacement effects might 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.

No impacts to federal endangered, threatened or sensitive status bird species from Alternative 1 are anticipated. A single bald eagle was observed on the Wild Horse site, but use by this species was so low that no impacts are expected. Some mortality of state sensitive species such as sage thrasher and loggerhead shrike might occur during the life of the project.

Bats

Some mortality of migratory bats, in particular hoary and silver-haired bats, would be anticipated during operation of Alternative 1.

Other Mammals

Other mammals that likely exist within the Wild Horse site include, badger, coyote, pocket gopher, Pauite ground squirrels and other small mammals such as rabbits, voles and mice. Construction of Alternative 1 might 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 would result in loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals would lose the use of the permanently impacted areas; however, due to their abundance and prolific breeding abilities 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

Construction impacts to reptiles and amphibians on site would be loss of habitat and mortality occurring in construction zones. Provided best management practices are employed on site and compliance with applicable permits regarding runoff and sediment control is 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 in the development areas. 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 underground burrows for cover or during periods of winter dormancy. Excavation for turbine pads, roads or other 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.

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.

Alternative 2: Springwood Ranch Site

Developing a wind plant on the Springwood Ranch property would result in impacts on wildlife and habitat similar to those described for the Desert Claim site. Wildlife species displacement or disturbance by this alternative would be similar in type to those from the proposed action, but smaller in magnitude because of the smaller project footprint for Alternative 2. Development within the deciduous and coniferous woodlands on the site would likely eliminate snags and down woody material from within these habitats on site. Forest wildlife species would be affected to a greater degree than under the proposed action, while grassland wildlife would be affected to a similar extent. Affected species would include raptors, small mammals, magpies, crows, sparrows, meadowlarks and some reptiles. Effects to riparian and wetland species would likely be similar to the proposed development because similar development buffers would apply. Impacts on local populations of large game animals would be similar due to similar types of suitable deer and elk habitat and disturbance from development. Disturbance from human activity would adversely affect wildlife and habitat generally as described for the Desert Claim proposal.

Deer and Elk

The development of the Springwood Ranch site would have little direct impact on elk, as there is little use of the site by elk and the riparian areas along the Yakima River and Taneum Creek would be protected by existing regulations. Deer use of the site appears to be similar to use of the Desert Claim site, and impacts from Alternative 2 would likely include disturbance and displacement impacts from construction activity. Indirect impacts associated with human activities could reduce the suitability of the retained habitat but it is likely that deer would become habituated to a wind plant at this site, especially if there were reduced hunting pressure on the site after construction.

Endangered, Threatened, and Sensitive Wildlife

Increased disturbance of winter concentrations of bald eagles could occur along the Yakima River and bald eagles in the area would be subjected to similar risk factors associated with wind plants as the Desert Claim site. Habitat loss could affect other state-listed species or species of concern, such as loggerhead shrikes, western bluebirds and sage thrashers. Most other endangered, threatened or sensitive wildlife species are not expected to be affected by development of this site because they are either unlikely to occur on the site or are present there very rarely.

No Action Alternative

Under the no action alternative the proposed Desert Claim Wind Power Project and all associated features would not be constructed. There would be no environmental impacts from the wind power facility. Production of a comparable amount of electric power could occur through other technologies, such as natural gas, which could have significant environmental impacts on the wildlife habitat and wildlife. The location of any such alternative generation is uncertain, and would not necessarily be within Kittitas County or Washington State. Land conversion in the area for residential development could also have significant impacts in the form of habitat loss and displacement of wildlife, especially big game from important wintering areas.

3.4.3.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.4.3.5 Mitigation Measures

Mitigation and monitoring measures that have been implemented at other, newer-generation wind plants, in particular those in the Washington and Oregon region, represent possible mitigation measures for the Desert Claim project.

Technical Advisory Committee

A Technical Advisory Committee (TAC) could be formed to implement and evaluate a mitigation and monitoring program and determine the need for further studies or mitigation measures once the project is operational. The TAC would be composed of representatives from Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Kittitas County, landowners, the project owner/developer and other affected interests such as conservations groups (e.g., Kittitas Audubon Society). The role of the TAC would be to determine and coordinate appropriate mitigation measures, monitor impacts to wildlife and vegetation, and address issues that arise regarding wildlife impacts during project operation.

Mitigation Actions

The primary impacts associated with the project are expected to be loss of shrub steppe habitat, fatalities of birds, and potential displacement effects on mule deer. The following are potential mitigation measures for these impacts:

- The overall design of the wind plant would minimize perching opportunities for raptors and other birds, for example, tubular towers would be used for the turbines and met towers and use of overhead powerlines in the project would be minimized.
- Sensitive wildlife areas such as the riparian corridors and raptor nest sites could be mapped, flagged, and/or identified to all contractors working on-site and could be designated as no disturbance zones during the construction phase.
- During project construction, best management practices could be employed to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint.
- A site management plan could be developed to, at a minimum, identify sensitive wildlife areas (e.g., raptor nests), provide adequate on-site waste disposal, and establish fire management and erosion control procedures.
- Raptor nests within ½ mile of construction areas could be monitored for activity prior to construction to determine the need for construction timing restrictions around active nests.
- All power and communication lines on-site could be buried underground where feasible.
- All overhead power line poles could be equipped with anti perching devices.
- Permanent met towers on-site will be free standing structures with no guy wires minimizing the potential for avian collisions.
- The modified turbine layout does not have turbines within 50 meters of the rim edge of steep slopes within the E1/2 of Sections 26 and 35, T19N, R18E, which showed higher than normal use by raptors during the baseline studies (see Young et al. 2003).
- Construction could take place primarily during the summer months, minimizing disturbance to wintering big game from construction activities

In addition to the above mitigation measure it is anticipated that other measures will be developed durin consultation with the USFWS about potential impacts to bald eagles. Appendix C, Exhibit 1 identifies several conservation measures that are likely to be implemented to minimize impacts to bald eagles.

Monitoring

A post-construction monitoring study is typically implemented to quantify project impacts to avian and bat species and assess the need for additional mitigation measures, for example unanticipated big game issues. The post-construction monitoring plan would be developed in coordination with the TAC. The monitoring plan for the project would, at a minimum, contain the following components:

- One year of standardized fatality monitoring involving carcass searches, scavenger removal trials, and searcher efficiency trials.
- A standardized procedure for O&M personnel instructing how to report incidental fatalities or injured birds for the life of the project.

The protocol for the fatality monitoring study would be similar to protocols used at other, newer-generation wind plants in northeastern Oregon and southeastern Washington. In addition, consideration could be given to developing, in cooperation with other industry participants, a focused monitoring study that addresses a specific question regarding impacts from wind plants. For example:

- Investigate effects of different turbine lighting schemes on avian mortality.
- Investigate the impact of the facility on wintering mule deer.
- Investigate whether wind turbines attract migrating bats.
- Investigate mechanisms for deterring migrating bats from turbines.

Such a study would be intended to provide information useful for future wind power planning and permitting, but would not affect mitigation requirements for the Desert Claim project.

3.4.3.6 Significant Unavoidable Adverse Impacts

Due to the relative lack of knowledge regarding migratory routes, population levels and trends, and reproductive patterns, it is difficult to assess with certainty any large-scale adverse impacts of wind plants on bat species such as hoary and silver-haired bats. Fatalities of these species occur at existing wind plants and are likely at the proposed wind project, unless the cause of their vulnerability to turbines is identified and possibly mitigated for; fatalities are currently unavoidable. Bat mortality at the proposed project area is expected to be insignificant at the local scale. However, it is unknown if cumulative impacts of all three Kittitas wind projects, in synergy with other wind plants in the Pacific Northwest and North America, could be a significant population sink to species such as hoary and silver-haired bats.

3.4.4 Fish

3.4.4.1 Affected Environment

Desert Claim Project Area

The affected environment considered for fish includes surface waters in the project area and receiving waters downstream of the area. As described in **Section 3.3, Water Resources**, 19 streams are present within the project area and immediate vicinity. There are 5 streams onsite classified as Type 3 waters; all others are classified as either Type 4 or Type 5 waters, using Washington's interim water typing system (WAC 222-16-031, see **Table 3.3-1**). Type 3 waters flow year round and have moderate to slight fish, wildlife, or human use. Type 4 waters flow year round while Type 5 waters are seasonal. Both Type 4 waters and Type 5 waters are considered non-fish habitat streams.

WDFW habitats and species maps and the StreamNet database (WDFW 2003) indicate there are no fish-bearing streams in the project area. These sources also show that water bodies in the project area, including wetlands, streams, irrigation canals and several ponds, do not contain any “priority fish species,” as defined by the WDFW. No survey information was available for these waters. Subsequent to the Draft EIS, however, WDFW provided anecdotal information to Kittitas County and the applicant that steelhead trout (the anadromous form of rainbow trout) had been observed in First Creek and it was possible that juvenile steelhead could be diverted to project-area streams through irrigation facilities (see discussion of threatened and endangered species below).

Aquatic fauna observed during field visits to the project area included crayfish. In addition, lamprey amoecetes may inhabit portions of the project area. If any fish species were present in these other water bodies, they would most likely be introduced warm-water fish that would not be subject to federal or state regulations. According to the WDFW, priority habitats in the project area include riparian areas located along streams. These areas are described in **Section 3.4.3**.

The majority of the project area streams 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.

Downstream from the project area, Reecer Creek and Currier Creek contain resident fish and priority resident fish, including rainbow trout. Upstream from the project area, Reecer Creek contains westslope cutthroat trout, a priority resident fish. Priority anadromous fish are located downstream from the project area in the lower 1.0-mile (spring chinook) and the lower 2.6-miles (summer steelhead) of Reecer Creek, and throughout the Yakima River (spring chinook and summer steelhead) in the area below Reecer Creek. In addition, there have been a few observations of bull trout, a priority resident fish, in the Yakima River.

The project area is within the Middle Columbia River Evolutionarily Significant Unit (ESU). In this ESU, spring chinook is not warranted for threatened or endangered listing at this time, and the summer steelhead is listed by NOAA Fisheries as a federal threatened species. The bull trout in the Yakima River is listed by the USFWS as a federal threatened species.

The Middle Columbia River population of steelhead includes those individuals that use the Yakima River. The steelhead that use the Yakima River spawn in the summer and are referred to as summer steelhead. Individual steelhead from the Middle Columbia River ESU are known to utilize the Yakima River and also Reecer Creek south (downstream) of the project (WDFW PHS 2002). Due to water diversions for irrigation and the intermittent nature of many of the streams in the project area, it has commonly been believed that steelhead using the lower reaches of Reecer Creek would not occur within the project area.

According to recent information from the WDFW, however, a radio-tagged steelhead was observed to have spawned in First Creek north of the project area (personal communication, B. Renfrow, WDFW, Ellensburg, Washington, January 16, 2004). Water in First Creek is diverted via an unscreened diversion facility into a ditch that winds over a low pass into Green Canyon and intercepts a few other small streams (see map in **Appendix C, Exhibit 1**). Fish in First Creek can be transferred via the ditch to the canal in Green Canyon and other small tributaries, and eventually into the Reecer Creek sub-basin. Because an adult steelhead spawned in First Creek, it is possible for juvenile steelhead to occur in the ditch and move down to the Reecer Creek drainage above the North Branch Canal and through the Desert Claim project area. Streams and interconnected channels in the Reecer Creek sub-basin could therefore be rearing habitat for juvenile steelhead.

<u>Wild Horse (Alternative 1) Site</u>

Based on available information, no fish occur in the Wild Horse area. The nearest fishery is located along Quilomene Creek approximately 1 mile (1.6 km) to the north of the site. The lower ends of Whiskey Dick, the North Fork of Whiskey Dick and Skookumchuck Creeks contain rainbow trout, and summer steelhead is identified along the lower end of Whiskey Dick Creek as well. These fisheries are more than 5 miles to the east of the project area for Alternative 1.

<u>Springwood Ranch (Alternative 2) Site</u>

The Springwood Ranch site borders the southwest side of the Yakima River. Land uses in the basin include ranching and farming. The river in this area is for the most part within a moderately confined canyon with banks extending up to several hundred feet above the river surface. A few small floodplains exist; however, they are currently on the other side of the river from the site. Taneum Creek crosses the southern portion of the site.

Fish Habitat and Species Present

The Yakima River, in the vicinity of the Springwood Ranch site, supports only one run of anadromous salmonid, the spring chinook salmon. Steelhead trout, although rare in the upper Yakima River system, and Pacific lamprey are present. Resident rainbow and cutthroat trout are common to the area, and the eastern brook trout is likely present. Bull trout have been reported within the project area near the mouth of Swauk Creek. Other common species in the area include sculpin, mountain whitefish and dace.

Channel morphology in the Yakima River between Manastash and Swauk Creek consists primarily of long runs with occasional deep pools. Large boulders provide some cover; however, large woody debris frequency is low. Overall cover protecting the river is rated poor. Side-channels are present and offer off-channel rearing opportunities, but can dry up in the late summer and fall as flows drop. Rip-rap placed along the margins where the railroad approaches the river impairs habitat quality along the south shoreline. Spawning habitat is present, but the impact of high irrigation flows on summer habitat quality is considered to be a major problem for survival of juvenile steelhead.

Resident trout and anadromous fish species have historically used lower Taneum Creek for spawning and rearing. More recent surveys have found rainbow and cutthroat trout, eastern brook trout, steelhead and spring chinook salmon in the river. Spring chinook juveniles were observed in the creek, indicating that spawning adults may be present. The fish are generally confined to the lower 1 mile of the stream.

Lower Taneum Creek is contained in a low-gradient channel with good gravel and rubble available for spawning. The riparian area has been degraded by adjacent land use in many areas, but in others a combination of scrub brush and willow is present. This changes to deciduous and conifer canopy in the upper basin. Upstream fish migration has in the past been hindered by irrigation diversions. Water withdrawals have degraded habitat value in the lower basin by reducing the size of the stream, influencing water temperature and hindering upstream migration. The creek is listed under the Clean Water Act as an impaired water body because of inadequate instream flows and the resulting damage to fish runs.

Threatened, Endangered, Sensitive and Other Priority Fish Species

The Columbia River district population segment of bull trout is listed as a threatened species under the Endangered Species Act. The mid-Columbia River evolutionarily significant unit of steelhead trout is listed as a threatened species. Bull trout and steelhead trout populations in the Yakima River are included in this determination. The Springwood Ranch area does not currently support any other known populations of fish species listed as endangered or threatened under the ESA. The PHS list (WDFW, 1997) includes two fish species that potentially occur within the Alternative 2 project boundaries. The bull trout and steelhead trout are listed as candidate species, and considered vulnerable to significant population declines.

3.4.4.2 Impacts of the Proposed Action

The impact assessment on fish is based on evaluation of the turbine layout provided in the Desert Claim application and displayed in **Section 2.2** of the EIS. However, the applicant intends to conduct subsequent micro-siting of turbines, roads, interconnection lines and other project features to avoid impacts to streams and associated fish habitat.

Potential impact mechanisms that could harm downstream fish populations include erosion/sedimentation and loss of riparian cover. Sediments can bury fish eggs and reduce foraging ability, while loss of riparian cover can increase water temperatures (due to reduced shading) and reduce potential nutrient and food contributions. The proposed project would be considered to result in a significant impact to fish if:

- A population of a threatened, endangered, or other sensitive species would be affected by a reduction in numbers; alteration in behavior, reproduction or survival; or a loss or disturbance of habitat;
- There would be a substantial adverse effect on a species, natural community, or habitat that is recognized as biologically significant in local, state, or federal policies, statutes, or regulations; or
- There would be any impedance of fish migration routes that lasts for a period that significantly disrupts migration.

Table 3.4-10 provides a summary of potential temporary (construction) and permanent (operations) impacts to fisheries resources. Impacts are discussed below for the project area and for downstream areas.

Table 3.4-10
Potential Impacts to Fishery Resources

Waterbody	Temporary Impact Level	Permanent Impact Level	Mitigation
On-site streams	Low	Low	Best Management Practices prescribed by required construction permits (see mitigation)
Currier Creek	Low	Low	Same
Reecer Creek	Low	Low	Same
Yakima River	None	None	None; no adverse impacts expected

Within Project Area

Activities associated with project construction were evaluated for potential adverse effects on streams and potential fish habitat. Possible impact sources include disturbance of bed and banks of ephemeral, intermittent, and perennial streams; removal of riparian areas adjacent to the stream banks; and the potential filling in and relocation of portions of ephemeral or intermittent streams. Impact mechanisms considered included road crossings in headwater streams that drain into fish-bearing streams, and potential tower placement in streams or sensitive riparian areas.

As discussed in **Section 3.3**, seven stream segments are overlapped by currently planned locations for construction disturbance around wind turbines. In addition, the turbine locations and construction zones would disturb riparian areas along Reecer Creek and Jones Creek. A total of about 0.25 acres of riparian habitat could be affected by temporary construction disturbance, while an estimated 0.03 acres of stream and riparian habitat would be permanently displaced by wind turbine pads and associated facilities. The project access roads also cross 16 streams (8 of which are crossed at least twice) and 2 of the 3 priority riparian areas. If relocation of facilities to avoid these areas were not feasible, mitigation would be developed to enhance or replace riparian areas. Based on the extremely small area of temporary and permanent impacts, construction effects resulting in temporary or permanent displacement of fish habitat would be negligible.

Other potential effects on fisheries would be associated with installing culverts at stream crossings. Construction time would be minimized when installing the culvert at the road to minimize impacts and maintain normal stream flow. Runoff from construction activities near waterbodies could also result in indirect impacts, although this effect would be relatively minor and would be controlled by implementation of erosion and sediment controls. Therefore, with appropriate mitigation, the proposed project is expected to have only temporary impacts on stream resources.

None of the streams in the project area are known to contain fish communities, although it is conceivable that juvenile steelhead may be present in some waters (as discussed in **Section 3.4.4.1**). Consequently, potential adverse impacts to fish are expected to be minor, and limited to downstream impacts. However, the possible presence of juvenile steelhead in some waters presents a situation that would likely require specific coordination and mitigation measures. Based on the modified layout, project access roads would cross Reecer Creek, tributaries to Reecer Creek or other interconnected waterways from the Green Canyon channel in multiple locations, and steelhead could occur in any of these waters. Construction at these stream crossings could affect juvenile steelhead directly though mortality or indirectly through reduced habitat conditions from water quality degradation (sediment, fuel/oils contamination) or blockage if the crossing did not allow fish passage. Impacts to streams and waterways would be minimized or avoided by the use of Best Management Practices (BMPs) for construction and operation, appropriate and adequate site management practices, and erosion control measures; however, the in-stream construction required to place culverts and road fill would result in some temporary, localized sedimentation from disturbance of stream bottoms and stream banks, and the placement of fill material. Because the crossings (culverts) would be designed to allow continual water flow and fish passage during low water conditions, long-term impacts to fish movement would be minimized.

Downstream of Project Area

Potential adverse impacts of the proposed action upon fisheries resources that may be present in downstream areas were also considered. The federally threatened summer steelhead is located in Reecer Creek and in the Yakima River downstream from Reecer Creek. Some erosion and sedimentation is expected to occur downstream due to construction of the project. The effect on fish, including special-status species listed in **Appendix C**, would not be significant, however, because the proposed action must meet a series of regulatory requirements prior to construction. These include a Kittitas County Critical Area Review, Washington State Hydraulic Project Approval, a National Pollutions Discharge Elimination System (NPDES) permit, and Section 404/wetland permits (or collectively through a Joint Aquatic Resource Permit Application, or JARPA). Best Management Practices, as listed in **Section 3.1.5**, would be applied as a condition of such permits. These regulations, together with the fact that most construction would occur during dry periods, would adequately protect downstream fisheries from potential effects associated with project construction.

3.4.4.3 Impacts of the Alternatives

Alternative 1: Wild Horse Site

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 under Alternative 1.

Alternative 2: Springwood Ranch Site

Alternative 2 could pose a higher risk of adverse impact to fish-bearing waters than the proposed action, because the Yakima River and Taneum Creek support important fish habitat and are located close to wind energy development that would occur under Alternative 2. The potential for greater construction-related impacts, primarily delivery of sediment to fish habitat, would exist even though required shoreline setbacks would avoid construction disturbance close to the streams. The temporary disturbance area and permanent footprint of Alternative 2 would be smaller than for the proposed action, so there would be less overall exposure of soil to erosion under Alternative 2. As discussed in **Section 3.3**, however, some of the turbine locations are near the top of steep slopes above the Yakima River or Taneum Creek that have been identified as high erosion and/or landslide hazard areas. These physical conditions represent localized concerns for potential impacts to fish habitat from construction disturbance, and might warrant site-specific mitigation measures in addition to the standard BMPs.

Development of Alternative 2 could affect habitat in the Yakima River and Taneum Creek used by bull trout and steelhead trout. The types of impacts possible would primarily involve delivery of sediment or other pollutants from construction areas to these water bodies, particularly if construction occurred in or near areas of high erosion or landslide hazard. While standard construction BMPs might be sufficient to avoid or minimize such impacts, site-specific evaluation of construction plans and protective measures might be required.

No Action Alternative

Under the No-Action Alternative, the proposed wind power facility would not be constructed. As such, the No-Action Alternative would result in no foreseeable new impacts to wetlands or streams and any fish habitat they might support. Existing and future land uses, including agricultural activities and low-intensity residential development, would continue to have direct and indirect effects on fish habitat in the project vicinity.

3.4.4.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.4.4.5 Mitigation Measures

Mitigation measures discussed in **Section 3.3.5** for surface water could also be implemented to minimize impacts to fish resources. Turbine and project access road locations would be evaluated during the Critical Areas review process, and micro-site analysis would be conducted to identify opportunities to avoid and/or minimize impacts to water bodies and/or wetlands and associated fisheries resources downstream from the project area.

The project would be designed to use existing roads where possible. The current road layout was determined to have the least impact upon stream resources. All crossings would be created with appropriately-sized culverts. The optional use of oversized culverts buried below the normal water line would allow a natural stream bottom to form inside the culvert, further minimizing habitat effects. Any work adjacent to streams would adhere to applicable federal and state regulations and would be addressed in detailed project plans.

Best Management Practices (BMPs) would be initiated to minimize impacts to fisheries resources located downstream from the project area. BMPs would be initiated to retain sediment from disturbed areas and minimize areas of disturbance. In addition, most of the streams are intermittent and therefore are likely to be dry during construction. Mitigation measures would include replacement of any riparian or wetland areas impacted by the project. Consequently, no adverse impacts to summer steelhead are expected as a result of the project.

Unavoidable impacts from these activities, such as clearing and grubbing of tree and shrub species, would also be minimized. The construction footprint at all stream or water channel crossing should be strictly minimized to avoid peripheral impacts to stream habitat. BMPs would include establishment of sediment retention basins and installation of erosion control devices (i.e. silt fence, covering of disturbed soils). Mitigation measures would include replanting of native species in areas that were disturbed as a result of the project. However, in certain areas, tree and shrub replacements would require more than 1 year to attain existing size. Consequently, disturbance of riparian areas would be an unavoidable impact, but mitigation measures would provide for long-term recovery.

Furthermore, if stream communities were disturbed during construction, the following measures would be implemented to avoid adverse impacts to downstream fish communities:

- Construction geotextile and sediment retention systems would be used for soils stabilization at road crossings, riparian areas, and within or along streambanks.

- Construction equipment refueling stations should be a minimum of 100 feet from any drainage, stream, irrigation channel or riparian area.
- Appropriately sized culverts would be used at all stream crossings, and all stream and channel crossings should be designed to allow continual water flow and ensure fish passage under all conditions.
- Native trees, shrubs, and erosion control grasses would be used in all disturbed riparian areas.

NOAA Fisheries, USFWS, and WDFW would be consulted prior to project construction regarding the possible presence of juvenile steelhead in project-area waters. The consultation process could result in the identification of additional mitigation measures beyond those listed above.

3.4.4.6 Significant Unavoidable Adverse Impacts

With appropriate mitigation, as required by the existing regulatory framework, potential impacts to fish habitat and/or fish populations would be minor and temporary. The extent of temporary disturbance of stream beds and banks that represent possible fish habitat would be minimized during construction, best management practices would be used to control erosion and sedimentation from disturbed areas, and the disturbed areas would be restored following construction. Road crossings at streams would be designed to maintain stream flow and fish passage at all times, preventing possible flow-related impacts to fish over the long term. Therefore, no significant unavoidable adverse impacts to fish resources are expected as a result of the proposed project.

3.5 ENERGY AND NATURAL RESOURCES

This section describes the potential impacts on the production, use and supply of energy and other natural resources resulting from the proposed Desert Claim Wind Power Project. The proposed project would require some use of energy and natural resources for construction and decommissioning. Negligible amounts of energy and natural resources would be necessary to operate the project, and most of that would be allocated to maintenance activities. The turbines themselves would require nearly no additional input of energy once they are constructed. The project would generate a substantial amount of electrical energy on a long-term basis.

3.5.1 Affected Environment

Existing energy sources in Kittitas County include natural gas for heating and cooking and electricity. Both Kittitas County Public Utility District (PUD) No. 1 and Puget Sound Energy supply electricity to retail customers in the county. Only PSE supplies natural gas. Petroleum-based fuels and other products are used to operate motor vehicles and construction equipment. These goods are not produced in Kittitas County but are available locally through a variety of wholesale and retail outlets.

The only existing electricity production facility in Kittitas County is the Wanapum Development, operated by the Grant County PUD No. 1. It consists of a dam and hydroelectric generating plant located on the Columbia River in Grant and Kittitas Counties approximately 3 miles downstream from Vantage. The Wanapum Development has been in full commercial operation since January 1965. The Wanapum Development generating plant has a rated capacity of 1,038 MW (Grant County PUD 2003). While relatively little electricity production takes place in Kittitas County, large amounts of electrical energy are transported through the county by a number of existing high-voltage transmission lines.

Current production of non-renewable natural resources in Kittitas County is primarily limited to sand, gravel and related materials mined from quarries distributed in many locations within the county. Construction activities in the local area account for most of the consumption of these resources. Metallic minerals historically supported mining in certain locations, and small-scale mineral production may continue. Some rocks and minerals found in the county are of interest to collectors.

Residential and agricultural water users in the project vicinity primarily obtain water supplies through private wells. The majority of water use in the project vicinity is for agriculture. The Kittitas Reclamation District (KRD), a local irrigation district, owns and operates the North Branch Canal, a gravity fed water supply system, which traverses the south portion of the project area. The canal supplies water for agricultural activities to areas south of the canal.

Renewable resources common in Kittitas County include wood fiber and wind. Much of the county is covered by forest land and the area has a long history of logging, timber management and wood production. Over 660,000 acres of land in Kittitas County have been designated as commercial forest land under the County's Comprehensive Plan. As discussed in **Chapter 2**, wind-energy resource maps indicate that relatively extensive areas of Kittitas County have average wind speeds that may be sufficient to support commercial production of wind energy. In general, these areas are distributed in certain locations around the margins of the Kittitas Valley.

Baseline conditions with respect to energy and natural resources for the Wild Horse and Springwood Ranch sites are similar to those described previously for the Desert Claim project area. The project area for Alternative 1 is within the service area for the Kittitas County PUD. There are no irrigation canals or other public water supply facilities near the Wild Horse site; all water used for agricultural and residential use is obtained from private wells. Two main irrigation canals operated by the Kittitas Reclamation District (KRD) cross the northwestern portion of the Springwood Ranch, although most water users located nearby obtain their water from wells.

3.5.2 Environmental Impacts of the Proposed Action

Operation of the project would not require use of natural gas, other than as a possible source of heating for the project operations facility. Electricity needed for construction and operation of the project would likely be supplied by Kittitas County PUD, although small-scale portable diesel generators might be operated to supply electricity used in the construction process. Electrical power could be delivered to the site through the PUD transmission and distribution system (Kittitas County 1999).

Energy and natural resource impacts resulting from the modified project configuration evaluated in the Final EIS would be essentially the same as for the proposed action evaluated in the Draft EIS. Natural resource inputs required for project construction would be reduced slightly, compared to the proposed action described in the Draft EIS, because the modified project configuration includes use of wind turbines with somewhat smaller towers (213 feet in height at the rotor hub, compared to 262 feet for the turbine model addressed in the Draft EIS) and slightly shorter rotor blades (127 feet, versus 131 feet). Construction and operation impacts to energy and natural resources would remain insignificant with the modified project configuration.

3.5.2.1 Construction

The proposed wind generation facility would be constructed using materials that require energy for their production. Energy would be required to transport these materials to the project site and to operate the necessary construction equipment, such as cranes, trucks, and tools, to assemble the turbines, dig cable trenches and construct substations. Expected energy consumption during the construction phase of the proposed project would include diesel and gasoline fuel for mobile construction equipment and electricity for operation of power tools.

Energy consumption during the construction phase of the project would not require large volumes of fuel or electricity and would not significantly affect locally available energy resources. Petroleum-based fuels for construction equipment and temporary electricity would be purchased from local or remotely located commodity and material suppliers. The amount of diesel fuel, gasoline and electricity necessary for construction of the project would be small relative to the use of those resources in the County as a whole, and would represent a temporary use of such resources.

Other non-renewable natural resources used in the construction of the proposed project would include sand, gravel, steel and concrete. Gravel would be used as base and surface material in construction of the project access roads, and as an input to the concrete used for turbine and transformer pads. The sources for sand and gravel have not yet been identified, but it is anticipated that these materials would be acquired from permitted, local sources near the project area or in the community. The sand and gravel needed for the project would not represent a major new demand for material relative to the existing overall supply in the area. Steel used to construct the wind turbine towers would be purchased on the international market, fabricated in a non-local manufacturing plant and shipped to the project area.

It is likely that that the project would utilize local water resources for the construction phase of the project. The water would be used for project dust controls during construction and, in the event that an on-site concrete batch plant is utilized, some temporary water supply would be needed for concrete manufacture. The source of the temporary water for construction has not yet been determined. The amount of water required would be modest, and could be purchased from existing sources or obtained through development of an exempt well producing less than 5,000 gallons per day. The amount of water needed would not have an impact on water supply in the local area.

Construction contractors and crews would follow applicable conservation standards for fuel and water use and for waste disposal.

3.5.2.2 Operation and Maintenance

The proposed project would have a nameplate generating capacity of at least 180 MW of electricity for sale over the 30-year operating life of the project. Based on use of a 33-percent plant factor that is typically assumed for wind-energy facilities (i.e., actual wind conditions experienced are usually sufficient for energy production to average one-third of the nameplate capacity), average annual generation is expected to be approximately 60 MW. At that level, annual energy production would be approximately 525,000 megawatt-hours (MWh) per year. To achieve this output the project would consume very little additional electricity or resources. A small amount of electricity would be needed to operate the project's control and safety systems (including lights), and small amounts of petroleum products would be used in servicing the turbines and operating maintenance vehicles.

Power produced by the project would be delivered to the regional power grid and transmitted to load centers. The location(s) of those load centers would depend upon the terms of future power sales agreement(s) to be executed by Desert Claim Wind Power LLC. Possible purchasers of the project's output include public utilities and/or investor-owned utilities in the Northwest, the Bonneville Power Administration (the federal power-marketing agency serving the Northwest), and/or private-sector power-marketing entities. It is not possible to predict at this time where the output would be delivered, or how much of the electricity might be used in the local area. It is conceivable that none of the project's output would be consumed at the retail level in Kittitas County if the power ooutput from the project were purchased by a utility that does not serve the local area. Alternatively, if one or all of the electric utilities serving Kittitas County (PSE, City of Ellensburg and the Kittitas County PUD) purchased electricity from the project, energy from the Desert Claim project would likely be blended with the respective utility's existing electric supplies and therefore would serve the local market. Therefore, it is likely the proposed project would have little or no impact on the supply and price of electricity available to local consumers.

Project operations and maintenance vehicles would need a small supply of diesel fuel and gasoline (for patrolling the site and servicing the turbines) once the project is operational. These resource demands would have no impact on the local supply or price of fuel.

During operation of the proposed project the primary renewable resource utilized to generate electricity would be wind. Project operation would use minor amounts of non-renewable resources. The project would also use efficient lighting in all of its facilities. The amount of electricity produced by the project would be far greater than the amount of energy needed to operate and maintain it, representing a large net gain in the production of electricity.

If an operations or maintenance facility is located within the project area, a new groundwater well withdrawing no more than 5,000 gallons per day might be installed to provide water supply for employees at that facility.

3.5.2.3 Decommissioning

Energy and resource utilization during decommissioning would be similar to utilization for construction. Likely resources would be fuel for construction equipment and transportation. The amount and type of fuel that would be necessary after the 30-year life of the project is not known. Water, or some other suppressor, would be required to suppress airborne dust.

Unlike the construction phase, decommissioning would not require any additional sand, gravel, or concrete. It would require additional waste disposal. Additionally, decommissioning might require soil to fill pits and trenches where the concrete bases and utility cables where removed. Soil might also be necessary for reclamation efforts on disturbed land.

The footprint of the project is small relative to the size of the project area. Decommissioning would not require great amounts of any resource, and would not have a measurable impact on energy or natural resource price or supply.

3.5.3 Impacts of the Alternatives

3.5.3.1 Alternative 1: Wild Horse Site

Impacts on energy and natural resources from construction of Alternative 1 would likely be essentially the same as those described for the proposed action in **Section 3.5.2.1**. Development of a 180-MW wind energy project at the Wild Horse site would involve the same construction activities and procedures over the same duration of time and virtually the same area as for the proposed action. Therefore, construction impacts with respect to energy consumption, use of non-renewable resources, and conservation and renewable resources would likely be indistinguishable from those of the proposed action, and would also be low. The same condition would apply to energy and natural resource impacts from decommissioning.

Operation and maintenance aspects of Alternative 1 would likely be essentially the same as those discussed in **Section 3.5.2.2** for the proposed action. Based on the respective project capacity and output characteristics presented in **Chapter 2**, average annual generation for Alternative 1 would not be expected to differ from the proposed action. Marketing and delivery of power from a wind energy project at the Wild Horse site would be as described previously.

3.5.3.2 Alternative 2: Springwood Ranch Site

Impacts on energy and natural resources from construction and operation of Alternative 2 would generally be of the same type as those described for the proposed action and Alternative 1, but they would be of lesser magnitude. Alternative 2 would involve development of approximately 40 to 45 turbines, compared to 120 turbines for the proposed action or Alternative 1. Consequently, the requirements for energy and natural resources during construction would be less than 40 percent of the corresponding requirements for a 120-turbine project. Natural resource consumption during operation would be minimal for Alternative 2. The maximum generation level for this alternative would be approximately 65 MW, and, applying the 33 percent capacity factor, the average annual generation would be in the vicinity of 22 MW.

3.5.3.3 No Action Alternative

Under the no-action alternative the Desert Claim Wind Power Project would not be developed and no energy would be consumed or generated by the project. No natural resources would be consumed or conserved in the construction or operation of the project. The consumption of electric power in the project area would likely increase if the area were further developed with single-family homes and/or if additional agricultural land were irrigated, although such an increase would not be significant on a countywide or regional basis.

The broader energy impacts of the no action alternative (beyond prospective changes in and near the Desert Claim project area) would depend on how and where alternative electricity supplies were developed. Development of alternative energy sources under this scenario might involve alternative wind energy proposals or it could entail new electricity supplies using different generation technology, such as natural gas-fired combustion turbines. A new wind energy facility comparable in size to the proposal but located elsewhere would have similar energy and natural resource impacts as described for the proposed action. Such a project would be responsive to regional energy demands in general, and to the recent requests for proposals issued in the Northwest by utilities, including PSE, Avista and PacifiCorp, for renewable energy production.

Similarly, combustion-turbine projects have been proposed for many locations in the Northwest in recent years. Regardless of location, such a power plant would require natural resource inputs for construction and would burn substantial volumes of fossil fuel in operation. As noted in **Section 2.3.3**, the no action alternative for the Desert Claim project does not include or preclude any specific action with respect to other energy generation projects that have recently been proposed or might be proposed in the future.

3.5.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.5.5 Mitigation Measures

No significant adverse impacts to energy and natural resources would occur and no necessary mitigation measures have been identified.

3.5.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to energy or natural resources would occur from the construction, operation or decommissioning of the project.

3.6 CULTURAL RESOURCES

Section 3.6 describes the potential impacts on archaeological and historic resources (hereafter referred to as cultural resources) from the proposed project. **Section 3.6.1** describes the affected environment of the proposed action, including summary discussions of the local landscape, prehistory, ethnography and history. Subsequent sections discuss the various kinds of impacts that would occur as a result of carrying out the proposed project (**Section 3.6.2**), impacts associated with alternatives (**Section 3.6.3**), and long-term, cumulative impacts (**Section 3.6.4**). **Section 3.6.5** lists mitigation measures that can be employed to alleviate, reduce, or eliminate potential impacts to cultural resources, and **Section 3.6.6** summarizes significant unavoidable adverse impacts.

3.6.1 Affected Environment

This section summarizes information on the landscape setting and cultural resources of the proposed Desert Claim Wind Power Project area. A more detailed account of the studies completed appears in the technical report included as **Appendix D**.

3.6.1.1 Landscape Setting

The Desert Claim Wind Power Project is located at the western margin of the Columbia Basin physiographic province on portions of two large Plio-Pleistocene alluvial fans in northwest Kittitas Valley. The valley is the topographic expression of a broad synclinal warp formed by deformation and compression of Miocene-aged volcanic rocks of the Columbia River Basalt Group and the sedimentary rocks of the Ellensburg Formation. The surface geology in the project vicinity is composed of Pliocene and Pleistocene gravels underlying large alluvial fans and terraces skirting the base of the Wenatchee Mountains. Small outcrops of the underlying basalt rise up through these alluvial gravels and the older gravels have been prograded by younger Holocene fans and colluvium (Waitt 1979; Walsh et al. 1987).

During the last maximum glacial advance in the Pacific Northwest, the Cordilleran ice sheet advanced south from British Columbia in the northwest portion of the Columbia Basin as far as the Waterville Plateau. Although the glaciers temporarily diverted the Columbia River and impounded glacial meltwater, the ice sheet exerted minimal influence in the Kittitas Valley. Instead, the basin experienced accumulations of glacial till and outwash when alpine glaciers in the Cascades descended to elevations of 2700 to 3000 feet in the Yakima and Naches River basins. Glaciers originating near Snoqualmie Pass advanced eastward through the upper Yakima River basin to about 7 miles beyond the town of Cle Elum.

The alluvial fan surfaces are relatively even and open and are expressed as long slope segments that have an overall dip to the south. The older and higher fan segment is located in the eastern portion of the project and is underlain by the Thorp gravels (deposited about 3.8 to 4.4 million years ago). The surface of this inactive fan has been presumably lowered and smoothed by the small streams that now traverse its surface. Surface soils are mostly shallow and stony but small areas of relatively stone-free loamy soils, sometimes formed into "mima mounds" or "biscuits", occur on interfluvial ridges and isolated, topographically elevated areas. The western portion of the Project is underlain by the glacially derived gravels of the Kittitas Drift, which were deposited between 130,000 and 140,000 years ago during a period of Cascades alpine glaciation. The surface of this fan is lower in elevation than the Thorp fan and is inset against the western shoulder of the older fan. Shallow stony soils are also predominant on this surface, but surface topography tends to be overall smoother than on the Thorp surface.

3.6.1.2 Cultural Setting

The project area falls within the southern portion of the Plateau culture area, which encompasses the drainage basins of the Columbia and Fraser Rivers. Most of the native peoples who live in the area belong to Interior Salish or Sahaptin-speaking groups. General elements of Plateau cultural patterns include alignment of settlement along rivers, reliance on a diverse resource base that included anadramous fish and extensive game and root resources, and a complex fishing technology similar to the one employed on the Northwest Coast (Walker 1998).

The earliest inhabitants of North America, known as Paleoindians, are believed to have arrived between 13,000 and 12,000 years ago. Their presence is marked by the appearance of a distinctive fluted spear point called Clovis. The earliest radiocarbon ages associated with these types of points in the West date to about 11,500 years ago and the closest known occurrence of Clovis points is north of the project area near the town of Wenatchee (Mehringer 1989). Clovis points at this site were found in direct association with Glacier Peak volcanic ash dating to 11,250 Before Present (B.P.) (Mehringer 1989). The Clovis people are believed to have been highly mobile hunters whose economy was primarily focused on hunting mega-fauna species (such as the mammoth) that became extinct soon after the end of the last glaciation. Other projectile points, such as large stemmed, shouldered, and lanceolate styles, also are found in western North America and closely follow, or are contemporaneous with, the fluted points. In the Plateau, stemmed and lanceolate projectile points known as Windust or Western-stemmed have been found in sites and dated between 11,000 and 8,000 years ago.

Life during the Vantage Phase, between 8,000 and 4,500 B.P., appears to have been focused on the major river valleys with few sites found in the surrounding uplands. However, between 4,500 and 2,500 B.P., the following Frenchman Springs Phase saw a shift in land use patterns denoted by the appearance of small, semi-permanent winter pithouse villages in the valleys and an increase in the number of sites containing plant processing tools in upland areas. Cultural change is also marked by increased population levels, aggregation in villages, greater reliance on stored foods, and dispersion from winter villages to small camps or residential groups during the spring, summer, and fall. The Cayuse Phase began about 1,000 B.P. and represents a pattern of life that began emerging during the preceding Frenchman Springs Phase. This pattern was similar to that recorded in early historic accounts and by ethnographers. Sites assigned to this period are found in a broad array of environmental settings and landforms and the phase as a whole is marked by increasing population levels, larger nucleated villages along the Columbia and Snake Rivers, increased emphasis on fishing and ongoing use of upland resources. The Cayuse phase ends with the introduction of the horse about 200 years ago near the end of the phase (Galm et al. 1981).

There is some uncertainty regarding the distribution and identity of peoples occupying the upper Yakima River basin. The Kittitas Valley lies on the boundary between the two major linguistic groups of the Interior Salish speakers to the north and Sahaptin speakers to the south. The Sahapatin-speaking Kittitas were most closely related linguistically to the Yakima to the south but maintained close ties with the Interior Salish-speaking Wentachi to the north. During the ethnohistoric period the Kittitas occupied permanent winter villages in the vicinity of the project area. There was a village on the Yakima River upstream from Thorp and another below it. Other villages were located at the mouth of Swauk Creek, at the mouth of the Teanaway River, and on Naneum Creek seven miles northeast of Ellensburg (DePuydt 1990; Ray 1936).

Euroamerican settlement in the Kittitas Valley began with the arrival of ranchers from Oregon in the 1860s. Cattle were raised for miners working the Colville, Cariboo, and Idaho mines, and were also sent over Snoqualmie Pass to Puget Sound (Meinig 1968). In 1887, the Northern Pacific Railroad completed its transcontinental line to Tacoma and was followed by the Chicago, Milwaukee, and St. Paul in 1909. The arrival of the railroads allowed the relatively cheap transport of resources from eastern Washington to more distant markets and spurred the development of the logging and wheat industries. The fertile but arid Columbia basin had fostered the development of a number of private irrigation networks in the Yakima Basin, which were consolidated under the U.S. Bureau of Reclamation in 1906 as the Yakima Project. Reservoirs were constructed in the upper Yakima basin at Lakes Keechelus, Kachess, and Cle Elum to supply water for irrigation districts in the Kittitas and Yakima Valleys. The Kittitas Project was the last irrigation system to be built in the late 1920s.

3.6.1.3 Previously Documented Cultural Resources

Prehistoric archaeological materials have been found in Caribou and Little Caribou Creeks draining the foothills north of Kittitas Valley, in the Trail Creek system, and at Grissom's Ranch within the valley proper. The limited amount of excavation in the upper Yakima River valley currently precludes a complete understanding of prehistoric land use systems in the valley, but a Clovis point found near Lake Cle Elum and later-period Cascade-like points (Vantage phase) found in the Keechelus-Cle Elum area indicates use of the upper basin beginning soon after deglaciation and persisting to at least the mid-Holocene (summarized in DePuydt 1990). Cultural resources investigations passing through the valley have also identified archaeological and historical sites related to settlement, mining in the Cle Elum vicinity, stock raising, logging, railroads, and the development of irrigation.

3.6.1.4 Traditional Cultural Properties

Traditional Cultural Properties (TCPs) are places associated with cultural practices or beliefs of a living community that are (a) rooted in that community's history, and (b) important in maintaining the continuing cultural identity of the community (Parker and King 1998). NWAA contacted the Yakama Nation Cultural Resources Program office when the archaeological field investigations commenced to seek information regarding TCPs within the bounds of the Project, based on the inclusion of the Kittitas band in the Yakama Nation and the location of the Kittitas Valley relative to the ceded lands of the Yakama. Although the Yakama Nation Cultural Resources Program office has not responded yet and did not comment on the Draft EIS, local residents informed NWAA field personnel that individuals were known to still exercise their reserved treaty hunting rights within the vicinity of the project area and groups still gathered to harvest roots on the fan where Naneum Creek emerges from the Wenatchee Mountains northeast of the Project. The lands within the project area are privately owned, however, and reserved treaty rights for off-reservation activities apply only to open and unclaimed lands. Therefore, use of TCPs within the project area could occur legally only with permission from the respective landowner(s).

Archival research revealed that no TCPs have yet been documented within the project boundaries. The eight landowners with whom Desert Claim Wind Power LLC have signed lease agreements report that they are unaware of any resources of cultural value on their properties, have not been contacted for permission to access property for TCP use, and are not aware of any unauthorized use of the property.

3.6.1.5 Field Survey Methods

Archival research preceded the field effort and included review of previous surveys in the vicinity, and of archaeological, ethnographic, historical, and environmental literature related to the Kittitas Valley. The entire 5,237 acres of the Project was surveyed for cultural resources from June 23, 2003 to July 16, 2003. Teams of archaeologist spaced at 30 m. (100 ft.) intervals systematically walked the area and recorded prehistoric locations and historic sites, structures, and buildings. Sites were defined as a feature or five or more artifacts within 30 m. (100 ft.) of one another. Locations with fewer than five artifacts were classified as *isolates*. Descriptive information and location were entered on standard forms completed for each discovery.

3.6.1.6 Field Survey Results

Thirteen prehistoric sites, 19 historic sites, 28 historic isolates, and 48 prehistoric isolates were documented during the field survey (see **Table 3.6-1**). All 13 of the prehistoric sites are newly recorded, while 18 of the 19 historic sites are newly recorded. A previously recorded historic site, the Springfield Farm (45KT513) was revisited and site information updated. Two lithic scatters produced by rockhound testing for agate-bearing nodules were also identified, but are not considered historic because they were created less than 50 years ago.

Just over two-thirds of the prehistoric isolates (37 sites, or 77 percent) consist of one or two flakes; of the remaining 11 isolates, 5 were bifaces, 4 were cores, 1 was a projectile point and 1 utilized flakes. Historic isolates included a wide array of artifacts such as metal blasting cans, food tins, ceramic and glass fragments, and agriculture equipment. Most of the prehistoric sites are lithic scatters representing manufacture and sharpening of stone tools or activities associated with short-term camps. However, the presence of fire-cracked rock at one site indicates the fan complex was occasionally the focus of longer residential stays. A large, complex lithic procurement site indicates the landform was also an important source of toolstone. Historic sites include farmsteads related to the earliest homesteading in the area as well as subsequent agricultural development. Debris scatters that may be related to sheep trails that crossed the project area when livestock were herded to the free pastures of the national forest in the first half of the 20th century; and features related to irrigation including stock ponds and the North Branch Canal of the Kittitas Reclamation District completed in 1930.

Table 3.6-1
Heritage Resources Newly Recorded or Revisited in the Desert Claim Wind Power Project Area

FIELD NO. DC-03-	COM-PONENT	DESCRIPTION	AGE	THEME	SIGNI-CANCE
Sites:					
1	H	Historic debris scatter near cattle track	1900 - 1940	Stock Raising	N
2	H	Historical debris scatter and depression	1900 - 1930	Agriculture / Settlement	N
3*	H	Morrison Homestead	1880 - 1940	Agriculture / Settlement	Y
4	H	Historic can dump	1940s	Agriculture	N
5	H/P	Lithic Scatter and historic bridge	Late Prehistoric / Early 20th C	Prehistoric / Settlement	N
6	H/P	Historic debris and prehistoric lithic scatter	Prehistoric/ 1900 - 1950	Prehistoric / Stock Raising	N
7	H	Small historic scatter	1940 - 1955	Agriculture	N
8	P	Lithic scatter	Prehistoric	Prehistoric	Y
9	H	Historic debris scatter	1940 - 1960	Agriculture	N
10	P	Lithic scatter	Prehistoric	Prehistoric	N
11	P	Lithic scatter	Prehistoric	Prehistoric	N
14*	H	Historic debris	1880 - 1930	Agriculture / Settlement	Y
15*	H	Historic structures and historic debris	1900 - 1940	Agriculture / Settlement	Y
16	H	Historic debris scatter	1920 - 1945	Agriculture	N
17*	P	Lithic scatter	Late Prehistoric	Prehistoric	Y
18	H	Historic debris scatter	1900 - 1940	Agriculture	N
19	P	Lithic scatter	Prehistoric	Prehistoric	N
20	H	Historic cabin and historic debris scatter	1880 - 1930	Agriculture / Settlement	Y
21	P	Lithic scatter	Prehistoric	Prehistoric	Y
22	H/P	Springfield Farm (45-KT-513h update) / prehistoric lithic scatter	1880 – 1950 / Prehistoric	Agriculture / Settlement Prehistoric	Y
23	H	Historic debris scatter	1925 – 1950	Agriculture	N
24	P	Lithic scatter	Prehistoric	Prehistoric	N
25	H	Roan Farm	1900 – Modern	Agriculture / Settlement	Y
26	H	Historic farm (White Ranch)	1900 – Modern	Agriculture / Settlement	Y
27*	P	Lithic scatter / procurement site	Prehistoric	Prehistoric	Y
28	H	Residence	1925 - Modern	Agriculture / Suburban Development	Y
29	P	Lithic scatter	Prehistoric	Prehistoric	N
30	P	Lithic scatter	Prehistoric	Prehistoric	N
31	H	North Branch Canal	1926 - Modern	Irrigation Development	Y

* Sites that would be disturbed under the current project design (refer to **Table 3.6-2**).

3.6.1.7 Resource Significance

Laws and review processes at the federal, state, and local level provide a framework for evaluating the significance of archaeological, cultural, and historic resources and for listing them in the National Register of Historic Places or the State Heritage Register. The National Historic Preservation Act (NHPA, which applies to federal actions) and the State Environmental Policy Act (SEPA) require that consideration be given to protecting significant historic, archaeological, and traditional cultural sites from damage or loss during development, and provide that impacts to cultural resources be considered during the public environmental review process. Other Washington state laws addressing cultural resources include the Indian Sites and Resources Act (RCW 27.53) and the Indian Graves and Records Act (RCW 27.44). The first Act prohibits disturbance or excavation of historic or prehistoric archaeological resources on state or private land without a permit from the state. The second Act prohibits knowingly disturbing a Native American or historic grave.

Although state laws provide no criteria for determining significance of sites and seek to prevent damage to all resources, some properties have greater scientific or historic value than others. In the absence of state criteria, federal criteria for significance provide a useful way to measure this value. Properties eligible for the National Register of Historic Places generally must be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria of significance. Significance is present for properties that are A) associated with events that have made a significant contribution to the broad patterns of our history; B) that are associated with the lives of persons significant in our past; 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 are likely to yield, information important in prehistory or history.

Table 3.6-1 includes preliminary assessments of eligibility for the surveyed resources, based on these criteria. Prehistoric and historic archaeological sites are generally evaluated using criterion D. The lithic scatters can provide information on prehistoric lithic technology and land use. Extremely small sites with low artifact counts and little diversity in tool types are viewed as having exhausted their data potential and are therefore of less importance than other prehistoric sites. Historical properties with standing structures or buildings are most often evaluated using criteria A or C. For this project certain features and the farmsteads provide a good representation of lifeways of the late 19th/early 20th century when settlement was new and agriculture developed in the Kittitas Valley. Isolates are unlikely to meet any of the criteria.

3.6.1.8 Wild Horse Site Cultural Resources

Lithic Analysts, a cultural resources firm under contract to Zilkha Renewable Energy, conducted a baseline cultural resources inventory of the Wild Horse site in 2003. The inventory included a full search of records archived at the Washington Office of Archaeology and Historic Preservation (OAHP) and a field survey using 30-meter transects along locations for turbine strings, existing and proposed access roads, electrical lines and substations within the 5,000-acre site during the spring of 2003.

The cultural setting described for the Desert Claim project area (**Section 3.6.1.2**) also generally applies to the Wild Horse site. The archival search for the Wild Horse site indicated six previously recorded archaeological and historical sites were located within approximately one-half mile of the project area (personal communication, P. Trautman, Lithic Analysts, Olympia, Washington, October 22, 2003). Some of the records document trails that led from the Columbia River to the Kittitas Valley, and others address archaeological sites at some of the springs near Whiskey Dick Mountain. The sites at Pine Spring and Government Spring are currently listed as one site on the National Register. The on-site inventory of the Wild Horse project area identified three previously unrecorded archaeological sites, including a lithic scatter and two rock features. The field survey also recorded an abandoned section of the Old Vantage Highway (an historical feature) crossed by the route of the possible transmission interconnection to an existing PSE transmission line.

3.6.1.9 Springwood Ranch Site Cultural Resources

As reported in the MountainStar Master Planned Resort Draft EIS, Volume IV, Appendix H (Kittitas County, 1999) four previous cultural resource surveys (Boas, Inc., 1989; DePuydt, 1990; Para, 1990; and Nelson, et al., 1996) have been conducted within the boundaries of the Springwood Ranch. These surveys identified six cultural resources (two prehistoric and four historic) and one potential trail. Both of the identified prehistoric cultural resources include talus rock features and pits that may be associated with burial activities in the area. In addition, the reported prehistoric/historic trail, identified from old historic maps, is purported to have crossed through the center of the property. Identified historic resources include two sites associated with railroad activities, one historic burial area and one area associated with early irrigation activities. Portions of the area surrounding the site have been surveyed, resulting in the discovery of 14 prehistoric cultural resources, 16 historic cultural resources and the documentation of two ethnographic villages (Boas, Inc., 1989; DePuydt, 1990; Nelson, et al., 1996; Goetz, 1996; Miller, 1996).

3.6.2 Environmental Impacts of the Proposed Action

3.6.2.1 Direct Impacts

The modified proposed action includes a number of ground-disturbing activities that have the potential to result in direct impacts to cultural resources within the project area. Ground disturbance destroys the relationships among artifacts and features and their contexts, and could cause the destruction of historic structures or buildings. Ground-disturbing activities would occur at most stages of project development, e.g., construction of the roads and tower foundations (including staging areas and work zones), installation of the power collection system, the substation and O&M facility, and the meteorological towers. Depending on site conditions, construction of turbine foundations would create areas of surface and subsurface disturbance to a depth of from 8 to 35 feet deep and from 18 to 42 feet in diameter. The power collection system would also disturb surface and subsurface sediments. Installation of underground cable by trenching would require excavating an open trench 2 to 4 feet deep, laying cables in the trench, and then backfilling the trench; installation by plowing involves directly plowing the cable into the ground. Overhead connection cables and the construction of the transmission line require construction along a corridor 8 to 12 feet wide, plus possible disturbance in temporary laydown and work areas around the base of each pole. The poles would be placed in holes drilled by an auger and construction procedures would entail drilling holes for the transmission structures, construction of the structures on site, and preparation of staging and work areas. The combined substation and O&M facility requires approximately 4 acres that would have to be cleared and graded (2 acres each for the substation and the O&M facility).

Potential direct impacts to documented cultural resources have been identified based on the proposed layout of project facilities, as shown in **Section 2.2**, relative to the locations of the resources. Any cultural resources within or very close to the area of temporary construction disturbance around the various project facilities would presumably be subject to direct impacts.

The map analysis (which is not documented in the EIS because the locations of the cultural sites are confidential and not appropriate for disclosure) indicates that five identified cultural resource sites would experience unavoidable adverse impacts associated with turbine, access road and power collection system construction if the project facilities were sited according to the modified design (**Table 3.6-2**). Three of these five sites (DC-03-3, -14, and -15) are historic sites with either standing structures or structural remains. The two remaining sites (DC-03-17 and -27) are prehistoric sites. Site DC-03-17 is a large and complex lithic scatter; DC-03-27 is a large prehistoric lithic procurement site located at the northwest periphery of the project. Based on the preliminary evaluation discussed in **Section 3.6.1.7**, destruction or damage of these resources would represent a significant adverse impact, for which appropriate mitigation would be required (see **Section 3.6.5**).

Table 3.6-2
Significant Prehistoric and Historic Sites Affected by Project Construction Elements

Site (DC-03-)	Component	Project Element(s) Creating Impact		
		Turbine	Road Access System	Electrical Collection System
03	H	X	X	X
14	H	X	X	
15	H	X	X	X
17	P		X	X
27	P	X	X	X

3.6.2.2 Indirect Impacts

Potential indirect impacts from development activities typically include increased opportunities for removal of prehistoric or historic artifacts due to increased visibility of the artifacts or awareness of their existence. Increased visibility and potential for exposure by personnel associated with the project could occur during clearing and grading in the construction phase, during heavy equipment transport, during maintenance (such as turbine adjustments, larger repairs to, or replacement of, equipment), or from additional surface and subsurface disturbance during clean-up efforts in the aftermath of inadvertent hazardous waste spills. Decommissioning the project at the end of its useful life also poses the potential for further impacts if decommissioning activities stray beyond the perimeters of the pre-existing disturbance zones used during construction. Measures such as clearly marking areas that need to be avoided to protect sensitive resources, and ensuring that project personnel observe those markings and their associated restrictions, can minimize the potential for these types of indirect impacts.

Indirect impacts to cultural resources can also occur if an action provides increased public access to the area in which the resources are located. This can occur through physical means, such as building or improving roads, or through operational measures that allow public visitors to move about more freely within an area. The proposed project is not expected to cause access-related indirect impacts to cultural resources. The parcels that are within the project area are all privately owned and are not open to general public access. The roads that would be constructed or improved to provide access to project facilities would be controlled by locked gates, public access to the project area would be restricted, and the project area would be patrolled on a regular basis. Therefore, the degree of public accessibility to cultural resources within the project area would be less with the project than it is at present.

The lands within the project area are privately owned, and the existence or use of traditional cultural properties within the project area has not been identified. Development of the Desert Claim project would not change the existing access conditions for the lands within the project area or the ability to use or visit resources of traditional cultural value within the area.

Existing historic sites in and near the project area would be subject to possible ongoing indirect impacts, however, primarily through changes to the visual environment around the sites. Although the existing landscape in the vicinity of the project has been subject to substantial modification from agriculture, residential development, road construction, high voltage electrical transmission lines, and construction of irrigation canals, the effect from construction of the Desert Claim facilities would represent a noticeable additional modification to the setting of historical resources within the project and to additional resources at some distance outside the project area. The introduction of these incompatible elements could create an indirect impact by altering the setting of an historic site, and thereby possibly diminish the integrity of the resource's historic significance.

Research at OAHP revealed that approximately 25 properties and two historic districts have been identified to date within an 8- to 10-mile radius around the project. Seven buildings and structures have been inventoried within a 1-mile radius of the project boundaries. Within 5 miles there are approximately 10 buildings or structures including several in the vicinity of the town of Thorp. A 10-mile radius would include the town of Ellensburg and vicinity, where at least 10 properties and two historic districts have been recorded. The historic structures and buildings newly recorded by NWAA within the project boundary, and most properties located adjacent the project boundaries, fall within the Northwest Valley Visual Assessment Unit, where visual impacts would vary from low to high depending on the position of the viewer (see **Section 3.10**, **Aesthetics/Light and Glare**). Visual impacts attenuate with distance and landscape position, so views in visual assessment units farther removed from the project, such as Southwest Valley, tend to receive lower impact ratings.

NWAA used digital elevation models to illustrate the extent of potential visual impacts to the setting of selected historic sites. These examples rely on construction of line-of-sight viewsheds based on a viewer stationed at the site with a 360-degree view unobstructed by vegetation or buildings; the viewshed range is 8,000 meters (about 5 miles). In **Figures 3.6-1** through **3.6-3** the portions of the landscape visible from a historic site or reference location are represented by solid lines radiating from the reference location; the blanked-out segments of the lines represent portions of the landscape not visible from the reference location.

The first two figures show viewsheds from two historical sites within the project boundaries and within the Northwest Valley visual assessment unit. **Figure 3.6-1** shows the number of turbines that would be visible from the newly recorded Morrison Homestead in the northeast corner of the project on the Thorp surface. **Figure 3.6-2** shows the number of turbines that could be seen within the Springfield Ranch viewshed on the Kittitas surface. Finally, **Figure 3.6-3** shows the number of turbines potentially visible within the viewshed of a historical site located some distance from the project, in this case, Thorp Cemetery near the Yakima River. These figures indicate that indirect adverse effects from modifications in the visual setting of the historic sites would likely be greatest among historic sites located on the higher elevations of the Thorp and Kittitas surfaces within the Northwest Valley unit. This line-of-sight analysis indicates the range at which historic sites might be subject to indirect impacts, based on topography. The actual influence on the setting of historic sites would depend upon the conditions specific to each site, primarily whether and to what extent views of wind turbines would typically intrude on scenes viewed at each site. Modifications to the visual environment are discussed in detail in **Section 3.10**.

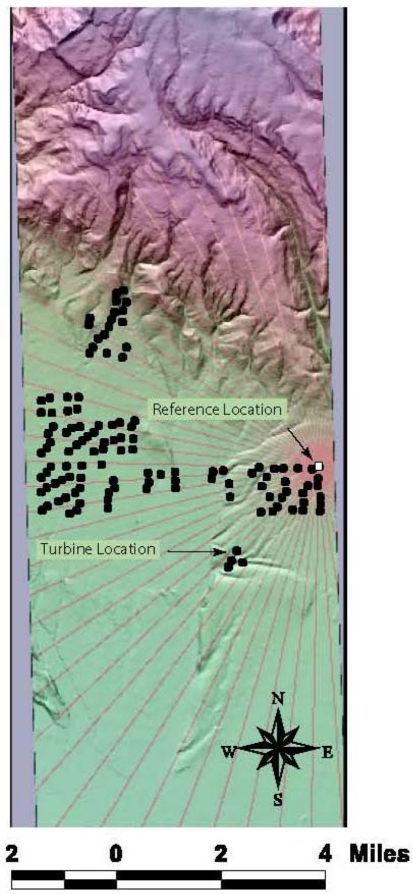


Figure 3.6-1
Viewshed from Morrison Homestead

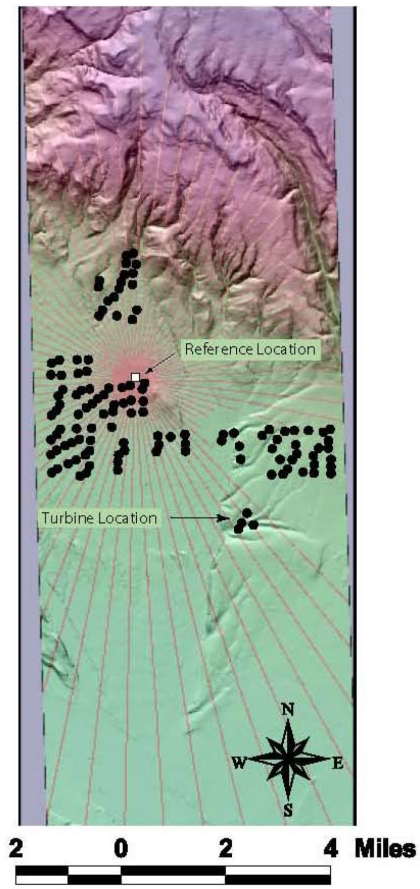
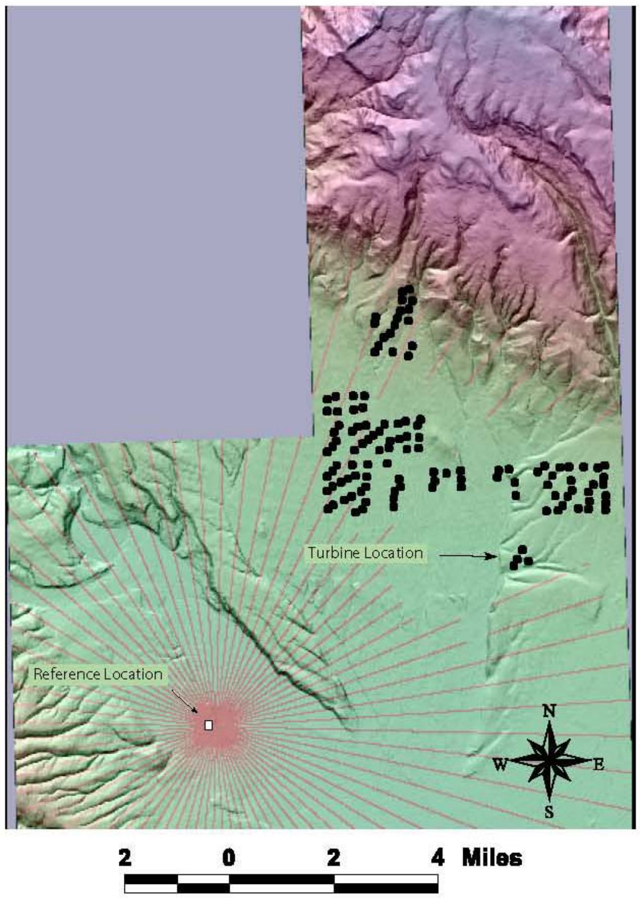


Figure 3.6-2
Viewshed from Springfield Ranch

Solid Lines Show Visible Portion of Landscape

Source: Ecology & Environment, 2004

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 3.6-1 & 2** **Viewshed from Morrison Homestead & Springfield Ranch**



Solid Lines Show Visible Portion of Landscape

Source: Ecology & Environment, 2004

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 3.6-3** **Viewshed from Thorp Cemetery**

Similar to the above discussion of historic sites, TCPs that might exist within viewing range of the project could also be subject to the same type of indirect effect. Although SEPA does not address TCPs specifically, it does direct lead agencies to identify places or objects of archaeological, scientific or cultural importance, and recommends that provisions for meeting tribal needs for the sanctity of a location be included in mitigation. At this time, no TCPs in the vicinity of the project have yet been identified, and specific adverse impacts to such cultural resources have likewise not been identified. If there are TCPs in the general area from which project facilities would be visible, tribal users of those resources would likely consider that to be an adverse effect on the resource. Given the degree of existing visual modification to the surrounding landscape, it would be highly subjective and difficult to assess the significance of such indirect impacts.

3.6.3 Impacts of the Alternatives

3.6.3.1 Alternative 1: Wild Horse Site

Evaluation of the wind energy project configuration for Alternative 1 relative to identified cultural resources in the project area indicates that expected construction impacts on cultural resources would likely be minimal or non-existent. None of the planned locations for wind turbines, access roads, power collection cables, met towers, the substation, the transmission interconnection or other project facilities coincides with the locations of inventoried cultural sites. Therefore, it is assumed that construction (or decommissioning) activities for this alternative would not result in the physical disturbance or destruction of any cultural resources.

Operations and maintenance activities under Alternative 1 would not likely result in direct impacts to cultural resources, as no resources would be located within the permanent footprint of the project. Existing cultural sites in and near the project area would be subject to possible ongoing indirect impacts, however, primarily through changes to the visual environment around the sites. Two of the known cultural sites would be within approximately ¼ mile of wind turbines or other project facilities, and views of project features would presumably alter the historic setting of the sites to some degree. The Pine Spring and Government Spring site would also be within view of Alternative 1 project facilities. Public access to the project area would be controlled, as for the proposed action; therefore, Alternative 1 would not be likely to increase the potential for disturbance and/or removal of artifacts from cultural resource sites.

3.6.3.2 Alternative 2: Springwood Ranch Site

The types of potential impacts under Alternative 2 would be similar to those identified for the proposed action. Construction activities could destroy artifacts or structures, or disturb relationships among artifacts and their context. A detailed evaluation of the relationship between the Alternative 2 project layout and the location of the identified cultural resources on the Springwood Ranch site has not been conducted, so it is not known how many of the seven identified resources would be subject to direct impacts from project construction. Because one of the resources is a prehistoric trail that reportedly crossed through the middle of the property, however, it is quite possible the trail route would intersect multiple elements of a wind energy project on this site. Conversely, the two prehistoric resources (both talus rock features) and the historic resources associated with railroad and irrigation activities are likely to be located near the Yakima River and would not likely be subject to direct impacts.

Indirect impacts to cultural resources under Alternative 2 would likely be similar in nature to those discussed for the proposed action, and would primarily involve changes to the visual context of the resources. This type of indirect effect could also apply to a number of the 30 cultural resources that have been identified in the area surrounding the Springwood Ranch.

3.6.3.3 No-Action Alternative

Under the No-Action Alternative, cultural resources in the project vicinity would continue to physically deteriorate naturally, primarily as a result of low-level ongoing surface erosion and weathering. Sites would also experience other forms of degradation at the current level of land use, including trampling by livestock and shifts in the focus of ranching activities (such as construction of new irrigation ditches and stock ponds). Under current Kittitas County zoning provisions, the project area could be segregated into as many as 400 residential lots with no discretionary action required by the County. Adverse impacts to cultural resources could vary from potentially severe to moderate, depending on the degree of environmental review and discretionary approval exercised by the County.

3.6.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.6.5 Mitigation Measures

For wind energy projects in general and the Desert Claim project specifically, the prospects for avoiding cultural sites would be addressed in the final micro-siting of wind turbines and other project facilities, which would occur during final design and prior to construction. For facility locations identified as in conflict with cultural sites, project engineers would evaluate data on site-specific structural and wind characteristics to determine whether it would be feasible to relocate the facilities in question, and thereby avoid direct impact to cultural resources.

No additional mitigation would be necessary for identified cultural resource sites avoided in the final layout and construction of project facilities. If final placement of the project elements results in unavoidable adverse impacts to a significant resource, then mitigation would be required to retrieve the scientific and historical information that makes each site significant.

In such cases, the applicant would retain a qualified cultural resource specialist to develop a cultural resource mitigation plan in consultation with the State Office of Archaeology and Historic Preservation (OAHP) and affected Native American tribes. This plan would include mitigation measures tailored to the specific circumstances of each resource and consistent with applicable national, state and local regulations. Mitigation measures would include provisions for working with affected tribes regarding traditional cultural properties, recovery of resource data potentials, and public interpretation of the resources.

Project construction would potentially demolish or alter the setting and character of existing historic resources. Construction impacts would include out-of-character visual elements, change in use, structural vibration, and dust. Project operation would also change the historic character of the surrounding area. Historic buildings and structures subject to unavoidable adverse impacts would be documented in accordance with HABS/HAER guidelines and in consultation with OAHP.

At the larger landscape scale, the project would have a visual impact that could be mitigated by producing a cultural landscape history of the footslope region of the Kittitas Valley below the Wenatchee Mountains. As is typical of such studies, the historical narrative could be accompanied by photos showing the character of the historical landscape and how it has evolved into the existing landscape, so that the historical narrative and the photos would serve as a source for comparative historical studies after the project is completed.

The project cultural resources mitigation plan would also need to provide for monitoring of construction activities and evaluation and treatment of unanticipated archaeological resources that might be discovered during construction. In the event of an unanticipated discovery, ground-disturbing activity in the immediate area would cease and the resources discovered would be tested for significance, following protocols developed in coordination with OAHP and affected tribes. State regulations require permits from OAHP for any excavation of archaeological sites.

3.6.6 Significant Unavoidable Adverse Impacts

If the Desert Claim project were developed according to the current layout, five identified cultural resource sites would experience unavoidable adverse impacts associated with turbine, access road, and electrical collection system construction (see Table 3.6-2). Three of those sites are historic sites with structural remains and extensive debris scatters and concentrations and two are prehistoric sites that include high-density artifact concentrations and tools that provide valuable evidence for land use on the higher-elevation footslopes in the Yakima River basin. As indicated above, it might be possible to avoid the potential direct impacts to these sites through relocation of project facilities during final micro-siting; the applicant, in consultation with OAHP, has agreed to perform such micro-siting to eliminate these impacts. Any remaining direct impacts to significant cultural resources that cannot feasibly be avoided could be mitigated through a mitigation plan developed in consultation with the Washington SHPO. Significant indirect impacts to cultural resources in the project vicinity are not anticipated, although there could be changes in the visual setting associated with some of these sites. A cultural landscape history review could be implemented as mitigation for these changes. Because the potential significant adverse impacts that have been identified could be avoided or otherwise mitigated through data recovery and archiving, no significant unavoidable adverse impacts to cultural resources have been identified.

3.7 LAND AND SHORELINE USE

3.7.1 Land Use Patterns

3.7.1.1 Affected Environment

Kittitas County

Kittitas County is located east of the Cascade Mountains, in the geographic center of Washington State. The County covers 2,297 square miles (1,470,272 acres) of mostly forested land, pasture, and unimproved grazing land. Urbanized land comprises less than 2 percent of the County (Kittitas County, 2003). Prominent natural features in the County include east Snoqualmie Pass, the Yakima River, Keechelus Lake, Kachees Lake, and Cle Elum Lake. In addition, Wanapum Lake runs north to south and forms the eastern boundary of the County. The Wenatchee Mountains serve as the County's northern backdrop, particularly in and around the City of Ellensburg. Mt. Rainier and Mt. Adams are visible to the southwest.

Cities within Kittitas County include Cle Elum, Ellensburg, Kittitas, Roslyn, and South Cle Elum. Unincorporated communities include Easton, Liberty, Ronald, Thorp and Vantage. The majority of cities and unincorporated towns are located along Interstate-90 and U.S. Highway 97, which intersect west of Ellensburg (see **Figure 2.2).**

Land ownership is divided among private (approximately 41 percent), state (approximately 18 percent), and federal (approximately 41 percent) interests. The largest land owners are the Plum Creek Timber Company, Boise Cascade Corporation, Washington Department of Natural Resources (WDNR), U.S. Forest Service, and the Yakima Training Center[1] (Kittitas County, 2003).

Major land uses are shown in **Table 3.7-1**. Timber harvesting occurs primarily to the north and west at higher elevations. As elevation decreases, rural residential and agricultural uses predominate. A system of irrigation canals, supported by water from the Yakima River, runs through the lower elevations and provides water to local agricultural crops. The predominant agricultural crops include wheat, oats, potatoes, and hay (WASS, 1996).

Table 3.7-1
Land Use in Kittitas County

Land Use	Acreage	Percent of Total Acreage
Commercial Forest	661,773	45
Rural	359,704	24
Commercial Agriculture	357,808	24
Public Recreation	81,562	5
Other	25,723	2
Total	**1,481,600**	**100**

Source: Kittitas County, 2003.
Table Notes: Total use differs from individual uses due to rounding.

[1] The Yakima Training Center is a federal military training reservation located in southeastern Kittitas County (164,000 acres) and eastern Yakima County.

As shown in **Table 3.7-2** below, the most extensive zoning classifications county-wide are Commercial Forest, Commercial Agriculture, Forest and Range and Agriculture-20. Approximately 97 percent of the County's land area is within these classifications. The Forest and Range and Agriculture-20 designations characterize the project site and the surrounding area; these designations encompass 27 percent of the county's total area. The primary purpose of these designations is to preserve farmland from encroachment and to protect agricultural activities (Ag-20 zone), and to encourage natural resource management and discourage development and subdivisions (Forest and Range zone). Rural residential uses are permitted in both zones but the predominant land use is rangeland.

Table 3.7-2
Kittitas County Zoning Designations and Acreage

Zoning Designation	Acres
Residential-2	44
Suburban	3,314
Suburban II	296
Agricultural-3	17,574
Agricultural-20	112,343
Rural-3	22,450
Commercial Agriculture	357,728
Limited Commercial	22
Planned Unit Development	861
Master Planned Resort	5,914
General Commercial	144
Highway Commercial	35
Light Industrial	148
General Industrial	912
Forest and Range-20	292,235
Commercial Forest-80	672,407
Liberty Historic District	17
Total	1,486,476

Source: Kittitas County, 2003.

Throughout the last decade, growth in the County has resulted in increased development of rural residential uses and subdivisions, and a reduction in forest and agricultural areas. This shift in land use has been the result of general economic growth; migration from the populated areas west of the Cascades; and changes in land management practices or restrictions in the harvesting of forestlands. From 1998 to 2002, there were applications for a 153 residential short plats (less than 4 lots) and 10 plats (greater than 4 lots). By early October of 2003, there were more requests for subdivisions than during the entire year of 2002[2]. **Table 3.7-3** shows the trend in subdivision applications over the last 5 years.

[2] 44 short plats; 10 plats (Kittitas County, 2003).

Table 3.7-3
Kittitas County Subdivision Applications, 1998 to 2002

Year	Short Plats (less than 4 lots)	Plats (greater than 4 lots)	Total
1998	21	2	23
1999	24	3	27
2000	34	2	36
2001	36	0	36
2002	38	3	41
Total	**153**	**10**	**163**

Source: Kittitas County, 2003.

Desert Claim Project Vicinity

The project vicinity which is used to characterize local land use is generally defined as the area within approximately 5 miles of the project boundary. This area is rural in character and extends north into the foothills of the Wenatchee Mountains, west toward the U.S. Highway 97 and State Route 10, east to rural residential and rangeland areas, and south toward Bowers Field (airport) and the City of Ellensburg. Land uses are characterized using County land use and zoning maps, aerial photo interpretation and direct observations.

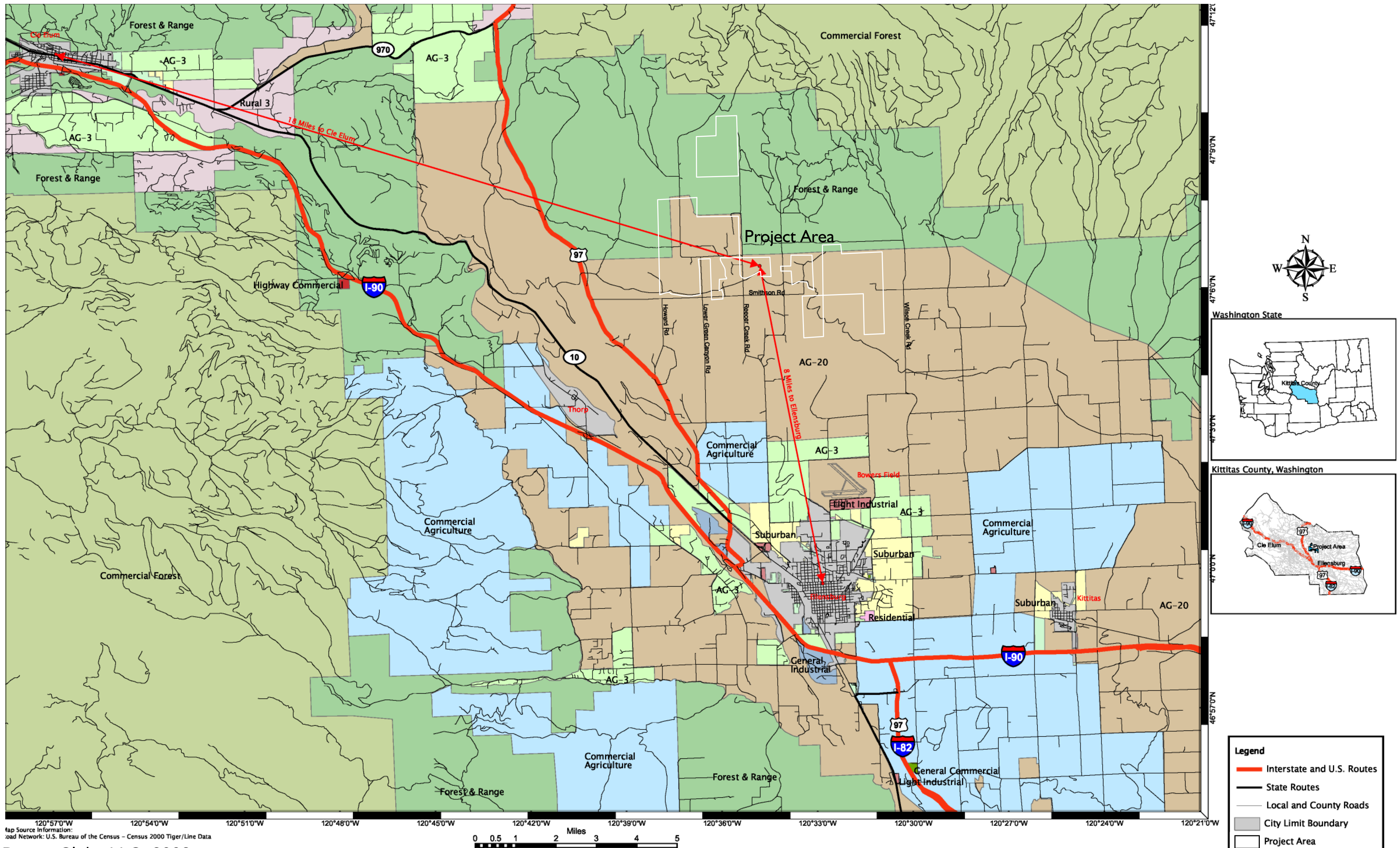
The lands surrounding the proposed site are characterized by a gently sloping landscape that gradually increases in elevation from the south to the north. In general, forested areas are located to the north, while agricultural and rural residential uses predominate in the immediate area of the proposed site and to the south toward the Ellensburg Urban Growth Area (UGA).

The majority of land within 1 mile of the project area is privately owned and generally consists of rangeland and residences. An estimated 83 residences lie within one-half mile of the project boundary[3]. Housing densities within this area occur at one dwelling unit (du) per 20 acres in the Forest and Range zone, while the Agricultural-20 zone allows for two dwelling units per 20-acre parcel. In the higher elevations to north of the central project area, single-family dwelling units occur along ridges and valleys. **Figure 3.7-1** shows zoning designations in the project vicinity.

The Sun East community is located within less than 1 mile to the north and east of the project area. The community is located on roughly 6,000 acres, beginning just north of the BPA transmission lines on Robbins Road (just over one-half mile from the project boundary in this area) and extending up the slopes of Table Mountain via a system of private, unimproved roads. The Sun East Property Owners Association serves community interests. The community consists of approximately 170 lots, 22 year-round residents and a number of landowners who maintain cabins for seasonal or weekend use. Housing densities within this area are generally one dwelling unit per 20 acres.

Further south, within the Ellensburg UGA, housing is developed at densities ranging from 1 du per 10 acres in the Ag-20 zone, to 1 du per 7,200 sq. ft. in the Residential zone. Subdivision development has occurred at the south end of Reecer Creek Road. The most recent subdivision application submitted to Kittitas County within the Ellensburg UGA could include up to 209 units on 56 acres, if approved. This property is zoned Residential, which permits 7,200 sq. ft. minimum lot size. Use of City public services is required within this zone.

[3] Estimate based on partial ground reconnaissance and aerial photography research.



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.7-1

Zoning Designations

WDNR administers roughly 5 parcels, each up to 640 acres in size, which are located adjacent to the site. WDNR also maintains mineral rights on approximately 160 acres of private property, located in the north-central area of the proposed site.

The U.S. Forest Service manages lands approximately one-half mile to the north of the project area, within the Cle Elum Ranger District of the Wenatchee National Forest. The immediate area is used for recreation and commercial forestry. Recreational activities are especially prevalent in the Lion Rock area, which can be accessed from the south via Reecer Creek Road.

U.S. Highway 97 runs in a northwest-southeast direction within 1.5 miles of the southwest corner of the proposed site and connects communities in Chelan County via Blewett Pass with I-90 and the communities of Kittitas County. Within and around the project area, several rural two-lane roads provide access to local agricultural operations, residences, recreation, and the electrical transmission lines. Some of these roads pass through the project area, while others dead-end into the site. The north-south roads serving the proposed site include Reecer Creek Road, Lower Green Canyon Road, Pheasant Lane, Robins Road, and Wilson Creek Road. Roads running east to west include Smithson Road and Charlton Road.

<u>Desert Claim Project Area</u>

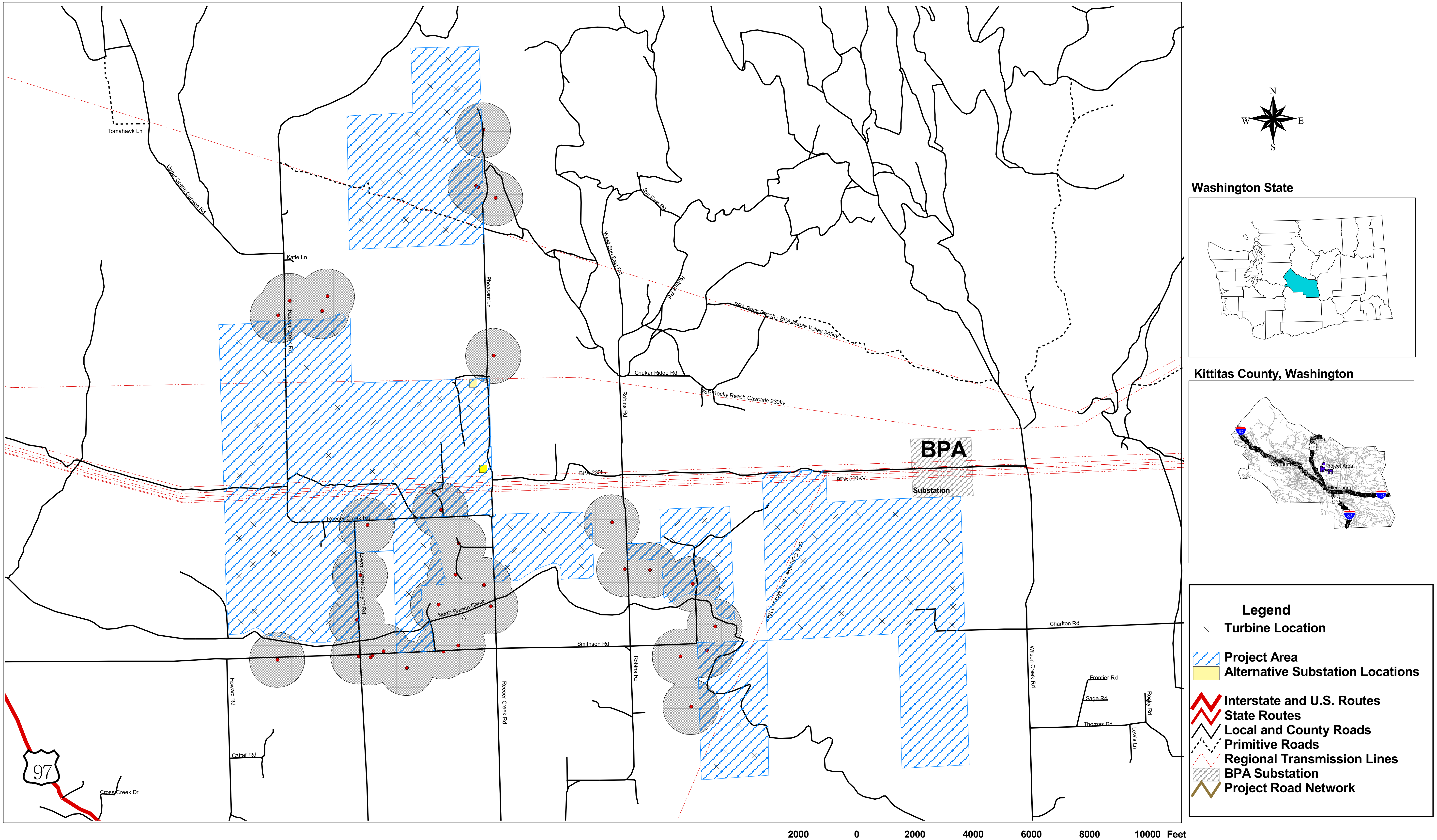
The Desert Claim project area is located approximately 8 miles north of the City of Ellensburg and contains approximately 5,237 acres. The land is in large, non-contiguous parcels owned by 8 private landowners (see **Figure 2.3**). WDNR maintains mineral rights on the northern-most 160-acre parcel within the project area. The proposed project area is approximately 5.5 miles from east to west and approximately 5 miles from north to south, with the majority of property concentrated in a northwest and southeast orientation.

Consistent with the applicable zoning, existing land uses on the proposed site generally include grazing, feed crop production, and rural residences. The North Branch Canal follows the southern edge of the site and traverses through a 320-acre portion of the project to the southeast, providing irrigation water to this area of the Kittitas Valley. Other possible uses, if granted through landowner permission, include outdoor recreation (i.e., snowmobile and horseback riding).

Eight high-voltage transmission lines either directly cross or are adjacent to the project area. Bonneville Power Administration (BPA) owns and operates six lines, while Puget Sound Energy (PSE) owns and operates the remaining two lines. BPA's 133-acre regional substation is located directly to the north of the project area's eastern boundary.

As shown in **Figure 3.7-2,** 32 residences (including 1 abandoned trailer) are located either within the project area or within 1,000 feet of the project boundary. Approximately 8 residences are located within the boundary of the project area. An updated ground survey was conducted for the Final EIS to verify the number of residences.

Section 3.4.1.1 identified the distribution of vegetation cover types within the project area. **Table 3.7-4** summarizes the vegetation data by general land use category. Well over half of the project area is rangeland, consisting of shrub steppe and riparian shrub areas. Grasslands, which could also be considered range area, account for another 37 percent of the project area. Relatively little of the project area is cultivated land, primarily irrigated hay meadows.



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc.
HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.7-2
Residences Within 1,000 Feet of Project Area

Table 3.7-4
Project Area Land Use

Land Use Type	Approximate Acreage	Percent of Project Area
Cultivated	252.3	4.8
Developed	26.5	0.5
Grassland/wet meadow	1,937.1	36.9
Forest	103.9	2.0
Rangeland	2,903.1	55.5
Water	23.4	0.5
Total	5,237.3	100

Wild Horse (Alternative 1) Site

The Wild Horse site is located in the east-central portion of Kittitas County, approximately 14 miles east of Ellensburg and 4 miles north of I-90. The site includes uplands at the eastern margin of the Kittitas Valley and slopes that drain eastward to the Columbia River north of Vantage. Based on the boundary of the lands proposed for development of the Wild Horse Wind Power Project, the site for Alternative 1 contains approximately 5,000 acres.

Whiskey Dick Mountain, with a maximum elevation of 3,842 feet, is the dominant terrain feature of the project site for Alternative 1. The remainder of the site and the surrounding area consists of a relatively flat plateau with steep-sided drainages cut into the terrain. The shrub-steppe cover type is the predominant vegetative cover in the area.

The lands within the Wild Horse site are predominantly in private ownership, and all of the private lands are held by one owner. Three sections (approximately 1,920 acres) of State lands administered by WDNR are included within the site. The area adjacent to the site has a similar ownership pattern.

The Wild Horse site is within an area designated as Rural under the Kittitas County Comprehensive Plan. All of the area within the site itself is zoned as Forest and Range (FR). A portion of the prospective transmission line route for interconnection with a nearby BPA transmission line crosses lands zoned as Ag-20. The site is currently used as rangeland, under grazing leases executed by the present owner. The only existing structures on the site consist of several meteorological towers and a communications facility on Cribb Peak, a point on the eastern end of the ridge formed by Whiskey Dick Mountain.

Lands adjacent to the Wild Horse site to the south and west have a similar character and are also used as rangeland. Cultivated agricultural areas are located farther (generally 3 to 5 miles) to the west. To the north and east, the site is bordered primarily by resource lands managed as wildlife habitat by the Washington Department of Fish and Wildlife (WDFW). These include the Schaake Wildlife Area to the east and southeast, and the Quilomene Wildlife Area to the north and northeast.

There are no existing residences located within the boundaries of the Wild Horse site or on the adjoining lands. A small number of seasonal cabins scattered along the upper reaches of Parke Creek, to the north/northwest of the site, are the closest residences to the site. Farm or ranch residences and small pockets of rural residential development are located at the eastern edge of the Kittitas Valley, about 3 miles or more from the Wild Horse site.

Springwood Ranch (Alternative 2) Site

The Springwood Ranch property is located directly to the northwest of Thorp, between I-90 and the Yakima River, in Lower Kittitas County (see **Figure 2-16**). The L.T. Murray Wildlife Recreation Area, managed by WDFW, is located to the southwest of the Springwood Ranch property[4]. The Iron Horse State Park/John Wayne Trail (accessible at Easton, Cle Elum and Thorp) crosses the project site along the Yakima River in the northern area and bisects the southern area (to the southeast away from the River). The Washington State Parks and Recreation Commission manages the trail and its 100-foot right-of-way.

Lands immediately adjacent to the Alternative 2 site are privately owned, with the exception of the I-90 right-of-way along the southern boundary of the property. The site borders the northern edge of the Thorp UGN and the Taneum Subarea. The Taneum Subarea is approximately 4,500 acres in size and situated to the south of I-90. The Thorp UGN is approximately 1,065 acres in size and located north of the freeway. Both areas primarily include rural residential and agricultural land uses. Thorp is also a historical transportation, milling and trading site. The UGN contains a small central commercial and higher-density residential area, similar to the rural communities in the Upper County.

The site consists of two landform types, termed the Thorp Prairie and the Thorp Lowlands. The Thorp Prairie comprises the northern part of the Springwood Ranch. It consists of rolling grassland terrain and steep slopes along the Yakima River. The Thorp Lowlands, in the southern part of the ranch, include less dramatic slopes and have primarily been utilized for agricultural and range land. Terraces near the Yakima River have been leveled and cultivated, and grazing livestock have been kept on the property periodically. There are no existing residential land uses.

The Springwood Ranch and surrounding areas are designated Commercial Agriculture and Rural in the Kittitas County Comprehensive Plan, and are zoned Forest and Range-20 and Agriculture-20.

3.7.1.2 Environmental Impacts of the Proposed Action

Direct Impacts

Construction and Decommissioning

Existing land uses within the project area — agricultural, rural residential, electrical transmission and forestry—would continue during construction. Some uses could experience temporary disruptions in access and experience proximity impacts, such as construction noise and dust. Truck traffic, earthwork, and other construction activities could temporarily reduce or interfere with some normal agricultural and grazing activities within portions of the project area for the approximate9 month construction period. If project construction occurred in phases, each phase would last approximately 9 months. The effect would be to extend the total duration of temporary disturbance from project construction, but to reduce the intensity or magnitude of impacts for any individual phase. Construction–related land use impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant in a phased-construction scenario.

[4] Approximately 320 acres of the Springwood Ranch site (in Sections 4 and 5 of Township 18 North, Range 17 East) are included within the authorized boundary of the L.T. Murray Wildlife Recreation Area (U.S. Forest Service, 1990), but are privately-owned lands.

During construction of the wind turbines and associated facilities, approximately 348.5 acres of land would be temporarily disturbed. During operations, 82.4 acres, or 1.6 percent, of the project area would be used for wind farm facilities and infrastructure (i.e., the permanent project footprint). See **Section 2.2.2** for a detailed description of the wind project infrastructure.

Decommissioning of the wind farm operation would result in land use impacts similar to those described for the construction phase. A limited area of land would be disturbed during dismantling of project facilities, similar to the area required for their construction. All disturbed areas would be restored as near as possible to their original condition through grading and planting.

Once the wind farm operation was removed, the lands formerly occupied by project facilities could be used as allowed under applicable zoning and comprehensive plan designations and regulations.

Operation and Maintenance

The Proposed Action is assumed to operate for 30 years, which is the useful life of a wind turbine. Direct impacts to land use would consist of the conversion of a portion of the project area – approximately 82.4 acres dispersed over the entire 5,237 acre site – from existing agricultural/range uses to use for energy production. This area would be temporarily removed from agricultural use. The proposal would not permanently displace or lead to the conversion of existing land uses. Existing residential uses would not be directly displaced, but would be located proximate to wind turbines and other facilities.

Rural residential and agricultural activities would generally continue. Agricultural activities, such as livestock grazing and feed production, would continue to take place around wind turbines and other facilities; the presence of these features is not expected to significantly impact the ability to carry out existing activities. Some temporary disruptions could occur during construction.

A wind farm is considered a “utility” use per KCC 17.61 and is not characterized as an “industrial” use as that term is defined in the County’s zoning code. As such, the proposal would be generally compatible with the broad pattern of rural uses that occur on site, adjacent to the site and in the surrounding area. It would also be generally compatible with ongoing agricultural activities. In terms of land uses and land use patterns, industrialization of the area would not occur as a result of the proposal.

The proposed wind turbines would be significantly larger than surrounding structures. While this difference in scale would generate visual impacts (see **Section 3.10**), it would not inherently conflict with rural land use patterns. Many agricultural activities include associated large structures and mechanical/industrial equipment; such appurtenances may be considered to be a characteristic or element of rural character.

Wind turbines would be significantly greater in scale than nearby rural residential uses, and some degree of incompatibility or conflict would exist, particularly as to some adjacent, individual properties. However, the extent of potential conflicts should be considered in the larger context of the pattern of land uses in the project area. Resource uses, such as agriculture and forestry, predominate in Kittitas County’s rural area. These uses commonly include the presence of large structures and equipment (although not as large or extensive as the proposal), and operations that involve intensive activities and generate off-site impacts. These effects are inherent in resource uses and are often part of a rural land use context. Although the size and visibility of the turbines (discussed in Section 3.10 of this EIS) would be larger than typical rural resource uses, wind farm operations are not inherently more intensive than other resource activities in terms of noise and associated land use impacts.

Wind turbines would be located at least 1,000 feet from existing residences and 487 feet from the project area boundary, public rights-of-way, adjoining non-project property lines, existing utility transmission corridors and the KRD canal. Individual wind turbines would be separated by a distance of two or more rotor diameters (approximately 1,000 feet) to provide for proper operation and safety. Creating a greater separation between turbines and existing residences – particularly adjacent to the central portion of the site, where there is a cluster of residences – could reduce perceived impacts to these residents. It would not, however, change the overall effect on rural land use patterns, which is not seen as significant.

Indirect Impacts

Indirect land use impacts include changes that the proposal, either alone or in combination with other uses, could contribute to or create pressure for. Examples include the attraction of supporting, secondary or spin-off activities; a tendency to discourage some types of land uses because of direct or perceived impacts; and the potential to attract or cause a proliferation of similar land uses. Visual and aesthetic impacts are considered in **Section 3.10** of this EIS.

The proposal would not attract supporting land uses or generate secondary or spin-off development. The number of full-time employees associated with the proposal is small and the turbines would be dispersed across a large area. The proposed use would not generate significant traffic or generally create the types of conditions that would create demand for commercial or industrial uses nearby. Transmission lines are already located proximate to the site. Similarly, the proposal would not attract significant numbers of non-resident workers. In-migration would be insignificant and would not result in significant demand for housing or services.

If the proposal were considered to be incompatible with or discouraged residential land uses in the immediate area, such effect would have both adverse and potentially positive aspects. Some nearby rural residential uses that viewed the wind facility as incompatible with their desired lifestyle, or who did not want to experience the changes or impacts that would occur, could possibly seek to relocate. This would be an adverse impact to these property owners. However, it would also reflect a conscious choice on their parts, since they would not be displaced by adverse land use impacts. Most surrounding lands are zoned and used for agriculture, and rural residential uses may currently compete with agricultural activities as a land use to some degree. As noted previously, increased residential growth in the County has occurred on lands used for agriculture. The proposal could indirectly support agriculture if it supported existing agricultural activities and thereby discouraged conversion of agricultural lands to residential use in the immediate area. On the other hand, if the proposal tended to disrupt or discourage the continuation of agricultural activities, it would adversely affect this land use. Based on the preceding discussion, however, wind energy production is seen as generally compatible with rural resource uses and with ongoing agricultural operations. The property owners who are leasing land for wind facilities would, as far as is known, continue existing agricultural activities. The revenue associated with these private leases could help support continuation of farming and reduce the financial pressure to convert to a non-resource use.

The proposal is not expected to significantly or adversely affect land uses within the City of Ellensburg or its Urban Growth Area (UGA). A wind farm would not present a physical barrier to future UGA expansion, if such an expansion were otherwise appropriate based on GMA criteria. If a wind farm encouraged continuation of rural, agricultural uses and discouraged suburbanization, it could indirectly "harden" the UGA boundary to some degree and make expansion to the north less desirable. This effect, if it occurred, would also tend to encourage preservation of rural areas and agricultural lands. The proposal would be visible from some locations within the City; please refer to the discussion in Section 3.10 of the Draft EIS.

Potential indirect effects on economics and property values are not required in an EIS pursuant to the SEPA rules (WAC 197-11-448). A separate report summarizing research on these issues is available from Kittitas County.

The potential for other wind power projects to locate in the general area, or elsewhere in Kittitas County, would depend primarily on the presence of sufficient wind resource. Other relevant factors influencing wind energy location decisions include availability of sites of sufficient size and characteristics, willing land owners, and access to adequate transmission facilities. It is these criteria, not the existence of the Desert Claim project, that would influence the likely location of other wind power facilities. Other sites in Kittitas County with the potential for wind power are discussed in Chapter 2 of this EIS.

Kittitas County's adopted process for reviewing and approving wind resource projects involves evaluation and rezoning of individual sites and proposals. It does not determine the size, location or permitted number of wind facilities in advance of a proposal. Any other wind power projects approved, therefore, are assumed to be consistent with relevant County criteria, including land use compatibility.

3.7.1.5 Impacts of the Alternatives

<u>Alternative 1: Wild Horse Site</u>

Direct Impacts

Direct land use impacts from construction and decommissioning of a wind power project at the Wild Horse site under Alternative 1 would be similar to those described previously for the Desert Claim proposal. The existing use of the project site as rangeland would be able to continue during the construction period, although there would be temporary disruptions of access and use as a result of construction activities. Normal grazing use within portions of the site could be displaced for up to approximately 9 months. Overall, construction activities would temporarily disturb approximately 349 acres of the site, as described in **Section 2.3.1**.

Decommissioning of Alternative 1 would result in similar temporary disturbance impacts. All disturbed areas would be restored to their original condition following removal of project facilities, and would be available for uses consistent with the comprehensive plan and zoning designations.

Long-term operation of the project under Alternative 1 would result in the conversion of approximately 153 acres from grazing use to energy production use. The existing use would continue on the remainder of the site not contained within the footprint of the permanent project facilities. No residential uses would be displaced or otherwise directly affected.

A wind-energy facility developed under Alternative 1 would be considered as a "utility" use under County land use provisions. While general types of utility uses are common in rural areas and are permitted by Kittitas County regulations, wind energy facilities are permitted only if the required permits are granted by Kittitas County. A wind energy project at the Alternative 1 site would need the same land use approvals as those described for the Desert Claim project. Considered as a type of land use, Alternative 1 would be generally compatible with typical rural uses and with the ongoing agricultural activity that predominates in the area of the Wild Horse site. No significant conflicts with existing land use patterns would occur.

Indirect Impacts

Alternative 1 would not attract supporting land uses or generate secondary or spin-off development. The number of full-time employees associated with the proposed project is small and the turbines would be widely dispersed. The proposed use would not generate significant traffic or generally create the types of conditions that would create demand for commercial or industrial uses nearby. Transmission lines are already located proximate to the Wild Horse site. Similarly, Alternative 1 would not attract significant numbers of non-resident workers. In-migration would be insignificant and would not result in significant increased demand for housing or services. The Wild Horse site and the adjacent lands are characterized by shrub-steppe vegetation used for grazing, while intensive agricultural and rural residential uses are located several miles distant from the site. Therefore, indirect impacts on existing land uses from Alternative 1 would likely be negligible or non-existent.

Alternative 2: Springwood Ranch Site

Direct and indirect land use impacts would generally be the same in type as those described for the Proposed Action and Alternative 1, but less in magnitude because of the smaller project footprint for Alternative 2. Approximately 30 acres of (primarily) grasslands would be converted to wind energy facility use, while existing grazing activity would be temporarily displaced or disturbed on approximately 125 acres. As discussed further in **Aesthetics** (**Section 3.10**), under Alternative 2 wind turbines would be significantly closer and more visible to drivers on I-90 than would be the case for the Proposed Action.

No Action Alternative

Under the No Action Alternative, on-site agricultural and rural residential activities would continue for the foreseeable future; current Ag-20 and Forest and Range zoning would likely continue. The potential for residential development in the project area, permitted by existing zoning, and the potential for conflicts with existing agricultural activities, would continue. For the approximately 4,000 acres zoned as Ag-20, the potential exists for development of up to 400 residential lots over this area. Conversion to rural residential uses could displace existing uses and affect rural character over time.

3.7.1.6 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.7.1.7 Mitigation Measures

Increasing turbine setbacks from the residences adjacent to the central portion of the site could reduce visual and proximity impacts to these residents. Similarly, increasing setbacks from property boundaries, as proposed in the modified project configuration, could reduce impacts to these property owners. As noted in Chapter 2 of the Final EIS, the applicant has modified the proposed turbine configuration to provide setbacks from residences, property boundaries, road rights-of-way, transmission facilities, and the KRD canal. Other impacts discussed would not be significant and do not warrant mitigation.

According to Kittitas County's regulations for wind farms (KCC 17.61A.010), which are discussed in section 3.7.2.1. below, the Board of County Commissioners' decision on a wind farm application will address the issue of land use compatibility. The Board must decide whether a proposed wind farm location is suitable, protects the public health, welfare, safety and quality of life, and ensure compatible land uses in the vicinity.

3.7.1.8 Significant Unavoidable Adverse Impacts

The scale of the wind turbines would be significantly larger than other land uses; this contrast is unavoidable because of the nature of wind power facilities. Effects on overall land use patterns in the project area would not be significant. Impacts to residences located proximate to the turbines could be reduced, but not eliminated, through increased setbacks.

3.7.2 Relationship to Land Use Plans, Policies and Regulations

3.7.2.1 Local

Kittitas County Comprehensive Plan (1996, as amended)

In 1996, Kittitas County adopted a Comprehensive Plan consistent with the requirements of the State Growth Management Act. The plan contains the County's goals for managing growth and development over a 20-year period (1996 to 2016). It includes general goals and policy statements for five major elements, including: land use, housing, transportation, capital facilities, and utilities. Land Use and Utility policies are most relevant to the proposal and summarized and discussed below.

Land Use

Summary: The Land Use section includes designations and policies for guiding land use in the County. Land use designations establish general locations for specific land use and development activities throughout the County. The project area and much of the surrounding area is designated as Rural in the Comprehensive Plan, except for areas to the north and northwest of the project area, which are designated as Commercial Forest. The Plan identifies the importance of natural resource activities, as they contribute to the County's economic base.

Chapter 8, Section 8.5, of the Comprehensive Plan states, "Rural lands in Kittitas County are now, and have historically been, a mix of resource lands, rural neighborhoods, and varied developments scattered throughout the county." The Plan's goals, policies, and objectives (GPOs) for land uses on rural lands are "established in an attempt to prevent sprawl, direct growth toward the Urban Growth Areas and Nodes, provide for a variety of densities and uses, respect private property rights, provide for residences, recreation, and economic development opportunities, support farming, forestry and mining activities, show concern for shorelines, critical areas, habitat, scenic areas, and open space while keeping with good governance and the wishes of the people of Kittitas County and to comply with the GMA and other planning mandates." The following GPO's apply to the development of wind resource farms:

GPO 8.5 *Kittitas County recognizes and agrees with the need for continued diversity in densities and uses on Rural Lands.*

GPO 8.9 *Projects or developments, which result in the significant conservation of rural lands or rural character, will be encouraged.*

GPO 8.11 *Existing and traditional uses should be protected and supported while allowing as much as possible for diversity, progress, experimentation, development, and choice in keeping with the retention of Rural Lands.*

The Comprehensive Plan states that utilities using natural resources may be appropriate in rural areas:

> *The economy of our rural community has traditionally been based on natural resource activities and Kittitas County encourages and supports their continuation in Rural Lands…. Economically viable farming and logging may occur with or beyond the state designated areas but more and more it is necessary to supplement income from outside sources in order to support natural resource operations. Other businesses and economic growth can be realized without sacrificing our rural character.*

Discussion: Development of the proposed project (or Alternatives 1 or 2) would be generally consistent with the above GPOs and the intent of the Comprehensive Plan. The proposed project would not directly change or replace existing uses of the site (agriculture) or affect the pattern of rural uses in the surrounding area. Wind farms are a relatively new and innovative type of energy (or utility) use that would support economic growth and generate revenues to Kittitas County and junior taxing districts (refer to the Fiscal Impact discussion in this EIS). As noted in the *Land Use* discussion above, the proposal could indirectly contribute to the continuation of agricultural activities, and would be generally compatible with the pattern of uses in the rural area. Kittitas County categorizes wind farms as a utility use, not as an industrial activity. (Refer to the definitions of "utilities" and "industrial uses" in the Glossary of Terms (Appendix A) of the Comprehensive Plan.) Even if considered to be an industrial use, however, wind farms would not be considered "urban growth" as that term is used in the Growth Management Act; please see the discussion of the Growth Management Act below.

Utilities

Summary: The Utilities section of the Comprehensive Plan identifies the general location and capacity of all existing and proposed utilities, including but not limited to, electrical lines, telecommunication lines, and natural gas lines. Generally, the goals, policies, and objectives seek to promote the maintenance of current information on existing and proposed facilities; plan for expansion or improvement of utility systems; encourage coordination between jurisdictions and utility providers; and ensure the proper placement and appropriateness of utility siting.

The Comprehensive Plan was amended in December 2002 to include a provision for wind farms, as follows:

GPO 6.1 *The County should promote the joint use of transportation rights-of-way and other utility corridors consistent with the underlying private property rights and easement limitations.*

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.*

GPO 6.34 *Wind farms may only be located in areas designated as Wind Farm Resource overlay districts in the Comprehensive Plan. Such Wind Farm Resource overlay districts need not be designated as Major Industrial Developments under Chapter 2.5 of the Comprehensive Plan.*

The Comprehensive Plan also articulates the County's policies for addressing regional energy demands and energy production goals, including the following:

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.*

GPO 6.8 *Additions to and improvements of utilities facilities will be allowed to occur at a time and in a manner sufficient to serve growth.*

GPO 6.13 *The County should coordinate with utility providers.*

GPO 6.18 *Decisions made regarding utilities facilities should be consistent with and complementary to regional demand and resources and should reinforce an interconnected regional distribution network.*

Discussion: The proposal (or Alternatives 1 or 2) would be located within the Rural Area, which is consistent with the Plan's policies, and would produce electricity to meet regional energy demands. Please refer to the discussion in Chapter 2 of this Draft EIS regarding a recent RFP by Puget Sound Energy and other regional utilities, including Avista and PacifiCorp, to acquire wind power as part of their plans for meeting the region's projected energy demand. The proposal would connect to an existing electric transmission line; proximity to a transmission line is a criterion for siting wind energy facilities (see the discussion of alternative sites in Chapter 2). Electricity generated by wind turbines would be collected through cables that run above or below the ground in the project area or within utility rights-of-way to an on-site substation. Most power collection lines would be located within the project area.

Since wind farms are considered to be utilities, not industrial uses, the relationship of the proposal to industrial land use policies in the Comprehensive Plan is not considered to be relevant.

Kittitas County Zoning Code (Title 17)

Summary: The Zoning Code implements the Comprehensive Plan and regulates the use and development of all property within the unincorporated area. The site is located within Kittitas County's designated Rural Area (see **Figure 3.7-1)**.
Wind farms are permitted within Kittitas County only through application of the County's Wind Farm Resource Overlay Zone, modification of the Comprehensive Plan Land Use map, and execution of a development agreement (KCC, Chapter 17.61A). The overlay zone permits wind energy resources in addition to uses permitted in the underlying zoning classification (Agriculture-20 and Forest Range); it

does not change the underlying land use. The intent of the code's provisions is to provide for the recognition and designation of properties located in areas suitable for wind energy production, while protecting the welfare of the public and ensuring compatibility between nearby land uses.

Please also refer to the preceding discussion of Comprehensive Plan policies for utilities and wind farms.

Discussion: The project (or Alternative 1 or 2) would conform to Kittitas County land use requirements, and would require an amendment to the Zoning Code. The amendment would involve the designation of Wind Farm Resource Overlay District. The development agreement would include standards for wind turbines (location, number, size and setback) and other facilities; mitigation measures; and other development conditions deemed necessary to protect surrounding properties, communities, or the County as a whole.

Kittitas County Critical Areas Ordinance (Title 17A)

Summary: Kittitas County's Critical Areas Ordinance (CAO, KCC 17A.03.045) sets forth the requirements for protecting frequently flooded areas, aquifer recharge areas, wetlands, fish and wildlife habitat conservation areas, and geologically hazardous areas. The County also considers the following areas (not classified as critical areas) during the permit review process: agriculture, erosion hazard areas, groundwater, landslide hazard areas, seismic hazard areas, and mine hazard areas.

Wetlands**:** Wetlands are areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Kittitas County has adopted a 'zero net loss' wetlands policy. "Zero" or "no" net loss does not mean that no impacts to wetlands can occur. Rather, it means that wetland impacts must be compensated for to ensure that no *net* reduction in wetland functions and values will occur; wetland subtractions may be offset by wetland additions, for example. The Critical Areas regulations require buffers of 50 to 200 feet for Type 1 wetlands, 25 to 100 feet for Type 2 wetlands, and 20 to 80 feet for Type 3 wetlands.

Discussion: The Desert Claim site contains areas of wetlands that could be impacted by project facilities, as does the site identified for Alternative 2; wetland impacts would not be expected under Alternative 1. Please refer to the discussion in **Section 3.4** of this Draft EIS. Information contained in the Draft EIS would be used to determine the location of project elements (turbines, etc) and to avoid or minimize impacts to wetlands. Wetland impacts would be mitigated as permitted by adopted critical area regulations.

Fish and Wildlife Habitat Conservation Areas**:** These areas include wetlands, big game winter range, riparian habitat and habitats for species of local importance (based on WDFW designations). Riparian areas are prioritized according to stream type, with buffers ranging from 10 to 200 feet from the ordinary high water mark. Terrestrial habitat is protected according to State and federal direction and local importance.

Discussion: Please refer to the discussion of potential impacts and mitigation measures in **Section 3.4** of this Draft EIS. Using information contained in the Draft EIS, the applicant will review and potentially modify the location of turbines and other facilities (i.e., micro-siting) to avoid or minimize disturbance to shrub-steppe habitat, riparian, and wetland communities. Disturbance of protected habitat would be minimized and/or compensated for through restoration and enhancement.

***Agriculture*:** Agricultural land is defined to include livestock raising, crop cultivation and harvesting, irrigation and drainage ditches, and farm roads. The County has adopted GMA minimum guidelines for classification and designation of agricultural lands, and has established an interim commercial agricultural zone (CAZ). Non-farm uses are discouraged in farm areas; incentives and support for farmers are a significant component of the designation.

Discussion: As discussed in the Land Use section above, the project area lies within the Ag-20 zone. None of the Desert Claim project area is within the CAZ, nor are the lands within the sites for Alternative 1 or 2. Use of the area for wind energy facilities would not displace or interfere with existing agricultural uses (hay and other feed-crop production and livestock grazing). The North Branch Canal would continue to provide irrigation for these activities.

Kittitas County Shoreline Master Program

Summary: Kittitas County's Shoreline Master Program (SMP) was adopted in March, 1975 and approved by the Department of Ecology in September 1995. The SMP regulates "substantial development" (i.e., $5,000 or more in value) within 200 feet of designated "shorelines." Shorelines subject to the SMP include specific rivers, streams and lakes, and wetlands and floodways associated with such water bodies.

The overall goal of the program is to promote a pattern of shoreline use that will minimize conflicts, preserve a high quality environment, and leave open the greatest number of options for future generations of shoreline users. The program's standards ad requirements are implemented through the County's substantial development permit process.

The SMP includes: goals concerning shoreline use (e.g., economic development, recreation, public access); use activity policy statements (e.g., utilities, agriculture); environment designations (Urban, Rural. Conservancy and Natural categories); and shoreline regulations (setbacks, etc. for various use activities).

Discussion: The project area does not contain and is not within 200 feet of any designated shorelines. The provisions of the SMP are, therefore, not applicable to the proposal. The same condition applies to the site for Alternative 1. The project site defined for Alternative 2 includes designated shorelines of the Yakima River, but project construction activity under this alternative would not occur within the shoreline zone.

3.7.2.2 State Policies and Regulations

Growth Management Act (RCW 36.70A) (1990)

Summary: Enacted in 1990, the Growth Management Act (GMA) establishes state policy to plan and manage growth. Jurisdictions subject to GMA must prepare and adopt: county-wide planning policies; comprehensive land use plans containing specified elements and embodying state-wide goals; regulations consistent with those plans; capital facilities plans for utilities and transportation systems; and programs designating and regulating critical and sensitive areas (including agricultural and forest lands, wetlands, steep slopes, and critical habitat). Counties must designate "urban growth areas," which are areas already characterized by urban growth and within which future growth is encouraged. Cities are included within urban growth areas and are generally expected to accommodate the majority of growth.

GMA goals generally consist of: directing growth to urban areas; reducing sprawl; providing efficient transportation systems; promoting a range of residential densities and housing types, and encouraging affordable housing; promoting economic development throughout the state; protecting private property rights; ensuring timely and fair processing of applications; maintaining and enhancing resource-based industries; encouraging retention of open space and habitat areas; protecting the environment; involving citizens in the planning process; ensuring that public facilities are provided at adequate levels concurrent with planned development; and preserving lands with historical and archaeological significance.

County Comprehensive Plans must address rural development issues. Measures in the plan must protect rural character by: (1) containing or controlling rural development; (2) assuring visual compatibility of rural development with the surrounding rural area; (3) reducing the inappropriate conversion of undeveloped land into sprawling, low density rural development; (4) protecting critical areas; and (5) protecting against conflicts with the use of agricultural, forest and mineral resource lands. "Rural development" is defined in the GMA as development outside urban growth areas and outside resource lands. It may include a variety of uses and densities (RCW 36.70A.030 (15)). At the time GMA was adopted, there were no wind energy facilities in Washington State. Such facilities are not addressed in the statute directly.

"Urban growth" is defined to mean "growth that makes intensive use of land for the location of buildings, structures and impermeable surfaces to such a degree as to be incompatible with the primary use of the land for the production of food, other agricultural products…or the extraction of mineral resources, rural development and natural resource lands…" (RCW 36.70A.030 (17).

Discussion: Kittitas County modified its Comprehensive Plan and zoning code in 2002 in anticipation of potential wind resource development applications. The County's adopted process includes project-specific amendment of the Comprehensive Plan Land Use map, rezoning and a development agreement before wind energy resources are permitted anywhere in the County. Project specific mitigation measures and development conditions would help ensure that GMA's rural policies are achieved.

Growth Management Hearings Board decisions were reviewed to identify any direction regarding the range of uses permissible in rural areas; as noted previously, no wind power facilities had been constructed in Washington at the time the GMA was enacted and this use is not addressed directly in the statute. A review of published digests of decisions of the Eastern Washington Growth Management Hearings Board identified several instances where the Board reiterated the GMA's prohibition against locating urban uses within rural areas, or discussed the flexibility and limitations provided to "limited areas of more intensive rural development pursuant to RCW 36.70A.070 5)(b)(v)) (e.g., *Whitaker v/ Grant County, No. 99-1-0019).* No discussion of the range of uses considered "rural" was identified, however.

The Central Puget Sound Growth Management Hearings Board did address this question generally in *Vashon-Maury, et al v. King County (No. 95-3-0008).* In that decision, the Board first interpreted GMA's rural provisions to mean that permitted land uses must be compatible with the land use *pattern* in the immediate vicinity of a proposed use and the rural character of that pattern, rather than solely with the use of an individual parcel (Id. at 1289). The Board went on to say that "rural character" has both a functional and visual component. The functional component was related to whether the proposed use was rural because it was "dependent on a rural setting." If rural lands or uses on those lands would be interfered with by impacts of the proposed use, the use would be considered incompatible. Similarly, if the proposed use "unduly disrupted or altered" the visual character of the rural landscape, it would be considered incompatible. This was seen as related to the degree to which the proposed use blends in or sticks out, which in turn is related to the intensity of development (Id. at 1289).

The Central Puget Sound Board also acknowledged that there could be legitimate rural uses that might meet the GM definition of "urban growth," which would be "an absurd result." It fashioned a "general rule," therefore, that would permit an intensive use if it was dependent, by its nature, on being in a rural area and was compatible with the functional and visual character of rural uses on the immediate vicinity (Id. at 1290).

The proposal (or Alternative 1 or 2) would not be characterized as "urban growth" as that term is defined in the GMA. While wind turbines are large structures, the proposal would not involve significant amounts of buildings, structures or impermeable surfaces (approximately 82 acres, or 1.6 percent of the entire 5,237 acre site), and, as discussed above, would not displace or significantly interfere with the primary use of land, or the predominant land use pattern in the project vicinity, for rural and agricultural activities. These lands are not designated as agricultural, forest or mineral resource lands of long-term commercial significance. Even if turbines were considered to be "urban growth", however, the nature of wind power energy systems requires that large areas of land be used to locate turbines. Such facilities are, therefore, functionally dependent on a rural setting and cannot as a practical matter be sited in urban areas. In both Europe and the U.S., wind facilities are typically sited in rural areas. As discussed in the Land Use section, the proposal would be compatible with the overall rural land use pattern; some conflicts with individual parcels of property would occur. To the extent that the location of turbines discouraged future residential development, it would help conserve the project area for agriculture. Visual impacts and compatibility are addressed in **Section 3.10** of the Draft EIS. Critical areas would be avoided where possible; any identified impacts would be mitigated. Overall, the County's project-by-project review process would enable it to determine the effects of wind energy facilities and to control rural impacts.

Indian Sites and Resources Act; Indian Graves and Records Act

Summary: The Indian Sites and Resources Act (RCW 27.53) and the Indian Graves and Records Act (RCW 27.44) address cultural resources pertaining to the Indian history within the State of Washington. RCW 27.53 prohibits the disturbance or excavation of historic or prehistoric archaeological resources on state or private land without a permit. RCW 27.44 prohibits knowingly disturbing a Native American or historic grave.

Discussion: The proposed action (or Alternative 1 or 2) contains a number of ground-disturbing activities that have the potential to directly impact cultural resources within the project area. Ground-disturbing activities would occur at most stages of project development, including construction of roads, tower foundations, power collection systems, substations, operations and maintenance facility, and other project features. See **Section 3.6** for an analysis of existing cultural resources and potential impacts within the project area.

Washington Scenic Highways Act

Summary: The Scenic and Recreational Highway Act (Chapter 47.39 RCW), enacted in 1967, designated a system of scenic and recreational highways throughout the State. Segments of more than 60 highways in Washington have been designated as part of the scenic and recreational highway system. Designated scenic highways in Kittitas County include SR-97, from the junction with SR-10 north to the junction with SR-2 near Leavenworth, and SR-10, beginning at the Teanaway junction and east to SR-97. Scenic highway designation typically results in the preparation of a scenic corridor management plan to provide policy guidance regarding local land use regulations, such as comprehensive plan policies and zoning designations.

Discussion: The Desert Claim project area would be visible from the south portion of SR-97 and along SR-10 from the Teanaway junction east to SR-97. The site for Alternative 2 would also be visible from both highways, and at a considerably closer viewing distance. Please see **Section 3.10** of the Draft EIS for a detailed analysis of the project's visual impacts on area viewpoints. Scenic corridor management plans have not been prepared for the SR-97 or SR-10 highway corridors. Designation of routes as scenic highways under RCW 47.39 does not establish regulatory authority or standards relating to visual resource conditions within view of scenic highway corridors.

3.7.2.3 Federal Policies and Regulations

Endangered Species Act (16 U.S.C. 1533) (1973), Bald Eagle and Golden Eagle Protection Act (1940)

Summary: The Endangered Species Act (ESA) requires the protection and recovery of threatened and endangered species. ESA is administered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries for species with ocean habitats or for anadromous fish species, and by the US Fish and Wildlife Service (USFWS) for all other species. NOAA and USFWS designate critical habitat for species which are identified as threatened or endangered or which are listed as potentially threatened or endangered. Section 7 of the ESA requires federal agencies to assess the effect of their proposed actions on listed species and consult with NOAA and/or USFWS, as applicable. Section 9 makes it unlawful to 'take' endangered species. Take is defined to include harm, harassment, and habitat modification or degradation. Section 10 enables interested parties to obtain a regulatory certainty (i.e., a take permit) in exchange for voluntary measures that conserve protected animals. 'Incidental take' or 'enhancement of survival' permits lawful activities that might unintentionally harm a species to proceed under a habitat conservation plan, candidate conservation agreement, or a safe harbor agreement.

The Bald Eagle and Golden Eagle Protection Act (BEPA) protects the bald eagle and golden eagle and imposes its own prohibition on any taking of these species. As defined in BEPA, 'take' is defined by actions to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb these species.

Discussion: **Section 3.4** of this Draft EIS addresses potential impacts to plants and wildlife that are listed, or are candidates for listing, as threatened or endangered and that may occur on or near the Desert Claim project area, or within the project areas for Alternatives 1 and 2. Bald eagles are known to use the area within and around the Project area and are listed as Threatened under the ESA. Golden eagles have a moderate potential for use of the site and are classified as a State Species of Concern.

National Historic Preservation Act (PL 90-577) (1966)

Summary: The National Historic Preservation Act (NHPA) protects historic sites and values (in cooperation with other nations, states, and local governments) as federal policy. It generally establishes a grants program to states for historic preservation and requires federal agencies to consider the effects of their actions on historic resources. Agencies can require private interests to pay costs of protecting archaeological and historic resources. Historic resources are identified by literature searches, sample evaluation, and site surveys.

Federal criteria provide a useful way to measure the scientific or historic value of properties. Properties eligible for the National Register of Historic Places generally must be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria of significance. The criteria are discussed in detail in **Section 3.6**.

Discussion: No sites within or adjacent to the project area are known to be listed on or proposed for listing on the National Historic Register. The Kittitas County Historical Site record indicates a homestead (the Robbins Homestead or Springfield Farm) located within the project area. Heritage resources identified in the field survey for the Desert Claim project include 13 prehistoric sites, 19 historic sites, 28 historic isolates (locations with fewer than 5 artifacts) and 48 prehistoric isolates. A preliminary assessment of resource significance for these sites identified 13 sites as likely to be significant, including 8 historic sites, 4 prehistoric resources and 1 site with both historic and prehistoric components within the project area. Evidence of potentially significant agriculture/settlement heritage resources includes the Morrison Homestead, Springfield Farm, Roan Farm, White Ranch, Hodges Residence, the North Branch Canal and miscellaneous historic farm structures and debris. Prehistoric resources include lithic scatters that represent the manufacture and sharpening of stone tools or activities associated with short-term camps. Potential project impacts on these resources and associated mitigation measures are addressed in **Section 3.6**.

Ethnographic data indicate that three Yakama villages were located within a few miles of the Desert Claim project area. People of these villages would have utilized the land for hunting, plant gathering, and traditional activities. See **Section 3.6** of this Draft EIS for further discussion of historic features within the project area, and within the sites for Alternatives 1 and 2.

<u>National Scenic Byways Program</u>

Summary: The National Scenic Byways Program is currently authorized by the Transportation Equity Act for the 21st Century (TEA-21, 1998; 23 USC 101). The Program provides for the designation of roads that have outstanding scenic, historic, cultural, natural, recreational and archaeological qualities as All-American Roads or National Scenic Byways. Jurisdictions along designated roads are given priority for discretionary highway projects, planning and design grants. The Program does not place restrictions on land use within scenic corridors. In Washington State, the Department of Transportation administers the highway selection process. The Federal Highway Administration approves selections and related grants.

Discussion: In 1998, I-90 from Seattle to Thorp was designated as a National Scenic Byway. The Desert Claim project area is at least partially visible from I-90 at Thorp. The Alternative 2 site adjoins I-90 and most of the site is visible from the freeway. Refer to **Section 3.10** of this Draft EIS for further discussion of visual impacts.

<u>Wenatchee National Forest Land and Resource Management Plan</u>

Summary: The Wenatchee National Forest Land and Resource Management Plan was adopted in 1990; it was amended in April 1994 by the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. The

1994 ROD directed the U.S. Forest Service (USFS) and Bureau of Land Management (BLM) to develop and implement a scientifically credible comprehensive plan for providing late-successional forest within Adaptive Management Areas (AMA) and protecting the critical connective link in north-south movement of organisms (USFS, 1994)[5]. In November 1997, the Record of Decision for the Snoqualmie Pass AMA for the Wenatchee and Mount Baker-Snoqualmie National Forests was adopted; the 1997 ROD outlines a comprehensive management plan for the area (USFS, 1997b). The plan establishes direction for managing the ‘checkerboard’ forest lands within the AMA, but does not authorize site-specific actions.

Discussion: The proposed project area does not lie within the Wenatchee National Forest boundary and does not include national forest lands. The same condition applies to the sites defined for Alternatives 1 and 2. Therefore, national forest plans and policies are not directly applicable to the proposal.

[5] AMAs were selected by US land management agencies to provide opportunities for innovation and a range of technical challenges, from an emphasis on restoration of late-successional forest conditions and riparian zones to integration of commercial timber harvest with ecological objectives.

3.8 HEALTH AND SAFETY

A number of comments submitted for the scoping process for the Desert Claim project EIS addressed concerns relating to potential health and safety issues. Specific topics indicated in these comments included certain possible hazards that are uniquely associated with wind turbines, such as blade throw and ice throw; health and safety issues associated with electrical and magnetic fields; more common hazards such as fire; and the incidence and impacts of shadow flicker, another phenomenon specific to wind turbines. **Section 3.8** addresses these wide-ranging health and safety topics that have been identified as concerns for the environmental review.

3.8.1 <u>Affected Environment</u>

3.8.1.1 Mechanical Hazards

The existing conditions and uses in and near the proposed project area include some identifiable mechanical and electromechanical hazards. In general, these are the types of hazards associated with everyday living, working and traveling in a rural area typified by agricultural and low-density residential uses.

The Kittitas County Fire Marshall provided scoping input indicating that the project site is historically a high fire hazard area, with a high incidence of recent fires that included arson events. Agricultural machinery and vehicles operate in areas of agricultural crops, grassland and scrub brush, creating the potential for fire caused by malfunction or contact of combustibles with hot catalytic converters. The dry climate of the Kittitas Valley contributes to the potential for wildfires.

Paved and unpaved roads traverse the properties included within the project boundary. While traffic volumes are low and no unusual traffic hazards have been identified, local traffic creates the potential for impacts between vehicles, as well as vehicles impacting people and structures.

A number of high- and low-voltage overhead power lines cross the project area. These lines create the potential for electrical safety hazards in the immediate vicinity of the lines and the potential for personal injury, property damage or fire in the event of transmission line failure or tower/pole collapse.

A number of residences are located within or close to the project area. Residential occupancies are linked to hazards associated with electrical appliances, powered yard and garden tools, stored fuels, indoor and outdoor burning, and other domestic activities.

The affected environment for Alternative 1 (the Wild Horse site) with respect to mechanical and related hazards is similar to that described for the Desert Claim site. The primary differences are that the Wild Horse site currently is used almost exclusively for grazing, and does not have cultivation or rural residential uses within the site or adjacent areas, and the Wild Horse site is not served directly by public roads. Therefore, the variety and degree of hazards associated with agricultural practices, domestic activities and vehicle traffic operations is considerably less for the Wild Horse site, compared to the Desert Claim project area. The shrub-steppe rangeland that comprises the Wild Horse site is similarly subject to wildfires that can spread rapidly, although the level of human activity and associated potential for human-caused fires is considerably less. The Wild Horse site appears to receive more recreational use than the Desert Claim project area, primarily in the form of hunting for elk and mule deer, and would have a correspondingly higher incidence of hunting-related accidents.

Existing conditions in the areas that would be affected under Alternative 2 (the Springwood Ranch site near Thorp) are quite similar to those described for the Desert Claim project area. The primary differences are that the area around the Springwood Ranch site is served by a road network that includes larger highways, such as I-90, SR 10 and the Thorp Highway, that carry significantly larger volumes of traffic than the county roads near the Desert Claim site. The Springwood Ranch site also includes more cultivated land and grassland, and less shrub steppe than the Desert Claim site.

3.8.1.2 Electrical Hazards

A number of high- and low-voltage overhead power lines cross the Desert Claim project area. Multiple transmission lines operated by the Bonneville Power Administration (BPA) at voltages up to 500 kV cross the project area in a generally east-to-west direction, and there is a large BPA substation located west of Wilson Creek Road and just to the north of the northeastern corner of the project area. Two transmission lines operated by Puget Sound Energy (PSE) also cross through or near the Desert Claim project area. These lines create the potential for electrical safety hazards in the immediate vicinity of the lines and the potential for personal injury, property damage or fire in the event of transmission line failure or tower/pole collapse. Transmission lines also create electric and magnetic fields in their vicinity. Household electrical wiring and appliances represent similar hazards and also create electric fields.

Existing electric and magnetic fields within the Wild Horse site (for Alternative 1) are limited to those produced by the earth itself and the antennae and other equipment comprising the communications facility located on Cribb Peak. There are no existing electric transmission lines crossing the site, and no other constructed facilities that typically produce electric and/or magnetic fields.

The BPA Schultz-Vantage 500-kV transmission line passes in a southeast-northwest direction through the area to the west of the Wild Horse site; at its closest point, this line is approximately 2 miles from the southwest corner of the Alternative 1 site. In 2004 BPA will begin constructing the Schultz-Wautoma 500-kV line parallel to the existing 500-kV line. An existing PSE 115-kV transmission line follows a generally east-west route that passes approximately 4 miles to the south of the Wild Horse site.

Existing electrical facilities within the Springwood Ranch site (for Alternative 2) include low-voltage electrical distribution lines serving rural residences in the local area. The BPA transmission corridor with multiple lines (discussed previously) passes approximately 2 miles to the north of this site.

3.8.1.3 Shadow Flicker

The Desert Claim project would be located in a rural area consisting primarily of farming and ranching uses. Existing sources of shadows on and near the project site include houses and other structures, traffic on local roadways and occasional aircraft flying overhead. While some of these sources are moving, none of the existing sources create shadows with the strobe effects known as shadow flicker. There are 32 residences located inside or within 1,000 feet of the project area boundary, and approximately 80 are located within about 1 mile of the project area.

The Wild Horse project site is located in a rural area with a low population density. There are no existing residences within the project area. The closest residence is located approximately 2 miles from the edge of the project area. There are scattered rural residences several miles to the west of the site, generally concentrated in the vicinity of the Vantage Highway and Parke Creek Road.

The Springwood Ranch site is also in a rural area with a low population density, with an overall level of development that is generally similar to the Desert Claim project area. Potential shadow flicker receivers for this site include scattered developed sites near Taneum Creek to the south of the site; nearby residences to the east along the Thorp Highway and school and residential uses within the nearby community of Thorp; and the Sunlight Waters residential/recreational community near the northwest corner of the site. Potential receivers in Thorp and along the Thorp Highway are approximately 1.5 miles or more away from the project area. Two receptor locations near Taneum Creek are within 1,000 feet of the project boundary for Alternative 2, while several other receptors in this area are at least 2,000 feet distant. One receptor location near SR 10 and the east bank of the Yakima River is approximately 2,000 feet from the nearest turbine location, while other residences near the junction of SR 10 and the Thorp Highway are about 4,000 feet or more distant. Several residences along the eastern edge of Sunlight Waters are within approximately 500 feet of the Alternative 2 site.

3.8.2 Environmental Impacts of the Proposed Action

3.8.2.1 Mechanical Hazards

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 in the literature, and systems of design and construction standards to mitigate these hazards have evolved to a large extent. 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.

The applicant has identified the turbine/tower system to be used in the proposed action as the General Electric Wind Energy (GEWE) 1.5sl, with a nameplate capacity of 1.5 MW. The selected unit has a tower hub height of 65 meters (212 feet) and a 77-meter rotor diameter. These dimensions are well within the 80-meter hub height and 80-meter rotor diameter analyzed as the maximum turbine envelope in the Draft EIS.

The following discussion refers to systems and nomenclature described in the technical descriptions and specifications for the GEWE 1.5s/1.5sl wind turbine generators, modified as appropriate for consistency with the project's maximum turbine envelope and the applicant's identification of the specific turbine model. Other makes of wind turbines have similar systems and functionality. The discussion addresses the impact of credible failures and mishaps due to the presence of the proposed wind generating facility.

Failure of Machinery and/or Structures

Determination of the area potentially affected by a failure of wind turbine machinery or structures is dependent upon the specific type of failure that might occur. The types of mechanical failures identified through scoping include tower collapse and blade throw.

Tower Collapse

Collapse of a turbine tower that has been constructed in accordance with international standards and local building codes is an extremely remote possibility. EFSEC (2003a) documents a personal communication with an insurance industry executive (whose company insures over 12,000 wind turbines worldwide) indicating that he was not aware of any case of a tubular wind tower collapsing. EFSEC (2004) subsequently documented testimony from a wind turbine manufacturing company executive concerning a tower collapse in France (due to an overspeed condition) and another in Germany (resulting from a weak weld in the tower flange). A wind-energy related website posts an article describing a malfunction of a wind turbine at Havoygavlen, Norway that resulted in the nacelle and rotor assembly being severed from the tower (Ventus Vigor 2003). Other websites display photos of the collapsed turbine in the German case referenced above.

In the unlikely event of a tower collapse, 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. Each of these items weighs many tons, so it is reasonable to expect that being struck would result in damage, injury or death. A tower collapse onto live electrical circuitry could conceivably start a fire.

Failure of a tower at its base, or of its anchorage to the foundation, would create a hemispherical hazard zone with a radius approximately equal to the tower height (to the rotor hub) plus one half of the rotor diameter (**Figure 3.8-1**). Persons, animals and facilities within this radius would be at risk of being struck by the tower, generator assembly or rotor blades. For the maximum turbine envelope, the maximum radius of the hazard zone under this scenario would be 120 meters (393 feet); this relates to a circular area at ground level of 11.2 acres per tower. For the selected GE 1.5sl, the hazard zone radius would be 103.5 meters (340 feet) and the circular area at ground level would be 8.3 acres per tower. Alternatively, a tubular steel tower could buckle at some point along its length. This failure mode would result in a smaller hazard zone due to the reduced radius.

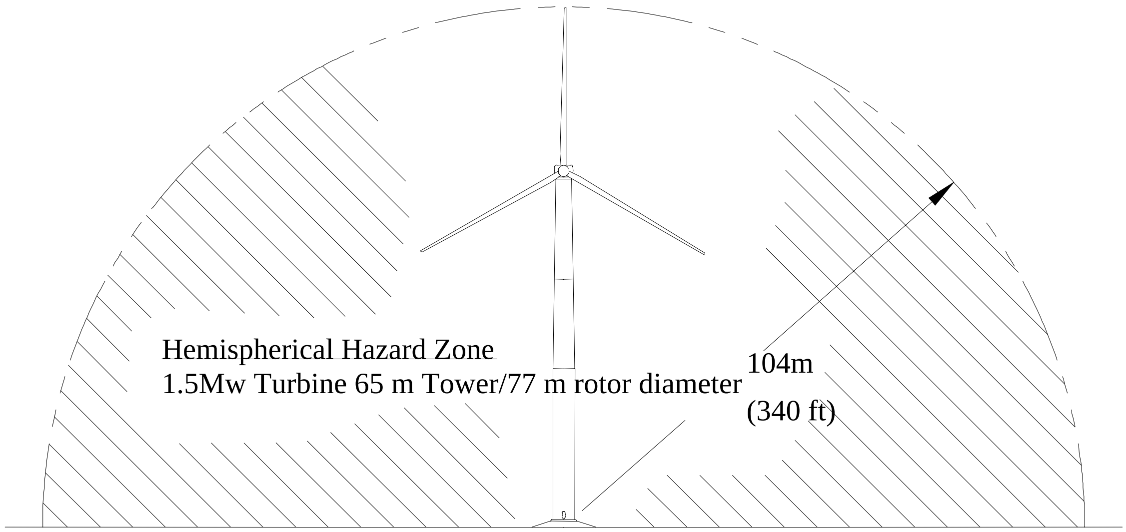


Figure 3.8-1
Tower Collapse Hazard Zone

Blade Throw

Scoping comments indicated concerns over the possibility that rotor blades or blade fragments might be thrown from operating wind turbines. Persons, animals and facilities within the blade throw hazard zone could be at risk of being struck by a falling blade or blade fragments. It is reasonable to expect that being struck could result in damage, injury or death. A thrown blade or blade fragment falling on live electrical circuitry could conceivably start a fire.

During normal operation, wind turbine rotor blades are exposed to centripetal, gravitational, and aerodynamic forces. In the course of each revolution, these forces create a cyclical combination of axial, bending and torsional stress at each part of the blade. If all or any part of a blade detaches from the rotor, its trajectory will be dependent upon the loading and stress state at the time of failure, and on the type and progression of failure before separation. 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 documented incidents of blade throw were found in the research reviewed to prepare the Draft EIS (Resoft, 2003). One was directly linked to improper assembly, resulting in immediate failure upon startup, and one resulted from a blade being struck by lightning. A subsequent EIS published by EFSEC (2004) documents a case of blade throw from a wind turbine in Denmark, in which a blade was thrown 50 to 75 meters. A number of Internet websites also include the same references to reported incidents of blade throw in Wales, Spain and Germany, but the articles do not include source documentation to substantiate the reports. Acts of vandalism such as gun shots could conceivably damage rotor blades and cause a blade fragment to be thrown, although such cases have not been documented.

Nevertheless, it is useful to perform simplified evaluations of two extreme subsets of blade throw: loss of an entire blade at its attachment to the rotor, and loss of tip fragments. These simplified cases will establish worst-case sizing of the hazard zone.

The simplified worst-case loss of a whole blade would occur with the blade rotating at maximum speed, when oriented at 45º from the vertical and rising. This is the classic maximum trajectory case from standard physics texts (Zemansky and Francis, 1970) and yields the results in **Table 3.8-1** as illustrated in **Figure 3.8-2**. Review of these data indicates that for the maximum turbine envelope (which is larger than the turbine selected for the project), the worst-case blade throw distance is 150 m (491 ft.) from the tower to tip of the fallen blade. For the selected turbine, the GEWE 1.5sl, the worst-case distance is 135 m (443 ft.). The simplifications employed in this calculation tend to over-estimate the distance traveled. Specifically, aerodynamic drag is completely ignored, the blade center of gravity (CG) is estimated as if the blade were of uniform thickness (in reality the blade CG is closer to the hub, so the initial kinetic energy of the blade is lower than estimated and the thrown distance will be less), and finally, it is assumed that the blade travels and lands oriented parallel to its flight path and in-plane with the plane of rotation. Downwind blade acceleration would not be significant because the tendency for the blade to feather into the wind would result in extremely low downwind force relative to the mass (several tons) of a rotor blade and the short flight time (approximately 7 seconds).

Table 3.8-1
Blade Throw Distances

Turbine Model	Rotor Diameter	Rotor Speed	Tower Height	Blade Throw
GEWE 1.5sl	77 m (253 ft.)	20 RPM (max.)	85 m (279 ft.) 80 m (262 Ft) 64.7 m (212 ft.)	144 m (472 ft.) 142 m (466 ft.) **135 m (443 ft.)**
GEWE 1.5s	70.5 m (231 ft.)	22 RPM (max.)	85 m (279 ft.) 80 m (262 Ft) 64.7 m (212 ft.)	145 m (476 ft.) 142 m (466 ft.) 136 m (446 ft.)
Maximum Project Turbine Envelope	80 m (262 ft.)	20 rpm (assumed maximum)	80 m (262 Ft)	**150 m (491 ft.) Project Maximum**

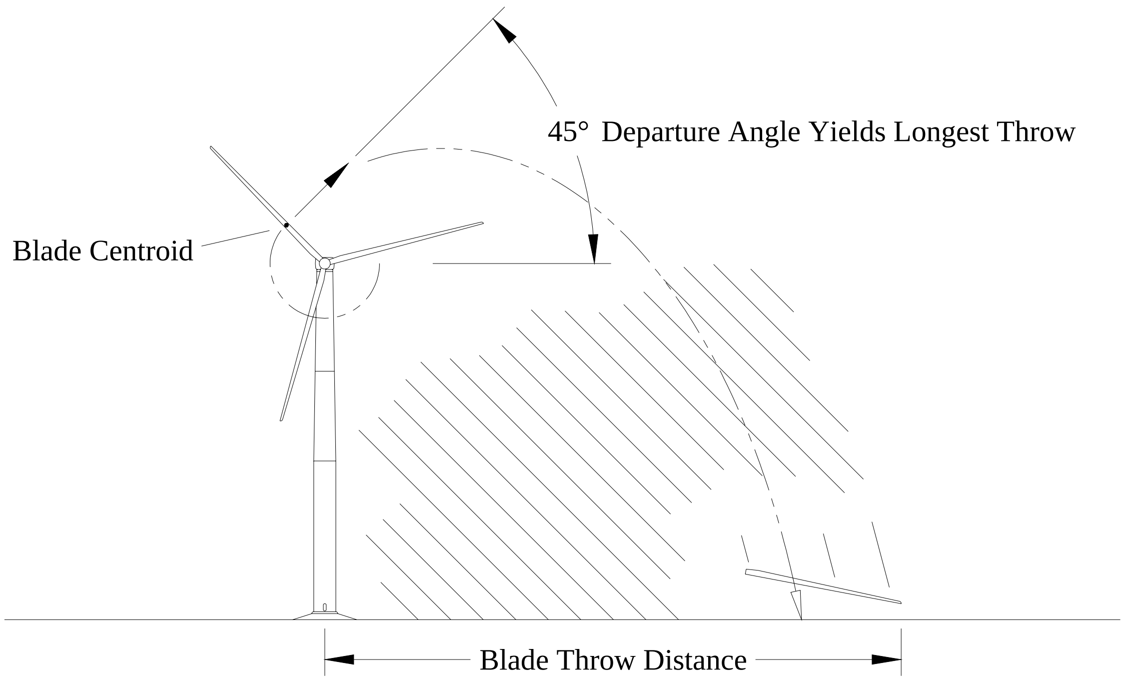


Figure 3.8-2
Blade Throw Hazard Zone

The loss of a tip fragment could be evaluated in the same way, but tip fragments will have minimal torsion and bending stresses and be relatively small, so the effect of drag on a fragment will be comparatively large. This observation makes it reasonable to conclude that the trajectory of a blade tip fragment and the resulting hazard area will be analogous to the issue of ice throw in the following paragraph. Also note that a blade fragment cannot develop initial radial velocity (the "sling shot" effect) prior to release, so evaluation of ice throw distance can reasonably be considered more conservative.

Similar to the previous discussion of possible throws of entire turbine blades, there are selected reports in literature and popular media of instances of turbine blade fragments being thrown considerable distances. Articles on such events have not included citations for authoritative source documents substantiating the reports, however, so these incidents cannot be verified. A contact with State regulatory staff in Minnesota, which has permitted a number of wind energy facilities, indicates that there have been cases of lightning strikes causing turbine blades to delaminate, but the blades have not come apart or thrown fragments (personal communication, L. Hartman, Minnesota Environmental Quality Board, St. Paul, Minnesota, August 3, 2004). Staff with the American Wind Energy Association (which, as noted previously, is the designated American participant on International Electrotechnical Commission activities relating to developing industry standards) indicate that cases of blade or blade fragment throw are generally associated with older wind turbine technology and have been essentially unheard-of with modern utility-scale turbines for approximately the past decade (personal communications, L. Jodziewicz and T. Gray, American Wind Energy Association, Washington, D.C., August 3, 2004).

Sound engineering design and quality control in the manufacture, construction and operation of wind turbines are the most appropriate and effective means for reducing blade throw potential (Manwell et al. 2002). Blade throw has occurred when conditions cause structure design limits to be exceeded, such as with older-generation turbines using less-advanced materials and designs and much more rapid blade speeds. Modern turbine braking systems, pitch controls and other speed controls should prevent design limits from being exceeded. Permitting agencies have also applied required setbacks from residences, public roads and adjacent property lines to provide safety buffers from potential blade throw.

Ice Throw

Under certain conditions ice can form on wind turbine towers and rotor blades in a variety of ways. , Many of these do not present an ice throw hazard; an example of this would be normal light frosting of a stopped blade. It has been observed that moving rotor blades are subject to heavier buildups of ice than stationary structures through the mechanism of rime icing (Morgan et al., 1998). Rime icing occurs when a sub-freezing structure is exposed to moisture-laden air with 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. Persons, animals and facilities within the ice throw hazard zone could theoretically be at risk of being struck by falling ice fragments which could result in damage, injury or death.

The study of ice throw and its related risks is one of three areas of work in a project entitled “Wind Energy in Cold Climates (WECO)” funded by the European Commission and the UK Department of Trade and Industry. As part of this work, WECO has developed analytical modeling techniques for determination of the probabilistic ice throw hazard in the vicinity of a turbine using variables for turbine and tower geometry, rotor speed, gravity, fragment dimensions and aerodynamic lift and drag. Risk is expressed in terms of the number of expected strikes per square meter per year.

Based on weather records at the Ellensburg airport, icing conditions in the vicinity of the proposed wind energy facility that may present an ice throw hazard have been estimated to occur 4 to 5 times per year (EFSEC 2003b). This is characterized as light-to-moderate frequency by WECO, and the WECO model predicts that there would be a risk of approximately .001 strikes per square meter per year at a distance of 100 m (328 ft.) from each tower of a GEWE 1.5s turbine at the proposed site. At 300 meters (984 ft.) under the same assumptions, the modeled risk goes down to approximately .000001 strikes per square meter per year. This last risk calculation means that a 1600 square foot house located 1000 ft. from a tower at this project would have a risk of less than 3 in 1,000 of being struck by ice in a 20-year period.

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. WECO team members presented findings from this effort at the BOREAS IV wind energy symposium in 1998. Significant findings included that (a) ice fragments ranged from 0.1 to 1.0 kg. in size and (b) no ice throw distances over 100 meters had been reported (Morgan et al., 1998; Tammelin and Seifert, 2001). Morgan et al. (1998) also observed that there have been no reported injuries resulting from ice thrown by wind turbines. Coupled with the analytical conclusions described above, this suggests that the risk of being struck by ice becomes diminishingly small at distances greater than 100 meters from each tower at the proposed facility.

Experience with wind turbines in Minnesota (noted for its cold climate and harsh winters) has not identified ice throw as a problem. With newer turbine designs, control sensors typically detect the additional weight and slower movement on blades with ice buildup and stop the rotors; the rotors are re-started after the ice has been shed (personal communication, L. Hartman, Minnesota Environmental Quality Board, St. Paul, Minnesota, August 3, 2004). Ice throws have not been reported for Minnesota wind projects, and known incidents involving ice are limited to ice shed onto a project vehicle parked underneath a turbine.

It should be noted that, similar to blade throw, the ice throw hazard area extends in a direction normal to the prevailing wind direction and downwind from the turbine. There is essentially zero ice throw hazard as little as 25 meters upwind from the plane of the rotor (Pligavko, 2003) (see **Figure 3.8-3**).

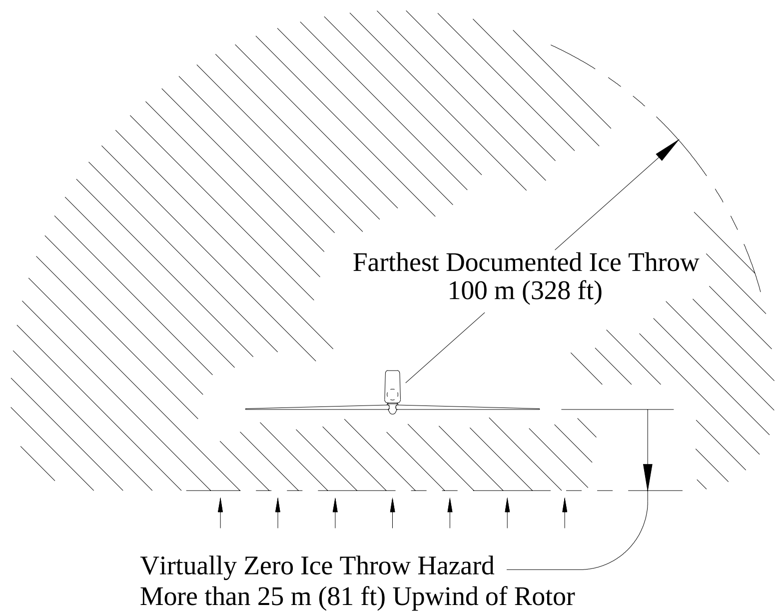


Figure 3.8-3
Ice Throw Hazard Zone

Fire Hazards

Project Construction

During the construction period of the project, construction activities and personnel would pose some increase in the fire hazard. This would result from the increased number of workers in the area, operation of powered machinery, and storage and handling of fuel. The Kittitas County Fire Marshall has identified fire hazards during construction as an area needing appropriate mitigation measures.

Fire Started by Wind Turbines

Fires have been directly or indirectly attributed to operating wind turbines, with suspected fire causes including sparks or flames resulting from substandard machine maintenance, improper welding practices, electrical shorts, equipment striking power lines and lightning (Manwell et al. 2002). Instances of electromechanical failures in wind turbine generators that resulted in fire have been documented (Ventus Vigor, 2003; Essential Information, 2003). For the most part, they have been traced to the electrical side of the systems, but mechanical malfunctions such as overheated bearings can conceivably cause a fire. The nacelle of many turbine generators, including the GEWE 1.5s/sl is made of combustible materials and contains combustibles, including approximately 80 gallons of oil (GE Power Systems, 2003). It is conceivable that a fire could penetrate the nacelle allowing burning materials to fall to the ground. Similarly, ground level equipment or maintenance activities could be a source of ignition.

Several comments on the Draft EIS referenced an incident involving a fatal accident and fire at a wind farm operated by *enXco,* Inc., at Altamont Pass, California. The specifics of that incident are summarized as follows (personal communication, J. Fahrendorf, *enXco*, Inc., North Palm Springs, California, April 15, 2004):

> On September 18, 2003 an *enXco* employee was involved in a fatal accident at the Tres Vaqueros Wind Farm near Byron, California. At the time of the accident the employee was performing a manual switching operation on a pad-mounted electrical transformer. There was nothing unusual about the specific assignment and it was well within the employee's experience and usual job responsibilities. Nevertheless, an explosion occurred during the switching operation. The employee died the following day from injuries sustained in the explosion. The explosion ignited a fire at the base of the turbine, for which the California Department of Forestry (CDF) was immediately notified. A CDF fire crew arrived at the site within 30 to 35 minutes of notification, by which time the fire had been approximately 90 percent contained by *enXco* personnel using company equipment stored at the project site. CDF and *enXco* personnel then completely extinguished the fire, which was limited to an area of approximately 7 acres.
>
> CalOSHA, the state agency with jurisdiction over occupational safety and health standards, was notified immediately after the accident and conducted an investigation that was completed on December 8, 2003. CalOSHA concluded that no applicable standard, rule order or regulation had been violated in connection with the subject accident, and that the accident was the result of worker error and not company policy.
>
> The Tres Vaqueros Wind farm was constructed in 1985 with Howden 330 kW variable-pitch turbines and Balteau Standard 550 kVA transformers. This type of transformer requires the operator to perform a "hot stick" procedure for disconnecting and de-energizing an individual transformer and turbine from the project's electrical system. This transformer design and procedure are common to wind farms built during the 1980s, but are not characteristic of modern wind farms. The proposed Desert Claim project would use current-generation pad-mounted transformers designed to 2004 electrical and safety standards. With the equipment proposed for the Desert Claim project, operators can electrically isolate an individual turbine or transformer on either side of the transformer using manually-operated isolation switches, which eliminates use of the "hot stick" procedure required on older transformers such as those at Tres Vaqueros. In addition, the current transformer models have virtually eliminated all exposed conductors by

locating them within locked safety enclosures, which further protects the operator during operation and maintenance procedures.

In summary, the equipment and operating procedure characteristics of the Tres Vaqueros Wind Farm are significantly different from those of the proposed Desert Claim project, and the Tres Vaqueros incident is not indicative of the operating experience that should be expected for the Desert Claim proposal. The Tres Vaqueros event is an example that worker errors and associated accidents do happen, although the specific type of accident that occurred at Tres Vaqueros could not happen at Desert Claim because the applicable hazard has been eliminated from the equipment design. The Tres Vaqueros event also is not indicative of *enXco* policy or operating practice that results in abnormal safety and/or fire hazard. *enXco* has more than 20 years of expertise in the wind power generation industry. *enXco's* occupational health and safety program has resulted in achieving a total lost workday record of less than ½ of 1% during the most recent 5-year period.

The site certification application for the Wild Horse Wind Power Project (Wind Ridge Power Partners LLC 2004) provides broad-based experiential data from the insurance industry concerning fires associated with operating wind energy projects. Wind Ridge quotes a company that has insured over 17,000 individual wind turbines over a 15-year period and experienced an average of 2 to 3 fires per year among that portfolio, which represents a long-term rate of 1 fire per 4,000 to 6,000 turbines. The insurance company indicated that approximately 85 to 90 percent of the fires were associated with turbines dating from 1995 or earlier. More significantly, the company reported that those fires had resulted in a single third-party damage claim, for a burned haystack on an adjacent property.

Fire hazards associated with operating wind farms can be minimized through a variety of measures that are typically incorporated within project design and operating procedures. As noted by Manwell et al. (2002) and the National Wind Coordinating Committee (2002), "The single most effective fire hazard avoidance measure is to underground all electrical wiring between turbines and the project substation;" this feature has been incorporated into the modified project configuration described in **Section 2.2**. Other typical measures include fire prevention plans, fire training programs, regular maintenance and monitoring of equipment, and adherence to proper operation and maintenance procedures. As described in **Section 2.2.4**, the operation and maintenance program for the Desert Claim project includes monitoring and maintenance schedules, control systems, safety plans and training programs that would minimize the potential for the project to start a fire.

If failure of wind turbine machinery or support equipment resulted in a fire that reached the ground, the size of the impact on the environment would depend on a variety of factors including fuel availability, climatological conditions, speed and strength of fire-fighting response, and location and efficacy of fire stops. Fuel availability within most of the project area would be essentially the same as at present, because current uses (primarily agricultural and grazing) would continue on lands outside of the permanent footprint of the project-element (e.g., turbine, pad-mounted transformer, etc.). The cleared area immediately surrounding the transformers and towers would consist of concrete and gravel, which would limit the potential for accidental sparks or flames to contact vegetation and spread. The network of project access roads would serve as an extensive system of fire breaks throughout the project area, which would also help to retard the spread of fire. Because the project would be monitored and patrolled on a round-the-clock basis, it is likely that any fires within the project area (whether caused by natural events, project facilities, or ongoing land use activities) would be observed and reported within a short time, promoting a prompt response. Project operations workers would have fire-response training and would have appropriate fire equipment available on site; therefore, they would provide the first response to any fire in the project area. The applicant would presumably execute a fire-service contract with a local fire district, under which fire district crews would respond to incidents at the project as needed. Existing service providers in the vicinity of the project have adequate capacity to respond to and control the types of fires that could occur in association with project operation. (See **Sections 3.14.1.1** and **3.14.2.1** for discussion of fire protection resources and services.)

Based on the project conditions and operating measures discussed above, it is considered unlikely that the project would cause a fire that would create extensive damage, particularly in areas outside of the project area boundary. Several factors would contribute to the ability of project workers and fire district personnel to respond quickly to any event and contain the damage to a limited area. The brush fire resulting from the explosion at the Tres Vaqueros Wind Farm, as described above, is likely indicative of the response and consequences that might be expected from a project-related fire. Consequently, the project is not anticipated to result in significant long-term impacts related to fire hazards.

Wind Turbine Influence on Fire

For the case of a brush fire passing through the proposed wind generating facility, it is unlikely that the presence of turbine generators would materially affect the fire. This is because the "turbulence" created by the presence of turbines is mild and the bottom of the flow stream spiral is approximately 40 meters above ground (as evidenced by wind tunnel smoke tests; National Renewable Energy Laboratory, 2003). Because the function of turbines is to extract kinetic energy from the wind as it passes, the First Law of Thermodynamics requires that the air leaving a turbine must have lower kinetic energy, i.e., lower velocity (VanWylen and Sontaag, 1969, Ch. 5.7) Furthermore, the turbines can be stopped to assure zero turbulence and to facilitate use of aerial fire fighting techniques; under normal conditions it takes up to 2 minutes to stop turbine rotation thorough the remote control system, but actuation of local emergency stop controls will stop the turbines in 5-10 seconds. Aerial fire fighting with planes and helicopters would be somewhat affected by the presence of the turbines, because lines of flight and altitudes would be limited by the presence of the towers. The existence of such hazards would need to be accounted for in planning and executing fire operations, similar to the hazards presented by the existing transmission lines in the project area. The extent of this effect would be limited to the 5,000-plus acres within the project area, as the turbines would be set back 487 feet from the property lines and the project area boundary.

Ground-level systems and facilities made of combustible materials could prolong a fire by adding fuel. Examples include office buildings, fuel storage facilities and certain types of transformers. As noted above, these facilities would be situated within cleared and graveled areas, and they would be isolated from other structures.

Effect of Fire on Wind Turbine Facility

It is highly unlikely the wind turbine tower, nacelle or rotor would be impacted by a passing brush fire. This is because of the relatively low fuel density at the proposed site, steel tower construction and the separation distance of the nacelle and rotor from the fire below. Note that for the GEWE units described herein, the rotor blade tip is 26.2 m (86 ft.) above ground at its lowest point for the worst-case combination of tower height and rotor diameter.

Ground-level systems and facilities made of combustible materials could be damaged or destroyed by fire. Examples include office buildings, fuel storage facilities and certain types of transformers.

3.8.2.2 Electrical Hazards

For purposes of addressing health and safety issues related to electrical effects from the proposed project, the electrical facilities for the proposed project consist of three components distinguished by their operating voltage: the turbines that would produce electric power at 575 volts (V), the collection system that would operate at 34.5 kilovolts (kV, thousand volts); and the interconnecting transmission system that would operate at 115- or 230-kV. The transmission system that receives the power would determine the voltage of the interconnecting transmission line. Transformers, protection equipment and control equipment would be located in a fenced substation. The power would enter the substation on the 34.5-kV collection lines, be increased to the transmission voltage by the transformers, and flow out of the substation on the overhead interconnection transmission line.

As with all facilities involving electricity, there are safety concerns regarding potential harm to humans. Contact with transmission lines or any electrical line can kill or seriously injure people. Furthermore, electric fields near high voltage transmission lines can cause perceivable nuisance shocks. Large metal structures such as wind turbines and transmission towers can cause interference with reception of broadcast television and radio signals. This section describes public health and safety concerns such as electrical shocks, the effects of electric and magnetic fields, and electromagnetic interference related to wind turbines and the electrical facilities.

Transmission lines, like all electric devices and equipment, produce ***electric and magnetic fields (EMF)***. Voltage, the force that drives the current, is the source of the electric field. Current, the flow of electric charge in a wire, produces the magnetic field. The strength of electric and magnetic fields depends on the design of the line and on distance from the line. Field strength decreases rapidly with distance.

Electric and magnetic fields are found around any electrical wiring, including household wiring and electrical appliances and equipment. Electric fields are measured in units of volts per meter (V/m) or kilovolts per meter (thousands of volts per meter, kV/m). Magnetic fields are measured in units of gauss (G) or milligauss (thousandths of a gauss, mG).

Accurate estimates of the expected electric and magnetic fields from transmission and distribution lines require detailed electrical and physical information. Such information is not yet available for the collector system and interconnection line of the proposed project. Therefore, estimates of fields and impacts are based on fields from existing lines at similar voltage levels.

Throughout a home, the electric field strength from wiring and appliances is typically less than 0.01 kV/m. Under transmission lines, such as the existing lines on the project site, electric fields can exceed 8 kV/m under the 500-kV lines and 3 kV/m under the 230-kV lines. Under the 115-kV lines the field is less than 2 kV/m, while under low voltage distribution lines, the fields are much lower.

Typical household magnetic field levels range from less than 1 mG to above 100 mG near certain appliances. Average magnetic fields in homes are about 1 mG. Under the existing transmission lines on the project site, the field varies as the current on the line varies. Under the existing 500-kV lines maximum magnetic fields can exceed 200 mG at maximum current, under the 230-kV lines they can exceed 150 mG, and under the 115-kV lines, 100 mG. The predicted field levels are only indicators of how the proposed project might affect the magnetic-field environment. They are not measures of risk or impacts on health.

Potential health and safety impacts associated with project electrical hazards include those that could affect construction workers, operation and maintenance personnel, agricultural and other workers, the public, and others who have occasion to enter the project area.

Impact Levels

Impact levels are dependent on public and occupational use of the land. The potential for public health and safety impacts increases in areas where human activities take place.

- A **high** impact would occur if the project-related EMF concerns precluded the use of the area for pre-existing activities.
- A **moderate** impact would occur if the project altered pre-existing activities.
- A **low** impact would occur if the project would not produce a change in activities.

Potential Impacts During Construction

During construction and installation of underground and overhead electrical lines, there is a risk of fire and injury associated with the use of heavy equipment, hazardous materials such as fuels, cranes, helicopters, potential bedrock blasting for towers or access roads, and other risks associated with working near high-voltage lines. Connection of conductors might be accomplished using implosion fittings, which could be a source of injury to construction personnel. In addition, there are potential safety issues with more traffic on the highways and roads in the project area during construction. These hazards are addressed in more detail in other sections of the EIS. Electrical hazards during project construction would primarily be associated with use of equipment near existing electrical lines; the project would not be energized during the construction period prior to commissioning the turbines and switchyard, and would not itself be a source of electrical hazards at that time.

Potential Impacts During Operation and Maintenance

Electrical Safety

Power lines, like electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize shock hazard. All the lines should be designed and constructed in accordance with the applicable codes. The National Electrical Safety Code (NESC) applies to the collection and transmission systems. The NESC (IEEE 2002a) specifies the minimum allowable distance between the lines and the ground or other objects. These requirements determine the edge of the ROW and the height of the line; i.e., the closest point houses, other buildings, and vehicles are allowed to the line.

People must take precautions when working or playing near power lines. It is extremely important that a person not bring anything, such as a TV antenna, irrigation pipe, or water streams from an irrigation sprinkler too close to the lines. The BPA, which operates high-voltage transmission lines crossing the project area, provides a free booklet that describes safety precautions for people who live or work near transmission lines (*Living and Working Safely Around High Voltage Power Lines*).

Electrical safety issues apply to both the 34.5-kV power collection line system and the 115- or 230-kV interconnection line for the project. These lines would be located primarily on private property where such lines are already present in the form of the existing distribution and transmission lines. Landowners in and near the project area should already be familiar with precautions necessary around the new lines associated with the proposed Desert Claim project.

The underground power collection cables would not be accessible to the public or landowners. The 575-V cables from the wind turbine to the transformer connecting to the collection lines would not be accessible to the public. The underground collection cables would be buried at a depth of 4 feet, making accidental contact difficult. The substation would be fenced and accessible only to authorized personnel. Consequently, the project would not result in significant safety impacts associated with the introduction of new or additional electrocution hazards.

Electric and Magnetic Fields

Possible effects associated with the interaction of electric and magnetic fields from transmission lines (or similar electrical sources) with people on and near overhead lines fall into two categories:

- short-term effects that can be perceived and may represent a nuisance, and
- possible long-term health effects.

Short-term effects and the levels of electric and magnetic fields near the proposed transmission lines are discussed below. In addition, the U.S. Department of Energy provides a booklet on this topic (*Questions and Answers about EMF*, published in 1995).

The issue of whether there are long-term health effects associated with exposure to fields from transmission lines and other sources has been investigated for several decades. There is little evidence that electric fields cause long-term health effects. Estimates of magnetic-field exposures have been associated with certain health effects in studies of residential and occupational populations. Research in this area is continuing to determine whether such associations might reflect a causal relationship.

National and international organizations have established public and occupational EMF exposure guidelines (IEEE 2002b) on the basis of short-term stimulation effects, rather than long-term health effects. In so doing, these organizations did not find data sufficient to justify the setting of a standard to restrict long-term exposures to electric or magnetic fields.

Electric and magnetic fields associated with the Desert Claim project would be comparable to those already present on the site. The power collection lines connecting major areas of the project with the project substation would be located underground and away from residences within existing right-of-ways. Similarly, the overhead line used to connect the project substation with an existing transmission line operated by either BPA or PSE would not be located close to residences or human activity areas. Incremental changes in exposures to electric and magnetic fields would be small to non-existent for the public. Therefore, impacts associated with electric and magnetic fields on possible long-term health effects are highly unlikely.

Short-Term Effects, Electric Fields: Electric fields from high-voltage transmission lines can cause nuisance shocks when a grounded person touches an ungrounded object under a line or when an ungrounded person touches a grounded object. These effects are generally associated with lines operating at voltages of 345-kV or higher. If the interconnection transmission line voltage is 230 kV, there is a possibility for perception of nuisance shocks; at 115 kV the potential for nuisance shocks would be minimal. Grounding fences and other metal structures on the ROW would limit the potential for nuisance shocks, especially if the line operated at the higher voltage. Since the line would be remote from residences and other human activity it is highly unlikely that the above-mentioned effects would impact residents.

The electric fields from 34.5-kV overhead connector lines (if any sections of overhead line are needed, based on site-specific constraints) would be similar to those from existing distribution lines on the site. These fields are too low to have an impact. As discussed above, the principal safety concern for the distribution lines and the collector lines is inadvertent contact with the lines. The underground collector facilities and the 575-V cables from the turbines would not produce electric fields.

Short-term Effects, Magnetic Fields: Magnetic fields from transmission lines can induce currents and voltages on long conducting objects parallel to the lines. These voltages can also serve as a source of nuisance shocks. However, the effects are well understood and can be mitigated by grounding and other measures. The interconnection line for the Desert Claim project, which would have a maximum length of approximately 300 feet, would be too short for such effects to occur.

Magnetic fields from transmission lines (and other sources) can distort the image on computer monitors. The threshold for interference depends on the type and size of monitor. Historically, this phenomenon is reported at magnetic-field levels at or above 10 mG, but some more sensitive monitors may exhibit image distortion at lower levels. For 115- and 230-kV transmission lines, interference from magnetic fields is generally not a problem except very close to the right-of-way. The proposed interconnection would be located well away from residences on existing rights-of-way and this type of interference is not anticipated. Magnetic fields from the 34.5-kV collection system are anticipated to be lower than those from the transmission line, and of insufficient magnitude to interfere with monitors.

Stray Voltage and Lightning

A number of review comments on the Draft EIS expressed concern over other aspects of electrical hazards, specifically stray voltage and lightning. In general, these comments questioned whether the project would produce electrical currents that would be noticeable on adjacent properties, and/or whether the project would create additional lightning strike hazards that would also affect adjacent properties.

"Stray voltage" is defined as a potential difference (voltage) between two points that can be accessed by a person or animal. Stray voltages in dairy barns have been studied extensively because of their potential for affecting cow behavior and productivity, leading to the identification of specific levels of concern. The level of concern for stray voltages in Wisconsin is established as 1.0 volt, which can cause a 2-milliampere (mA) current to flow through a 500-ohm resistance, representative of the resistance of a cow. An example of stray voltage in a dairy barn would be a voltage between the floor and a watering trough. Stray voltages can arise from unbalanced neutral currents flowing into the earth through ground rods, pipes or other conducting objects, or from faulty wiring or faulty grounding of conducting objects in a facility. Thus, stray voltage is generally associated with the distribution system that provides electric power to a farm and nearby areas, and/or with wiring on the farm.

Electric power from the proposed wind turbines would be balanced, three-phase power that is fed directly into the electric transmission system. In the balanced three-phase system there would be very little or no unbalanced current to return through the earth. In addition, the power collection and interconnection system would be separate from the distribution system serving the local area, and would not contribute to currents associated with that system. Consequently, no stray voltage effects related to the Desert Claim project are anticipated.

Lightning is a relatively infrequent occurrence in the Kittitas Valley, with an annual average of approximately 10 thunderstorm days per year. More importantly, lightning protection systems and the physical characteristics of the project and local utility electrical systems would serve to protect local residents from increased lightning hazards.

Protection against lightning strikes is built into the electrical systems of all wind turbine projects. All wind turbines have a lightning protection system that includes grounding of the towers (See **Section 2.2**). The grounding system installed as part of the foundation is also used for lightning protection. The preferred resistance to neutral earth for the grounding system is 2 ohms or less (GEWE, 2002). Surge protection is provided as standard on the low-voltage side of the transformer, based on this resistance to ground. If the resistance to earth is higher than the preferred value, then a larger surge protector is required, based on the actual resistance to earth. The project lightning protection system would dissipate lightning strokes into the ground. Consequently, a person standing next to a turbine when a lightning strike occurred would be at some risk that a ground potential rise could result in a voltage between the ground and the tower or between two spots on the ground. This risk would only apply to project operations workers, and would be counteracted by safety procedures instructing workers not to stand near turbines during lightning activity.

The electrical system of the wind turbine project would be completely independent of the residential distribution system in the project vicinity. Therefore, any faults or surges on the project's electrical system due to lightning strike or other causes would not extend to the local distribution system that provides power to residences in the area, and the project would not increase long-term lightning hazards for residents in the project vicinity.

Communications Interference

Telecommunications can be affected by electromagnetic interference (EMI), such as that associated with corona on transmission lines, and by physical blocking or reflection of the signal. This latter effect can be caused by large metallic structures such as transmission towers, large metal buildings or wind turbine towers.

Electromagnetic noise caused by corona on transmission lines (the electrical breakdown of the insulating properties of air very near to the surface of a high-voltage conductor) can interfere with reception for some types of communications. Cable and satellite television systems are not affected by electromagnetic interference associated with transmission and distribution lines. This source of EMI for radio signals is primarily of concern for lines with voltages above 230-kV, such as the existing 500-kV lines that cross the project. Corona is a well-understood phenomenon and transmission lines are designed to mitigate it as a source of EMI. For the Desert Claim project, EMI due to corona noise would be minimal because the proposed transmission line would be short (less than 0.3 miles) and would be operated at 115- or 230-kV, where corona levels are generally low. Arcing on lower-voltage overhead distribution lines can also be a source of EMI. However, EMI from sparks across air gaps in hardware on overhead 34.5-kV collector lines (if any were constructed) would be eliminated by the use of modern hardware and construction techniques. Other telecommunications systems such as FM radio reception, cellular telephones, and emergency response communications operate at higher frequencies and would not be affected by electromagnetic interference from the interconnection and collector lines associated with the Desert Claim project.

Physical blocking or reflection of radio or television signals by wind turbine towers might occur and could affect reception quality. Similarly, blocking of signals could affect reception of other types of communication signals in very close proximity to towers, as discussed below.

Both wind turbines and steel transmission structures can block or cause unwanted reflections of broadcast signals. Reflections from structures can result in ghosting of television images. This would require that the towers be in a near line-of-sight between the transmitter and the antenna. The wind turbines would be located 1000 feet from the nearest residence, which should provide sufficient separation to eliminate interference. Similarly, the location of transmission structure on existing right-of-way and the use of wood poles or steel pole structures should eliminate transmission towers as a source of interference with reception. The use of fiberglass rotors also eliminates the problem of reflection of signals from the rotor blades. Therefore, it is unlikely that television interference would occur as a result of the project.

Radio communications used by emergency services responders are typically operated at higher frequencies (above 30 megahertz) that are not affected by corona-generated electromagnetic noise from transmission lines. Blocking of these communication signals very near or inside structures could occur. However, this occurrence would be no different than similar signal interference caused by metal structures such as barns, silos or industrial facilities. In the case of wind turbines and other structures, a slight change in physical location by the operator of the communication device can eliminate the interference.

Signals to/from cellular telephones or other personal communication devices could be blocked or partially blocked in very close proximity to the wind turbine towers. However, as with poor radio reception near other structures, improved reception can be achieved by slight changes in physical location.

Prior to final placement of the wind turbines, a study would be conducted to investigate possible blocking of microwave signals by individual turbines. This entails determining the paths that microwave signals follow from antennas in the region and comparing these with the locations of the wind turbines. Federal law does not permit interference with registered microwave transmission pathways; thus, it would be mandatory that any interfering wind turbines would be eliminated or relocated outside the microwave pathways.

3.8.2.3 Shadow Flicker

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity due to the moving blade shadows cast on the ground and objects, including receptor windows; shadow-flicker is not the sun seen through rotating wind turbine blades or moving through the shadows of a wind farm, such as while driving. Because wind turbines are located relatively far away from receptors, shadow-flicker usually only occurs at sunrise or sunset when the cast shadows are long.

Shadow flicker does not occur when fog or clouds obscure the sun, because no shadow is then cast on the ground or on objects. A wind turbine also has to actually be operating for the shadow to move (flicker). The amount of time shadow flicker occurs depends not only on the location of the wind turbine and shadow-flicker receptor, but also which direction the wind is coming from. When the rotor plane is in-line with the sun seen from the receptor, then the cast shadow will be very narrow (because of the blade thickness) and the intensity very faint, especially at great distances. The shadow will also pass the receptor very fast, whereas when the rotor plane is perpendicular to the line between the receptor and the sun the shadow is wider (based on the rotor diameter).

Modeling Approach

The shadow-flicker results presented in the EIS have been modeled using standard assumptions, terrain input, turbine dimensional data, etc. No site-specific assessments have been made to confirm the shadow-flicker model results. The modeled results therefore represent essentially the worst case that might be expected. There are several scenarios reflected in the model analysis:

- When obstacles are present (terrain, trees, buildings etc.) between the wind turbines and a potential shadow-flicker receptor, then shadow-flicker time and/or intensity is reduced (or not applicable) at such receptors; this factor is not incorporated in the model.
- The model considers terrain around the project boundaries but only to a distance of approximately 2 miles out. The terrain in this range around the project is rolling to mountainous, and it is likely that part of the shadow-flicker time derived is actually after sunrise and sunset (dusk/twilight). The lowest angle of the sun considered in the model is 3 degrees, however, and the effect of the mountain terrain on shadows might already be covered.
- In most areas cloud cover (or fog), if present, is likely to occur in the morning and evening hours rather than during the day. The applied cloud cover (or fog) inputs are averages (hours per day) and the model therefore cannot distinguish between cloud cover in the daytime and mornings/evenings.
- Wind turbine run hours are also averages (stated in hours per day). Wind patterns change over the day, however, while the model considers the calm wind periods (where turbines do not run) to be distributed equally.

Shadow Flicker Intensity

An important aspect of the shadow-flicker phenomenon that is often not known or not discussed is the *intensity* of the shadow-flicker. The intensity is defined as the difference between the lightness of a given spot when shadow is present and when it is not. Some considerations are outlined below:

- The wind turbine blade is narrow at the blade tip and wide closer to the nacelle/hub. If a wind turbine is located close to a shadow-flicker receptor, then the wider blade portion might be wide enough to cover most of the sun's disk seen from the receptor. During such time the flickering intensity is high, whereas when a wind turbine is located far away from the receptor the blades cover only part of the sun's disk and the intensity will therefore be reduced.
- Because of the blade width explained above, the shadow-flicker changes in intensity as the shadow of the wind turbine rotor moves from the tip of the blades (one side) through the tower/nacelle to the other side. The greatest intensity will be when the cast shadow of the nacelle/hub hits the receptor, if this indeed occurs.
- At times the cast shadow is from the top part of the rotor only. This would be the case where a receiver only experiences low numbers of shadow-flicker hours. In other words, a

low number of shadow-flicker hours in the model results also means those hours occur at low intensity.

- During weather conditions with low visibility (but still sunlight), the shadow-flicker intensity will be lower than at normal conditions and good visibility.
- At longer distances between the wind turbine and shadow-flicker receptor, the cast shadow is far more ‘out of focus.’ This does not contribute to lower intensity, but the flickering is less distinct.
- Shadows are fainter in a lighted room. Consequently, switching lights on in a dark room will lower the intensity of shadow-flicker in a room during the times shadow-flicker occurs.
- Covering a window where shadow-flicker occurs (with curtains, blinds or shutters) will prevent shadow-flicker from occurring within the room.

The above mitigating aspects are not considered in the applied shadow-flicker model; the model results only identify flicker or no-flicker conditions. Consequently, it is entirely likely that affected receptors would not actually experience significant shadow flicker, even though the report tables and plots indicate shadow-flicker time; receptors indicated in the results as marginally affected are likely not to actually experience shadow flicker at all. At times when shadow flicker would likely occur, the intensity is likely to be very low. Under those conditions the available remedies are easy to identify and implement, and include measures such as installing curtains, blinds and shutters within residences or planting trees between turbines and windows.

Model Inputs and Outputs

The shadow-flicker model (which is also a function of the WindPRO software used for the noise analysis) requires the following input:

1) Turbine locations (coordinates);
2) Shadow flicker receptor locations (coordinates);
3) USGS 1:24,000 topo map;
4) USGS DEM (height contours);
5) Rotor diameter;
6) Hub height;
7) Joint wind speed and direction frequency distribution; and
8) Sunshine hours (monthly averages)

The model calculates the shadow-flicker time for (a) each receptor, (b) everywhere (all defined areas) or both (a) and (b). A receptor is defined as a window at the residence. The azimuth of windows has been estimated for each receptor residence (north, south, east and west, or 90, 180, or 270 degrees from the nearby access road) and the window size is set to 1 meter by 1 meter. The software calculates the sun’s path from the turbine location and the cast shadow derived over the day. Then the run-time for the turbine is derived from the wind speed data. From the wind direction data, the direction of the wind turbine (seen from the receptor) is calculated and the reduced shadow-flicker time. Finally the extent of cloudiness is applied (no direct sun means no shadow flicker would occur).

The amount of computation depends highly on the chosen output parameters (a, b or both a and b described above). Usually a map with line contours showing the number of hours of shadow flicker is the preferred output; this requires computations for areas sized at 50 by 50 meters. The outputs are:

1. Turbine locations and elevations;
2. Calculated shadow-flicker time at selected receptors;
3. Tabulated and plotted time of day with shadow flicker at selected receptors;
4. Listing of turbines causing shadow flicker at each selected receptor; and
5. Map showing turbine locations, selected shadow-flicker receptors and line contours indicating projected shadow-flicker time (hours per year).

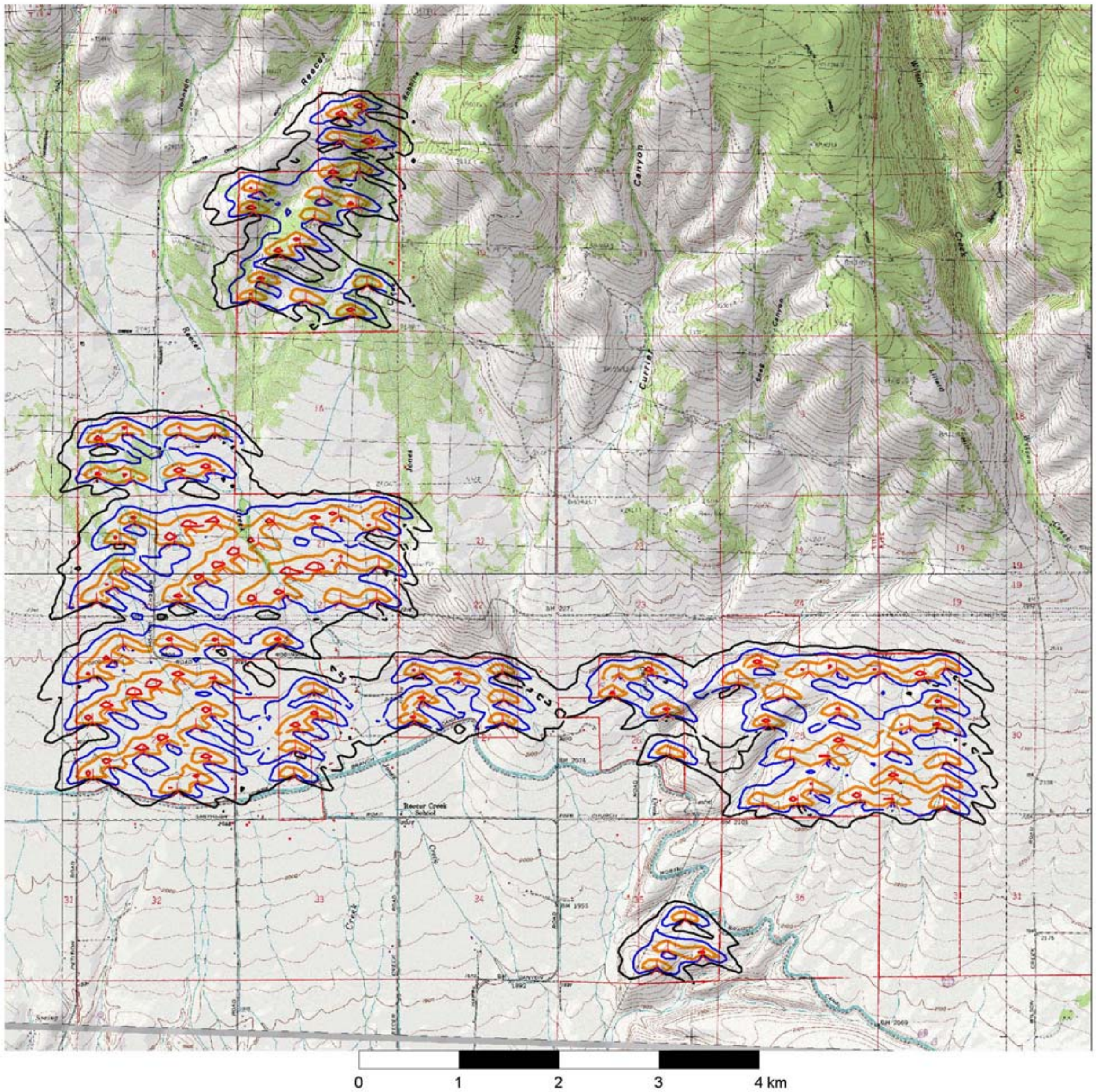
Impact Results

All potential residential receptors for the Desert Claim project, based on their distance range from the project, have been included in the model. Only shadow-flicker receptors in the immediate neighborhood of turbines have been included in each segment of the model. There are 7 segments (local areas) modeled for this project. Shadow-flicker receptors directly north and south of proposed wind turbines would not be likely to receive shadow-flicker at all, because the shadows cast by the turbines are short in the north and south directions.

Detailed output from the model analysis is provided in **Appendix E**. **Figure 3.8-4** is a contour map showing areas of shadow-flicker exposure per year (in hours) relative to turbine and receptor locations. (Because this is a small-scale map covering the entire project vicinity, the receptor symbols are small and difficult to discern. **Exhibit 2** of **Appendix E** includes seven larger-scale contour maps for different sectors of the study area for this analysis, on which receptor locations are more distinct.)

Table E1 in **Appendix E** summarizes the modeled shadow-flicker results for all 78 receptors potentially within range of shadow flicker during operation of the project. The shadow flicker analysis included in the Final EIS differs from that documented in the Draft EIS because the analysis in the Draft EIS included results for 45 potential receptor locations. The larger number of receptors in the Final EIS analysis is based on an updated inventory of residences near the project and an expanded distance limit for the analysis. The model analysis included in the Final EIS indicated that the number of potential receptors increased, while the maximum potential exposure decreased by one day. This analysis indicates that 65 of these receptors would potentially experience shadow flicker for some time during the year, while 13 of the receptors would not be exposed to shadow flicker. The theoretical maximum number of days per year on which a specific receptor might experience shadow flicker (from at least one window) would range from 21 days (receptor 127) to 260 days (the west side of receptor 11). This result could only occur with the sun actually shining on every day for which the sun angle would make shadow flicker possible, and with the contributing turbine(s) always running when shadow flicker is possible; actual sunshine and wind conditions would reduce the number of actual shadow-flicker days to well below the theoretical maximums. Similarly, the theoretical maximum duration of shadow flicker in any day at any receptor would range from 6 minutes (receptors 14 and 127) to 2 hours 18 minutes (receptor 6).

The model applies average reductions for cloud cover and calm wind periods to the theoretical maximum days and hours of shadow flicker time to derive the expected duration of shadow flicker time per year on each side of each receptor. These net model results indicate annual hours of shadow-flicker exposure at the 65 affected receptor locations ranging from about 1/2 hour per year (at receptors 5, 127, 145, 146 and 147) to over 50 hours per year (receptor 11). The distribution of the results is summarized in **Table 3.8-2**.



Source: Wind Engineers, Inc.

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 3.8-4** **Shadow Flicker Contour Map**

Table 3.8-2
Summary of Shadow Flicker Duration and Receptors

Expected Duration (Hours/year)	Number of Receptors
0-5	44
5-10	13
10-20	14
20-30	4
0ver 30	3

Most (73 percent) of the potential receptors would experience less than 10 hours of shadow flicker per year, while only 7 (9 percent) would experience more than 20 hours per year. Given the conservative factors used in the modeling approach, these results likely approximate the worst-case scenario for shadow flicker; i.e., the actual frequency and duration of shadow flicker at any given location would likely be less than indicated in the model results.

The highest shadow-flicker exposure modeled, at over 50 cumulative hours per year, would occur at receptor 11. In this case nine different turbines located north, east, south and west of the receptor would contribute to shadow flicker at varying times of the year and day. The majority of the 50-plus hours would occur in the evening every day (depending on weather conditions) from March through October, with some additional exposure in morning hours at varying times of the year. The maximum daily shadow-flicker time for this receptor would be 1 hour 18 minutes, which would occur on evenings from May through August.

The second highest shadow-flicker level modeled is approximately 40 to 45 hours per year at receptor 24. Here the main contributors are again a suite of nine turbines arrayed to the north, east, south and west of the receptor. Most of the shadow-flicker hours would occur in the evening from March through November, and most of the shadow flicker would be from the north and west. The maximum daily shadow-flicker time for this receptor would also be 1 hour 18 minutes, which could occur in evenings in May through August.

The third highest shadow-flicker level modeled is 35 to 40 hours per year at receptor 19. The contributing turbines are 66, 67, 70 and 71, located primarily west and north of the receptor. Virtually all shadow flicker at this receptor would occur in the early evening (around 7 to 8 p.m.) from May through July.

The model results indicate that shadow flicker would affect relatively few residential receptors on a frequent basis, and their exposure would generally occur for a limited total duration in a year. Determining the significance of those impacts is a subjective question and would likely vary considerably based on the perspective of the evaluator.

Given the physical characteristics of shadow flicker, movement of turbine locations a relatively short distance can often result in a substantial reduction in the frequency and/or duration of shadow flicker at a specific receptor. Conversely, the same minor shift in location of a turbine could also result in comparable increase at another receptor. Nevertheless, the WindPRO model provides a tool to test the ability to reduce shadow flicker impacts through micro-siting.

Shadow flicker could also be noticed by people or animals outdoors at locations other than residences near the project area. Because the model requires analysis of specific mapped locations, it does not include possible instances in which people driving, walking or performing other functions away from residences might be exposed to shadow flicker. The shadow flicker contour map presented in **Figure 3.8-4** indicates the potential extent of non-residential shadow flicker exposure, however. As discussed in **Section 3.11**, recreational users within approximately 2,000 feet of an operating turbine might at times experience shadow flicker. These occurrences would be confined to rare and very specific conditions (lack of cloud cover, sufficient wind for turbine operation, low sun angles at the beginning or end of the day, etc.), would be limited to short durations when they did occur (typically on the order of one-half hour or less per occurrence), and would occur for a limited total duration (a maximum of about 50 hours per year, based on the analysis results for residential receptors). For a person engaged in outdoor activity, exposure to shadow flicker would likely be a transitory experience that amounted to an annoyance or distraction, and that could usually be avoided by moving out of the relatively narrow band of the turbine shadow. The same observations would apply to animals, such as horses being ridden for recreational or ranching purposes. For motorists traveling on local roads, it is likely that the rapid movement of the vehicle through the shadow band of the rotor would typically prevent drivers or passengers from noticing the shadow flicker.

<u>Shadow Flicker Consequences</u>

Scoping comments indicated concerns that people exposed to shadow flicker could suffer adverse health consequences. The potential for shadow flicker to create adverse health effects appears to depend primarily on the frequency of the flickering.

The shadow-flicker frequency is related to the rotor speed and number of blades on the rotor. The rotor speed for the GE 1.5s model is about 20 RPM, which translates to a blade pass frequency of 0.87 Hz (less than 1 alternation per second). Such low frequencies are considered to be harmless with respect to adverse human health consequences. For example, the Epilepsy Foundation (2004) notes that epilepsy affects more than 2.5 million Americans and that about 5 percent of these people can experience seizures triggered by lights flashing at certain intensities, or by some types of flickering. Variables that appear to influence photosensitive reactions include the frequency of the flash or flicker, brightness, level of background lighting and whether a person's eyes are open or closed. The foundation indicates that lights flashing at frequencies of 5 to 30 Hz are most likely to trigger epilepsy seizures, and recommends that flash rates be kept below 2 Hz to reduce the likelihood of a photosensitive reaction. Strobe lights with frequencies higher than 3 Hz but below 10 Hz are widely used in nightclubs.

Given the low frequency of shadow flicker from wind turbines, this phenomenon does not appear likely to be capable of triggering epileptic seizures. In addition, an adverse photosensitive reaction is more likely with a bright or high-intensity light source at a close distance, while shadow flicker would typically be relatively dim and distant. Based on these characteristics of shadow flicker relative to known causal factors in photosensitive reaction, there is no basis to conclude that shadow flicker from the Desert Claim project would be likely to result in adverse human health consequences for the local population.

Comments on the Draft EIS also noted concerns that shadow flicker could cause startle effects to horses or vehicle drivers that could lead to accidents. Comprehensive literature sources on wind energy development and environmental issues, such as Manwell et al. (2002) and NWCC (2002), do not identify such events as problems in their discussion of shadow flicker, nor does there appear to be documented evidence of such incidents actually occurring. Based on the discussion above, outdoor exposure to shadow flicker appears to be a potential event of low probability. Given that drivers must and generally do adapt to all manner of distractions and external events, such as sun glare and particularly other traffic, it is not reasonable to conclude that rare and fleeting potential exposure to shadow flicker would constitute a significant accident risk. While horses are commonly considered to spook rather easily, that characteristic alone is not a sufficient basis to postulate a probable or significant hazard to horse riders resulting from possible exposure to shadow flicker from the project.

3.8.2.4 Other Health and Safety Issues

Some comments submitted during scoping for the EIS and the review of the Draft EIS expressed concern that the project might result in declines in the raptor population that would lead to an increase in the population of rodents that are prey species for raptors. Because certain rodents such as deer mice are carriers of hantavirus, which is an airborne pathogen that can be contracted by humans, the concern was that this indirect impact on rodents could result in increased risk of human exposure to hantavirus. Similarly, Draft EIS comments suggested the prospect that postulated declines in bird and/or bat populations could cause an increase in the mosquito population and a corresponding increased risk that humans might contact West Nile virus.

The impact analyses for avian species and mammals (including bats; see previous discussion in **Section 3.4.2**) determined that the Desert Claim project would have a low mortality rate for raptors, other birds and bats, particularly bats that are resident to the local area. In all cases, the level of mortality would not have a measurable effect on the population of the species. Consequently, there is no basis to assume there would be a corresponding increase in the rodent or mosquito populations, or more widespread exposure to hantavirus or West Nile virus.

It is also worth noting that both diseases have a very low incidence in Kittitas County. As of early 2004, 26 cases of hantavirus pulmonary syndrome had been reported in Washington (Centers for Disease Control 2004). The source did not indicate how many of those cases might have been from Kittitas County, although the County website does not include hantavirus among seven public health concerns listed with links to information. As of March 2004, no (0) human cases of West Nile virus disease had been reported in Washington State (CDC 2004). Washington Department of Health (2004) information indicates that testing in 2002, 2003 and 2004 has not identified any West Nile virus positive cases in birds, horses or humans in Kittitas County. Statewide testing in 2003 included 4 horses, 2 birds and 2 mosquito pools from Kittitas County, and none of the tests yielded positive results. Public health agencies at the federal, state and local level have recently distributed extensive public information about both hantavirus and West Nile virus.

Some comments on the Draft EIS also expressed concern relating to use of hazardous substances in project construction or operation and the damages that could occur from potential spills of such substances. Because surface water or groundwater would be the medium through which any spilled hazardous substances would disperse, this issue is addressed in **Section 3.3**.

3.8.3 Impacts of the Alternatives

3.8.3.1 Alternative 1: Wild Horse Site

Mechanical Hazards

The types of mechanical and related hazards applicable to Alternative 1 would be the same as those described in **Section 3.8.1.2** for the proposal. Likewise, the probability and extent of those hazards would be the same as for the proposed action. The possible consequences of those hazards, however, would be considerably different as a result of the differences in land use patterns between the Desert Claim and Wild Horse sites. There are no residential uses or public roadways within or immediately adjacent to the Wild Horse site. Consequently, the numbers of residents and visitors to the site who would be subject to hazards such as tower collapse, blade throw and ice throw would likely be considerably less under Alternative 1 than for the proposed action. The primary uncertainty with respect to this issue concerns whether hunting would be allowed to continue on the Wild Horse site under Alternative 1. Based on the Zilkha Renewable Energy proposal for the Wild Horse Wind Power Project, and the current popularity of big-game hunting on the Wild Horse site and adjacent WDFW lands, it is conceivable that hunting might be allowed to continue on the site (with some limitations) under Alternative 1. In that event, hunters would be exposed to potential turbine-related hazards for a limited duration during the annual hunting season(s).

Electrical Hazards

Alternative 1 would require construction and operation of the same types and voltages of electrical facilities as the proposed action, and involve the same types of electrical safety, electric and magnetic fields and electromagnetic interference issues discussed previously in **Section 3.8.2.2**. Electrical safety issues would apply primarily to people undertaking project construction or operation activities, as there would not typically be landowners or other residents present on the Wild Horse site. As for the proposed action, electric and magnetic fields associated with Alternative 1 would be comparable to those already present near the transmission lines that exist in the vicinity of the site. Incremental changes in public exposure to electric and magnetic fields would be small to non-existent, because of both the relatively lower voltage of the proposed interconnection facilities (115- or 230-kV) and the lack of human activity along the transmission feeder line routes for Alternative 1.

Shadow Flicker

The distance threshold for shadow flicker impacts is approximately 2,000 feet; potential receptors beyond that distance from a wind turbine would not be subject to shadow flicker (personal communication, C. Taylor, Zilkha Renewable Energy, Portland, Oregon, September 18, 2003). Because there are no residences closer than 2 miles from a proposed wind turbine location on the Wild Horse site, no permanent receptor locations would be affected by shadow flicker from a wind energy project at this site. If continued limited access to the project area for hunting were permitted, some hunters might approach within 2,000 feet of a wind turbine and might experience brief or intermittent shadow flicker under specific weather and sun-angle conditions. No evidence of shadow flicker impacts on wildlife has been documented (personal communication, C. Taylor, Zilkha Renewable Energy, Portland, Oregon, September 18, 2003). Therefore, shadow flicker impacts under Alternative 1 would be minimal to nonexistent.

3.8.3.2 Alternative 2: Springwood Ranch Site

Mechanical Hazards

The types of mechanical and related hazards applicable to Alternative 2 would be the same as those described in **Section 3.8.1.2** for the proposal. Likewise, the probability and extent of those hazards would be the same as for the proposed action. The possible consequences of those hazards, however, would be somewhat different as a result of the differences in land use patterns between the Desert Claim and Springwood Ranch sites. There are some residential uses or public roadways within or immediately adjacent to the Springwood Ranch site, although the density level is somewhat less than for the Desert Claim project area. Consequently, the numbers of residents and visitors to the site who would be subject to hazards such as tower collapse, blade throw and ice throw would likely be less under Alternative 2 than for the proposed action. The primary area of concern for Alternative 2 would likely be the Sunlight Waters community to the northwest of the site, where some residences would be within approximately 500 feet of identified turbine locations.

Electrical Hazards

Impacts of Alternative 2 with respect to potential electrical effects would be essentially the same as those described for the proposed action and Alternative 1. No significant impacts of this type would be expected.

Shadow Flicker

A model analysis for the potential shadow flicker impacts of Alternative 2 has not been conducted because a number of needed model inputs are not available for the Springwood Ranch site. Based on the 2,000-foot distance threshold referenced above, however, it is likely that some residences near the site would be exposed to shadow flicker under Alternative 2. The potential receptor locations most likely to be affected include two receptor locations near Taneum Creek, within about 1,000 feet identified turbine locations for Alternative 2; one receptor location near SR 10 and the east bank of the Yakima River, approximately 2,000 feet from the nearest turbine location; and several residences along the eastern edge of Sunlight Waters, within approximately 500 feet of Alternative 2 turbine locations. The Taneum Creek receptor locations are to the south of the project site, indicating they might experience little if any shadow flicker. The receptor location near SR 10 would only be subject to shadow flicker during late afternoon hours, while the Sunlight Waters residences would only experience shadow flicker during morning hours. Aside from those limitations, the frequency and duration of shadow flicker conditions at these locations might be similar to the analysis results for the Desert Claim site.

3.8.3.3 No Action Alternative

Under the no action alternative, the proposed action would not be implemented and the potential mechanical hazards associated with this utility-scale wind energy project would not be introduced to the project area. Other similar developments are in various stages of planning at nearby sites. If none of these facilities were constructed, existing hazards would likely continue for the foreseeable future, with some possible change in character (e.g., nature and frequency) with likely increasing rural residential development in the area.

Existing electric and magnetic field levels in the project area would continue under the no action alternative at levels the same as or higher than for the existing facilities, as a result of modifications to the BPA substation and construction of a new transmission line. No change in public health and safety impacts for residents in the project vicinity would be expected.

Under the no action alternative, the potential shadow flicker impacts associated with a utility-scale wind energy project would not be introduced to the project area. Existing shadow conditions in the project area would likely continue for the foreseeable future.

3.8.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.8.5 Mitigation Measures

3.8.5.1 Mechanical Hazards

A broad array of measures are available 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.

Primary among the means of preventing hazards would be adherence to appropriate design and construction protocols such as IEC 61400-1. This would 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. Other important prevention measures are establishment of a skilled workforce and implementing effective facility-wide maintenance, surveillance and security programs. These measures would be incorporated into the proposed Desert Claim facilities and operation, as discussed in **Section 2.2**.

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 are located on posted private property would facilitate management of access to the facility by persons unaware of safety setbacks.

Even when conditions have developed to the point where a significant hazard is imminent, it is often possible to take immediate action to prevent an environmental impact. An example of this would be actuation of a fire suppression system upon detection of heat or smoke within the turbine nacelle.

Wind turbine generators such as the GEWE 1.5s/sl are equipped with multiple safety systems as standard equipment. As examples: rotor speed is controlled by a redundant pitch control system and an automatic 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 or overspeed condition is detected. Lightning protection is standard.

Tower Collapse

The selected wind turbine generator/tower combination, the GEWE 15.sl, would be subjected to engineering review to assure that the design and construction standards are appropriate for the Kittitas County site. This review would include consideration of code requirements under various loading conditions and give a high degree of confidence of structural adequacy of the towers.

Even so, it is possible that during the life of a wind turbine it would be exposed to unanticipated load combinations that could cause failure. For this reason, even with a unit certified to IEC and building code standards, human access should be restricted and high-value facilities should not be built within a distance from each tower equal to 110 percent of the tower height plus half the rotor diameter. Based on the turbine model proposed for this project, this would mean a setback of 416 feet from each tower. In response to direction from Kittitas County and comments on the Draft EIS, the applicant modified the project to include a 487-foot performance-based safety zone setback. That setback is large enough to provide a sufficient safety zone for potential tower collapse.

The applicant also modified the project to locate power collection cables under ground wherever feasible to eliminate the possibility of certain indirect impacts described above.

Blade Throw

Certification of the wind turbine to the requirements of IEC 61400-1 would assure that the static, dynamic and defined-life fatigue stresses in the blade would 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, would give a high level of assurance against blade failure in operation.

Nevertheless, it is conceivable that that all or part of a blade could become detached from the turbine. For this reason, even with a unit certified to IEC standards, human access should be restricted, and high-value facilities should not be built, within a distance from each tower equal to 110 percent of the maximum calculated blade throw, which would be 540 ft. for the maximum turbine envelope size. Based on the shorter turbine model preferred by the applicant, the maximum blade throw safety zone would be 487 feet. Consistent with direction from Kittitas County, the applicant modified the project to include this 487-foot performance-based safety zone setback, which is large enough to provide sufficient setback for potential blade throw from the GEWE 1.5sl.`

The applicant also modified the project to locate power collection cables under ground wherever feasible to eliminate the possibility of certain indirect impacts described above.

Ice Throw

Ice throw over 100 m has not been documented as a hazard and an ice throw injury has not been reported. GEWE recommends an ice throw exclusion zone with a radius of 125 m (410 feet) on the downwind side of the tower, which they cite as 125 percent of the largest recorded throw distance (Pligavko, 2003). Note that for large wind turbines such as the GEWE 1.5s/sl, observance of the tower collapse hazard area or the blade throw hazard area restriction would keep unauthorized persons out of the ice throw hazard zone. The 487-foot performance-based safety zone setback, included in the modified proposal is large enough to provide sufficient setback for potential ice throw from the GEWE 1.5sl.

Also, in light of the few days of icing conditions expected at the Kittitas County site, it might be practical to shut down selected turbines when the danger of icing exists. Alternatively, icing sensor systems are available and could be installed on specified turbines to accomplish this purpose.

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.

Fire Hazards

The applicant's plans for the proposed project include a number of design and operational measures intended to prevent fires and minimize the consequences of any fires that might occur (see discussion in **Sections 2.2** and **3.8.2.1**). The Kittitas County Fire Marshal has also established a list of requirements that would mitigate fire hazards associated with the project (personal communication, D. Gaidos, Kittitas County Fire Marshal, September 22, 2003 and January 29, 2004). Measures to address these requirements would include the following (see also **Section 3.14.5**):

- During the construction period, it would 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 must be available to designated employees trained in its use.
- Use of mufflers and spark arrestors on all construction equipment.
- Required construction shutdowns consistent with area-wide industrial precautions, and limitations on "hot" work when necessary.
- In normal operation, regular maintenance, including review of real time and stored temperature sensor readings, would highlight developing problems and facilitate prevention of equipment-caused fire. Large wind generators such as the GEWE 1.5s/sl have such systems as standard equipment.
- Installation and maintenance of a fire suppression system in each turbine nacelle would supplement standard fire prevention measures and eliminate the possibility of burning objects falling to the ground.
- Location of transformers and electrical equipment below ground would harden them against tower collapse, blade throw and vandalism, thereby reducing the fire hazard.
- Establishment of a contract with a local fire district for fire protection service to the project.
- Development and adoption of fire prevention and fire control plans for the project.
- Maintenance of updated emergency contact information and coordination procedures.

3.8.5.2 Electrical Hazards

The following mitigating measures would help minimize potential health and safety risks associated with electrical hazards that might exist with the project:

- Prior to starting construction, the contractor would prepare and maintain a safety plan in compliance with Washington requirements. This plan would be kept on-site and would detail how to manage hazardous materials such as fuel, and how to respond to emergency situations.
- During construction, the contractors would also hold crew safety meetings at the start of each workday to go over potential safety issues and concerns related to working on electrical facilities.

- At the end of each workday, the contractor and subcontractors would secure the site to protect equipment and the general public.
- Employees would be trained, as necessary, in tower climbing, cardiopulmonary resuscitation, first aid, rescue techniques, and safety equipment inspection.
- If implosion bolts are used to connect the conductors, they should be installed in such a way as to minimize potential health and safety risks to workers.
- Project workers should stay on established access roads during routine operation and maintenance activities.
- Vegetation would be trimmed to avoid contact with collection and interconnection lines.
- The project would construct and operate the new collection and transmission lines to meet the National Electrical Safety Code.
- Installation crews would clearly mark the location of all buried collection cables.

Mitigating measures available to address potential telecommunications interference associated with electromagnetic or physical conditions that might exist with the project include the following:

- Conduct a study of potential microwave interference prior to final location of turbines, and move or eliminate turbines that would block microwave pathways.
- Conduct baseline monitoring of television reception quality in the near vicinity of the project and investigate claims of diminished signal quality as a result of the project. Means to accomplish this can range from contracted studies by qualified professionals to simple before-and-after videotaping.

3.8.5.3 Shadow Flicker

Several types of mitigation measures are available to address shadow flicker impacts. In general, they involve (1) potential changes to project operations or (2) physical modifications that could be undertaken at receptor locations.

Because shadow flicker can only occur when turbine blades are moving, shadow flicker could (in principle) be prevented by shutting down specific turbines at times when weather and sun conditions would otherwise be expected to result in shadow flicker at specific receptor locations. Implementing this specific measure in practice would likely be quite difficult, however. While the model analysis discussed in **Section 3.8.2.3** predicts the time and duration of shadow flicker at each receptor, it does this based on average sun and wind conditions and is not a simulation of actual conditions over a given period. It would not be feasible to use the WindPRO software to develop a program to shut down specific turbines in advance of specific times when they were capable of producing shadow flicker at specific receptor locations.

An operational measure discussed in the Draft EIS and identified in some comments on the Draft EIS would be to develop a telephone hotline system. In such a system, receptor locations identified as susceptible to shadow flicker could be provided with a specific number by which they could connect to project staff at the operations and maintenance facility, to request temporary turbine shutdowns at times when shadow flicker was troublesome. The viability of this option with respect to project operational costs, logistical feasibility and flexibility appears to be uncertain at best. If such a system were to be included in the terms of a development agreement, Kittitas County would need to take responsibility as the initial point of contact for such calls. Given the short duration of most shadow flicker events and the early-morning and late-afternoon times at which they would occur, it is likely that the shadow flicker event would have ceased by the time an operational response could be made.

Several practical options exist for controlling or preventing shadow flicker at the receptor location, rather than at the source. Because shadows are fainter in a lighted room, switching lights on in a dark room will lower the intensity of shadow-flicker in a room during the times shadow-flicker occurs. Similarly, covering a window with curtains, blinds or shutters will prevent shadow flicker from occurring within the room. Depending on site-specific conditions, it might also be possible to block shadow flicker by planting trees between affected windows at the receptor locations and the turbines capable of causing shadow flicker. Consequently, an alternative set of mitigation measure would be for the applicant to develop and implement a program including the following possible actions at affected receptor locations:

- distribute educational materials to potentially affected receptors with instructions on how to block or reduce shadow flicker, such as turning on lights in the affected room;
- provide and install curtains, blinds or shutters on windows at affected receptor locations; and/or
- plant trees at receptor locations where they could block or screen shadow flicker at affected windows.

3.8.6 Significant Unavoidable Adverse Impacts

All of the potential health and safety environmental impacts that derive from the electromechanical nature of a wind energy facility could be mitigated at the proposed site by prevention, establishment of safety zones and proper operating procedures. In particular, the potential health and safety impacts that derive from the possible mechanical hazards of a wind turbine (tower collapse, blade throw and ice throw) would be mitigated by incorporation of a 487-foot performance-based safety zone in the modified project layout. Therefore, the potential impacts could be mitigated to insignificant levels, and no significant unavoidable impacts would remain.

The potential health and safety impacts of the electrical facilities of the proposed project would be low, and similar to those from the existing electrical transmission and distribution lines in the project area. Nearby residents and other members of the public would be isolated from project electrical safety hazards, and would not experience elevated electric and magnetic fields associated with project facilities. Electromagnetic or physical interference with telecommunications is not expected to be significant, and could be resolved through mitigation if it occurred. Therefore, no significant adverse unavoidable impacts related to electrical systems would remain after mitigation.

The model analysis conducted for the shadow flicker issue indicated that the proposed project would be capable of causing shadow flicker for some time during the year at an estimated 65 residences near the project area. While these receptor locations would experience shadow flicker only under specific weather and wind conditions and for relatively limited daily durations, the affected individuals would likely consider these impacts to be significant. Shadow flicker impacts would represent a nuisance or annoyance effect; shadow flicker experienced in the vicinity of the project is not expected to result in adverse public health or safety consequences. Mitigation measures are available that would drastically reduce or eliminate the shadow flicker impacts. Therefore, with mitigation, the proposed project would not create significant unavoidable health and safety impacts associated with shadow flicker.

3.9 NOISE

3.9.1 Affected Environment

3.9.1.1 Introduction to Noise Terminology and Descriptors

Noise can be characterized as excessive or unwanted sound. The human ear responds to a very wide range of noise intensities. The decibel scale used to describe noise is a logarithmic rating system that accounts for the large differences in audible sound intensities. This scale accounts for the human perception that loudness doubles with an increase of 10 decibels (dB). Therefore, a 70-dB sound level will sound twice as loud as a 60-dB sound level. People generally cannot detect differences of 1 dB. Although differences of 2 or 3 dB can be detected under ideal laboratory situations, they are difficult to discern in an active outdoor noise environment. A 5-dB change would likely be perceived under normal listening conditions.

Because of the logarithmic scale used to describe noise, a doubling of the strength of a noise source produces a 3-dB increase in average noise. For example, two adjacent, discrete noise events occurring simultaneously would result in a 3-dB increase over the sound level produced by only one event. Such an increase would not be perceived as a doubling in noise *loudness*, which requires a 10-dB increase.

When addressing the effects of noise on people, it is necessary to consider the frequency response of the human ear, or those frequencies that people hear best. Sound measuring instruments are therefore often designed to "weight" sounds based on the way people hear. The frequency-weighting most often used to evaluate environmental noise is A-weighting because it best reflects how humans perceive sound. Measurements from instruments using this system are reported in "A-weighted decibels," or dBA.

Noise levels are decreased by distance, by obstructions such as buildings or terrain, by atmospheric absorption, and by absorption by the ground and vegetation. Sounds from line sources (e.g., fairly continuous roadway traffic) decrease by approximately 3 dBA for each doubling of the distance from the source. Sounds from point sources (e.g., a single wind turbine) decrease by 6 dBA when the distance from the source is doubled.

Several descriptors are used in this section to describe various noise levels. An indication of average noise levels is provided by a noise descriptor known as the equivalent sound level (L_{eq}). The L_{eq} is the level of a constant sound that has the same sound energy as the actual fluctuating sound. As such, it can be considered an energy-average sound level. In discussing sound level measurements and predictions, it is important to identify the time period being considered, because most sound-energy criteria address sound-energy averages over some time period. The L_{dn} is a 24-hour L_{eq} with a 10-decibel penalty added to sound levels that occur between 10 p.m. and 7 a.m. to account for potential disturbance of people trying to sleep. The L_{90} is the level exceeded 90% of the time during a measurement, and this level can be used to represent the background level that is almost always present during a given period of time. Continuous noise sources such as wind farms have the potential to affect the local background noise environment.

Sound levels associated with a range of common noise sources are shown in **Table 3.9-1**.

Table 3.9-1
Sound Levels Produced by Common Noise Sources

Thresholds/ Noise Sources	Sound Level (dBA)	Subjective Evaluations	Possible Effects on Humans[a]
Human Threshold of Pain Carrier jet takeoff at 50 feet	140	Deafening	Continuous exposure to levels above 70 can cause hearing loss in most people
Siren at 100 feet Loud rock band	130		
Jet takeoff at 200 feet Auto horn at 3 feet	120		
Chain saw Noisy snowmobile	110		
Lawn mower at 3 feet Noisy motorcycle at 50 feet	100	Very Loud	
Heavy truck at 50 feet	90		
Pneumatic drill at 50 feet Busy urban street, daytime	80	Loud	
Normal automobile at 50 mph Vacuum cleaner at 3 feet	70		Speech Interference
Air conditioning unit at 20 feet Conversation at 3 feet	60	Moderate	
Quiet residential area Light auto traffic at 100 feet	50		Sleep Interference
Library Quiet home	40	Faint	
Soft whisper at 15 feet	30		
Slight rustling of leaves	20	Very Faint	
Broadcasting Studio	10		
Threshold of Human Hearing	0		

[a] Source: EPA, 1974

Note that both the subjective evaluations and the physiological responses are continuums without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.

3.9.1.2 Regulatory Overview

Washington State Noise Limits

The project site is located in unincorporated Kittitas County. Kittitas County has not adopted independent noise standards. Consequently, the applicable environmental noise limits for this evaluation are those established by the Washington Administrative Code (WAC 173-60).

WAC 173-60 establishes limits on sounds crossing property boundaries based on the Environmental Designation for Noise Abatement (EDNA) of the sound source and the receiving properties. Individual local jurisdictions may assign specific zoning or land use designations to each EDNA through ordinance or resolution. In the absence of such declarations, as in Kittitas County, WAC 173-60-030 establishes that the EDNA "of any property shall be based on the following typical uses, taking into consideration the present, future, and historical usage, as well as the usage of adjacent and other lands in the vicinity."

- Class A EDNA – Lands where people reside and sleep. They typically include residential property; multiple family living accommodations; recreational facilities with overnight accommodations such as camps, parks, camping facilities, and resorts; and community service facilities including orphanages, homes for the aged, hospitals, and health and correctional facilities.

- Class B EDNA – Lands involving uses requiring protection against noise interference with speech. These typically will include commercial living accommodations; commercial dining establishments; motor vehicle services; retail services; banks and office buildings; recreation and entertainment property not used for human habitation such as theaters, stadiums, fairgrounds, and amusement parks; and community service facilities not used for human habitation (e.g., educational, religious, governmental, cultural and recreational facilities).

- Class C EDNA –Lands involving economic activities of a nature that noise levels higher than those experienced in other areas are normally to be anticipated. Typical Class A EDNA uses generally are not permitted in such areas. Typically, Class C EDNA include storage, warehouse, and distribution facilities; industrial property used for the production and fabrication of durable and nondurable man-made goods; and agricultural and silvicultural property used for the production of crops, wood products, or livestock.

The WAC noise rules contain some leeway in the classification of the appropriate EDNA, and various jurisdictions interpret the noise rules differently. For example, Benton County, which is also subject to the WAC rule, mandates that, regardless of zoning, farms or ranches with residences are considered Class C receivers, and other nearby residences with no farming or ranching uses are considered Class A receivers. The Washington Energy Facility Site Evaluation Council (EFSEC), in its overview of the proposed Kittitas Valley Wind Power project, identified differing use areas of single properties, essentially "breaking up" the properties into separate EDNAs, with the agricultural portions of the surrounding properties considered Class C receivers and the residences considered Class A receivers.

Because Kittitas County does not have an ordinance or resolution making all properties zoned for agricultural uses Class C EDNAs, regardless of their actual or probable use, this analysis uses the present land use to determine the EDNA of the receiving properties. Accordingly, properties clearly used for agricultural or silvicultural purposes are identified as Class C receiving properties. Those properties primarily used for residential purposes with no clearly visible farming or ranching activities, are identified as Class A receiving properties.

The allowable environmental noise level limits for the three EDNA classifications are displayed **in Table 3.9-2**. The state noise rule allows these limits to be exceeded for certain periods of time: 5 dBA for no more than 15 minutes in any hour, 10 dBA for no more than 5 minutes of any hour, and 15 dBA for no more than 1.5 minutes of any hour. Sometimes these exceptions are described in terms of the percentage of time a certain level is exceeded, using statistical noise descriptors (L_ns). For example, L_{25} represents a sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, $L_{8.33}$ and $L_{2.5}$ are the sound levels that are exceeded 8.33 and 2.5 percent of the time, or 5 and 1.5 minutes in an hour, respectively. At no time can the allowable sound level be exceeded by more than 15 dBA. The applicable L_n noise limits for a Class C EDNA noise source affecting different types of receiving properties are displayed in **Table 3.9-3.**

Table 3.9-2
Washington State Environmental Noise Limits (dBA)

EDNA of Source Property	EDNA of Receiving Property		
	Class A Day/Night	Class B	Class C
Class A	55/45	57	60
Class B	57/47	60	65
Class C	60/50	65	70

The limitations for noise received in Class A EDNAs are reduced by 10 dBA during nighttime hours (10 p.m. to 7 a.m.).

Source: WAC 173-60-040.

Table 3.9-3
Applicable L_n Noise Limits for Class C EDNA Noise Sources

EDNA of Source Property	L_n Limits			
	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{max}
Class A[a]	60/50	65/55	70/60	75/65
Class B	65	70	75	80
Class C	70	75	80	85

[a] The limits for noise received in Class A EDNAs are reduced by 10 dBA during nighttime hours (10 p.m. to 7 a.m.), and are shown for Day/Night.

Source: WAC 173-60-040 (b) and (c).

Because the noise generated by the proposed wind turbines is unlikely to vary significantly over an hourly period (i.e., there would be no short-term peaks), the allowances for short-term increases in the noise level limits would rarely apply. Thus, the most stringent noise limit for the proposed wind turbine project (a Class C source) would be an L_{25} of 70 dBA at nearby Class C EDNAs (i.e., agricultural and ranching properties), an L_{25} of 65 dBA at nearby Class B EDNAs, or an L_{25} of 60 dBA between 7 a.m. and 10 p.m. and 50 dBA between 10 p.m. and 7 a.m. at nearby Class A EDNAs.

WAC 173.60.050 exempts temporary construction noise from the state noise limits shown in **Table 3.9-2**.

Environmental Protection Agency Guidelines

While the U. S. Environmental Protection Agency (EPA) has no regulations governing environmental noise, the EPA has conducted extensive studies to identify the effects of certain sound levels on public health and welfare. The U.S. EPA "Levels Document" identifies sound levels "requisite to protect the public health and welfare with an adequate margin of safety" (U.S. EPA 1974). For example, EPA suggests an L_{dn} of 55 dBA for outdoor areas where a noise level of "quiet" is a basis for the use of that area. Partly because neither the cost nor feasibility of achieving these noise levels was taken into consideration in the EPA study, these suggested noise levels are guidelines, not regulations or standards.

In April 1973, the local EPA Region X office published a document titled, "Environmental Impact Statement Guidelines." This document discusses potential impacts from noise increases in terms of expected community response to the introduced noise source. This regional EPA guideline document suggests the following potential community responses to ranges of noise increases:

- Up to 5 dBA increase – few complaints if gradual increase
- 5 to 10 dBA increase – more complaints, especially if conflict with sleeping hours
- Over 10-dBA increase – substantial number of complaints

According to the EPA Region X document, generally no mitigation is required if the increase is less than 5 dBA. Some mitigation should be considered for increases of 5 to 10 dBA. Increases greater than 10 dBA would be considered serious and would warrant close attention. Again, these are EPA guidelines without the force of law, but they serve as useful indicators for potential noise impacts of projects undergoing environmental review. The 1973 document does not indicate either the time interval (e.g., hourly or daily) or the noise metric (e.g., L_{eq} or L_{max}) to which these impact/mitigation thresholds should be applied. Therefore, these guideline recommendations are applied in this revised noise analysis to the predicted cumulative hourly levels (L_{eq}/L_{25}), with some reservations as to their usefulness and applicability.

3.9.1.3 Existing Sound Environment – Desert Claim Project Area

The project area is located in a rural area consisting primarily of agricultural, ranching and low-density residential uses. The predominant sources of existing noise on and near the project site include agricultural activities, traffic on local roadways, occasional overhead aircraft (including helicopters), birds, and livestock. At some locations, wind is also a major source of noise during periods with higher wind speeds.

To characterize the existing noise environment in the project vicinity, long-term sound level measurements (SLM) were taken at four locations in July and August 2003. Measurements were also taken at an additional location in June and July 2004, to better characterize ambient sound levels near the eastern part of the project area in response to comments on the Draft EIS and to help evaluate the modified project layout. These measurements were taken over a weeklong period in order to characterize typical fluctuations in the sound levels due to varying wind conditions; ambient sound levels typically increase with higher wind speeds. The measurements were taken using four Larson Davis 820 Type I integrating sound level meters with microphones placed on tripods in acoustically neutral environmental shrouds approximately 5 feet above the ground and connected to the sound level meters with extension cables. The meters were field-calibrated prior to and immediately following the measurements.

Weather conditions during the measurement period were generally hot and dry, with highly varying wind speeds. Although the meters were not attended for the entire measurement, noise sources were noted during setup and retrieval of the meters. A summary of the sound level measurement (SLM) results is displayed in **Table 3.9-4**, and detailed information regarding the measured levels is included in **Appendix F**. Charts displaying the variation of the background sound levels with changing wind speeds are also included in **Appendix F**. The SLM locations are displayed in **Figure 3.9-1**.

As is shown in **Table 3.9-4,** the existing L_{dn}s at two of the sound level measurement locations (i.e., SLM2 and SLM3) are quite high, apparently due to numerous hours of high winds increasing the ambient sound levels. However, the measured sound levels seem inordinately high for the highest wind speeds (i.e., wind speeds greater than 20 mph) and appear to have been somewhat influenced by wind affecting the measurement equipment. The equipment manufacturer indicates that with wind speeds greater than 20 mph some vibration of the microphone might occur, resulting in somewhat higher measured sound levels. Regardless of the high measured levels during high wind, the range of background sound levels (i.e., the L_{90}s) indicates that at times it is very quiet in the project vicinity.

The occurrence of high winds had much less influence on the measured sound levels at SLM1 and SLM4, although the figures included in **Appendix F** clearly indicate that the ambient sound at these locations is also dependent upon the wind.

3.9.1.4 Existing Sound Environment – Wild Horse Site (Alternative 1)

The Wild Horse site is located in a rural area with a low population density. The closest distance between a residence and a wind turbine location (see **Figure 2-15**) is over 2 miles. The Wild Horse site and the prospective interconnect points for Alternative 1lie on privately owned land. Grazing is the predominant existing use of the site, and existing sources of human-caused noise are minimal. On-site sound monitoring data have not been collected, but the existing sound environment is likely to be quite quiet.

3.9.1.5 Existing Sound Environment – Springwood Ranch Site (Alternative 2)

Existing sound levels in the vicinity of the project site for Alternative 2 were not measured for this EIS. Given the existing low-density land uses in the area, however, it is likely that the predominant sound source in the southern portion of the site is I-90, and that farther from the freeway the sound levels are relatively low (i.e., it is fairly quiet). Other than I-90, traffic on the local roads probably represents the primary human-caused sound source in the area most of the time. Operation of agricultural equipment on the site and in nearby areas likely creates intermittent, localized noise.

Potentially sensitive receivers for this site include scattered developed sites near Taneum Creek to the south of the site; nearby residences to the east along the Thorp Highway; school and residential uses within the nearby community of Thorp; and the Sunlight Waters residential/recreational community near the northwest corner of the site. The potential receivers in Thorp and Sunlight Waters would be classified as Class A EDNAs, while those in the rural areas (such as near Taneum Creek) would be classified as Class C EDNAs.

Table 3.9-4
Range of Measured Existing Sound Levels (dBA)

Location	Days	Time	Leq	Lmax[a]	L2[b]	L8[c]	L25[d]	L90[e]	Ldn
SLM1	7/31-8/4/03	Daytime	30-56	50-85	26-55	33-60	40-65	21-42	57
		Nighttime	23-60	43-80	22-59	24-65	28-70	20-46	
SLM2	7/31-8/5/03	Daytime	33-67	51-83	27-68	33-71	42-74	21-59	68[f]
		Nighttime	30-68	57-83	24-68	26-72	33-68	22-58	
SLM3	7/31-8/5/03	Daytime	29-67	46-82	27-68	32-71	36-73	21-59	68 [f]
		Nighttime	28-68	41-81	26-69	29-73	34-76	22-59	
SLM4	7/31-8/5/03	Daytime	31-53	46-82	31-52	33-56	35-60	30-41	51
		Nighttime	30-56	40-83	30-50	30-54	31-58	29-41	
SLM5	6/30 - 7/2/04	Daytime	32-67	51-83	37-75	34-71	31-68	29-54	59
		Nighttime	29-57	41-76	31-65	30-62	30-57	29-43	

Daytime hours are between 7 a.m. and 10 p.m., nighttime hours are between 10 p.m. and 7 a.m. L_{dn}s were computed for the entire measurement period.

SLM1: On the Frable property, representing residences near the northernmost parcel. Existing noise sources included minimal traffic on the nearby dirt road and birds.

SLM2: On the Roan property near meteorological station 0219, representing residences just north of the western parcel. Existing noise sources included distant traffic, cows, and occasional aircraft.

SLM3: In an empty field south of Reecer Creek Road and east of Lower Green Canyon Road. This measurement represents residences surrounding the southern half of the western parcels. Existing noise sources included distant traffic, birds, and a helicopter working in the distance (only observed during the equipment deployment).

SLM4: On the Femrite property, representing residences near the eastern parcels. Existing noise sources were scarce and included crickets and birds.

SLM5: On the Morrison property, representing residences east of the easternmost parcels, near Wilson Creek Road. Existing noise sources were scarce and included cows, birds, and distant traffic.

[a] L_{max} = maximum sound level.

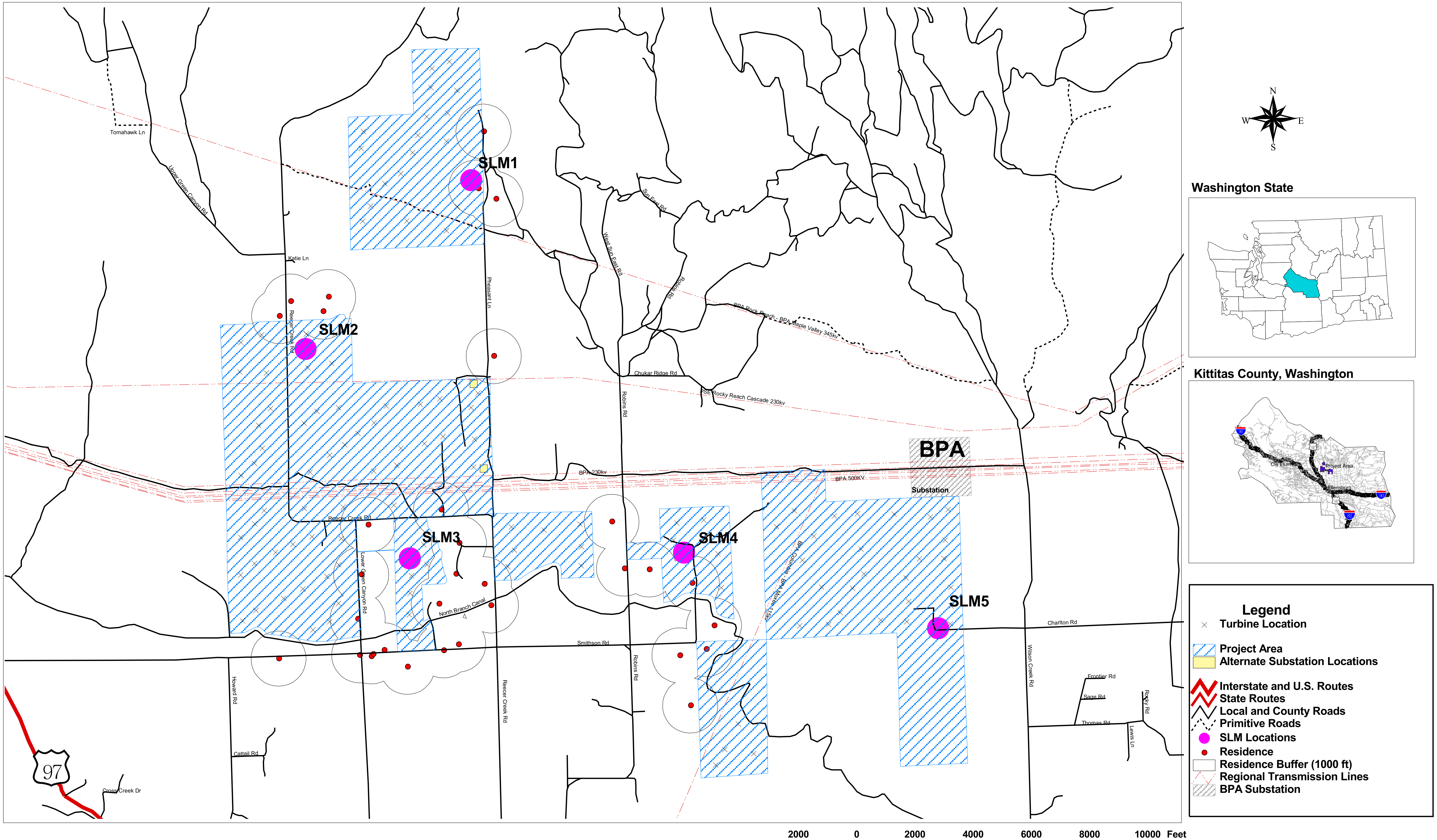
[b] The L_2 sound level roughly equivalent to the $L_{2.5}$ noise descriptor (i.e., the sound level exceeded 2.5 percent of the time, or 1.5 minutes of an hour).

[c] The L_8 sound level roughly equivalent to the $L_{8.33}$ noise descriptor (i.e., the sound level exceeded 8.33 percent of the time, or 5 minutes of an hour).

[d] The L_{25} is a sound level exceeded 25 percent of the time.

[e] The L_{90} is a sound level exceeded 90 percent of the time and is often considered a background sound level.

[f] The calculated L_{dn} sound level included numerous hours of measured sound levels with winds greater than 20 mph. Since the measured sound levels with wind speeds at or greater than 20 mph were likely influenced by sound level meter equipment being affected by the wind, the actual L_{dn}s are likely somewhat lower than 68 dBA.



Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.9-1
Sound Level Measurement Locations

3.9.2 Environmental Impacts of the Proposed Action

3.9.2.1 Construction

During construction, there would be temporary increases in sound levels near active areas of construction and along roadways used for construction vehicles. The increases in noise levels would depend on the type of equipment being used, and the amount of time it is in use. Typical construction equipment could include bulldozers, graders, concrete and gravel haul trucks and cranes. Typical sound levels for these and other types of equipment are shown in **Table 3.9-5**.

Much of the construction equipment would operate at least 1,000 feet from the nearest residences, due to the siting of the wind turbines 1,000 feet or further from residences. Based on the typical attenuation of sound over distance (6 dBA per doubling of distance), construction equipment noise levels 1,000 feet from active construction areas would often fall within the state daytime noise limits for residential receivers (i.e., 60 dBA) and would easily meet the state noise limits for agricultural/industrial receivers (i.e., 70 dBA). Construction noise is exempt from the state noise limits between 7 a.m. and 10 p.m.

Table 3.9-5
Typical Construction Equipment Noise (dBA)

Activity	**Range of Hourly Leqs**		
	At 100 feet	**At 1,000 feet**	**At 5,000 feet**
Clearing	77	57	43
Grading	69-82	49-62	35-48
Paving	66-82	46-62	32-48
Erection	66-78	46-58	32-44
Types of Equipment	**Range of Noise Levels**		
	At 100 feet	**At 1,000 feet**	**At 5,000 feet**
Bulldozer	71-90	51-70	37-56
Dump Truck	76-88	56-68	42-54
Scraper	74-77	54-57	40-43
Paver	80-82	60-62	46-48
Crane	69-79	49-59	35-45
Generators	65-76	45-56	31-42
Compressors	68-75	48-55	34-41

The range of sound levels of the various types of equipment and activities stems from the variety of types of equipment that may be used for particular tasks as well as the different sound levels that may be produced by different operational modes of the same equipment. For example, some equipment will make more noise when handling heavy loads than when simply idling.

Source: EPA, 1971, modified by MFG, Inc., 2002

As indicated in **Section 2.2.3.8**, use of explosives might be necessary for installation of rock anchors if bedrock were encountered at selected turbine locations. The surficial geology of the project area consists predominantly of alluvial and glacial outwash deposits, with very limited outcroppings of basalt bedrock (see **Section 3.1.1.3** and **Appendix A**, particularly **Figures A-1** and **A-2**). Therefore, the potential for encountering bedrock and associated need for blasting would be limited to a small number of turbine locations. Blasting would occur during the turbine foundation portion of the construction schedule (relatively early in the construction process) and only during daytime hours. Blasting noise could be audible at a considerable distance from the construction site, and (if it occurred) would be noticeable at a substantial number of residences near the project area. Sound levels from blasting at receptor locations would not be extreme, however, and the occurrence would be low in frequency, intermittent and confined to a period of 1 to 2 months. WAC 173.60.050 exempts temporary construction noise, including noise from blasting, from the State noise limits between the hours of 7 a.m. and 10 p.m.

The large distances between much of the project area and potentially affected residences, the temporary nature of construction, and the restriction of construction activities to daytime hours would serve to minimize potential noise impacts from construction activities. Based on the anticipated noise levels and the timing aspects of these impacts, construction noise impacts are expected to be insignificant.

If project construction occurred in phases, the effect on the level of noise impacts would be to extend the total duration of temporary disturbance from project construction, but to reduce the intensity or magnitude of impacts for any individual phase. Construction noise impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant in a phased-construction scenario.

3.9.1.2 Operation

The primary long-term noise sources associated with wind energy projects are the wind turbine generators. The Desert Claim project would entail erecting and operating 120 wind turbine generators located on multiple parcels encompassing 5,237 acres. While electrical equipment in substations also typically can produce various types of noise, the alternative substation locations identified for the project are both located more than 1,000 feet from the nearest potential receptors. Therefore, a perceptible increase in sound levels at the receptors nearest the substation is not expected, and operational noise from the substation is expected to be within the applicable noise limits.

Impact Assessment Criteria

The potential for noise impacts depends on many factors, including the existing sound environment, the expectations and attitude of a listener toward the noise source, the character of the sound, the control of the receiver over the noise source, whether the receiver perceives a loss of property value or other detriment due to the noise source, and whether the receiver might benefit from the project. Because all these factors affect the potential for impacts from any given noise source, universally applicable noise impact levels have not been defined. For purposes of estimating the potential for noise impacts from the proposed project, the following general categories of “low,” “medium,” or “high” noise impacts have been defined and applied in this analysis.

The following impact criteria were used to assess predicted noise impacts to residential receivers in Class A EDNA’s (residential). Impacts that are rated high are considered to be “significant” in magnitude in the context of SEPA (per WAC 197-11-794), while those rated as medium or low are not considered to be significant. Because the wind turbine generators may operate at any time of day or night, the impact criteria were defined based on noise received during nighttime hours.

- Low – Predicted project-related continuous noise levels of 50 dBA or less *and* predicted cumulative hourly sound level increases (in L_{eq}) less than 5 dBA. In this situation, the overall sound levels would remain below the levels typically deemed acceptable for residential uses and the increases in sound levels, while clearly perceptible if at the top end of the range, would be less than most agencies consider a major noise change.

- Medium – Predicted project-related continuous noise levels of 50 dBA or less *and* predicted cumulative hourly sound level increases (in L_{eq}) of 5 to 10 dBA. In this situation, the overall sound levels would remain below the levels typically deemed acceptable for residential uses, but the increases would be both clearly perceptible and at the top end of the range approaching a doubling in loudness where most agencies consider a major noise change.

- High (Significant) – Predicted project-related continuous noise levels greater than 50 dBA, *or* predicted cumulative hourly sound level increases (in L_{eq}) greater than 10 dBA. In this situation, the overall sound levels would exceed the levels typically deemed acceptable by the State of Washington for residential uses during nighttime hours, or the increases would represent more than a doubling in loudness over the existing condition.

The following impact criteria were used to assess predicted noise impacts to residential structures located in Class C EDNA's (agricultural). Because the wind turbine generators may operate at any time of day or night, the impact criteria were defined based on noise received during nighttime hours.

- Low – Predicted project-related continuous noise levels less than 50 dBA, *and* predicted cumulative hourly sound level increases (in L_{eq}) less than 5 dBA. In this situation, the overall sound levels would remain below the levels typically deemed acceptable for residential uses, and the increases in sound levels, while clearly perceptible if at the top end of the range would be less than most agencies consider a major noise change.

- Medium – Predicted project-related continuous noise levels from 50 – 59 dBA, *or* predicted cumulative hourly sound level increases (in L_{eq}) of 5 to 10 dBA. In this situation, the overall sound levels would reach or exceed the levels typically deemed acceptable for residential uses, or the increases would be both clearly perceptible and at the top end of the range approaching a doubling in loudness where most agencies consider a major noise change.

- High (Significant) – Predicted project-related continuous noise levels 60 dBA or higher, *or* predicted cumulative hourly sound level increases (in L_{eq}) greater than 10 dBA. In this situation, the overall sound levels would exceed the high end of the range of levels typically deemed acceptable for residential uses, and the increases would represent more than a doubling in loudness over the existing condition.

In defining the impact criteria for residences located in Class C EDNAs, high noise impacts were defined at a noise level lower than allowed by the WAC limits. This approach is reasonable because WAC sets a 24-hour noise limit for Class C EDNA receiving properties of 70 dBA. At the same time, WAC 173-60-030 also provides that typical Class A EDNA uses generally are not permitted in such areas, and most studies/literature and federal and local noise limits state that a sound level of 70 dBA occurring 24-hours a day is too high to protect residential uses. For example, if a noise source were to operate to the full extent of the WAC noise limit, the resulting hourly L_{eq} would be approximately 2 dBA higher than the identified maximum permissible level. This would allow a Class C noise source affecting a Class C receiver to emit up to an hourly L_{eq} of 72 dBA, 24 hours a day. An hourly L_{eq} of 72 dBA over a 24-hour period would result in a day-night sound level (L_{dn}) of 78 dBA, which, as is discussed in more detail below, is considered unacceptable for residential uses by most (if not all) federal, international, and local jurisdictions. Therefore, the WAC noise limit of 70 dBA for Class C receivers would not sufficiently protect residential uses from high noise impacts, and a lower level was deemed appropriate for determining when high impacts might occur. The various levels described below were considered in lieu of the 70-dBA WAC noise limit for residences located on Class C EDNA receiving properties.

The first level considered was the U.S. EPA-recommended level (L_{dn}) of 55 dBA, a guideline level intended to protect residents from noise impacts with an adequate margin of safety. This level was determined to be too low because the margin of safety used was 5 dBA, implying that EPA found that an L_{dn} of 60 dBA would likely be protective for most locations where quiet is a basis for use (i.e., residences), and because it would have essentially limited noise from the project to 49 dBA, which is more stringent than most local and federal limits. (An L_{dn} adds 10 dBA to nighttime sound levels between 10 p.m. and 7 a.m. to account for sleep sensitivity.) This EPA guideline was not adopted for regulatory use because neither the cost nor feasibility of achieving this level was considered. Also, numerous residents in the project vicinity are currently exposed to sound levels exceeding this recommended limit.

The second level considered was the 66 dBA sound level specified by the Washington State Department of Transportation (WSDOT) as a peak hourly L_{eq} at which traffic noise impacts could be expected. However, this level was set with the expectation that off-peak traffic noise would be much lower than peak-hour traffic noise, and that nighttime levels would generally be much quieter. Therefore, a continuous sound level of 66 dBA was deemed inappropriate and too high for protection of residents.

The third level considered are the Department of Housing and Urban Development (HUD) standards for new residential projects. HUD considers residential developments in locations with existing L_{dn}s of 65 dBA or lower “acceptable,” locations with existing L_{dn}s of 65-75 “normally unacceptable,” and locations with existing L_{dn}s of 75 dBA or more as “unacceptable.” As noteded above, the WAC noise limits for a Class C EDNA noise source affecting a Class C EDNA receiving property could result in an L_{dn} of 78 dBA, which HUD considers unacceptable for residential uses. An L_{dn} of 65 dBA corresponds to a continuous 24-hour sound level of 59 dBA; therefore, hourly levels of 59 dBA and below would be considered “acceptable” and levels 60 dBA and above would be considered unacceptable. Consequently, a continuous level of 60 dBA was selected as the limit at which high noise impacts could be expected.

The EPA (1973) guidelines for environmental impact statements were used to characterize potential impacts due to cumulative sound level increases. This document states that sound level increases of 5 dBA would be expected to result in some community complaints, while increases greater than 10 dBA would likely result in a substantial number of complaints. Therefore, a 5 to 10 dBA increase is characterized as a medium impact, and a greater than 10-dBA increase is characterized as a high or significant impact.

Methodology

The noise impact analysis presented in the Draft EIS has been updated to reflect the modified proposal described in **Section 2.2**, including the wind turbine model identified by the applicant. GE Wind Energy (GEWE), the manufacturer of the wind turbine model proposed for use in the Desert Claim project, provides project developers with a warranty concerning the noise performance of the model. The warranty specifies maximum sound power levels for each wind turbine generator at varying wind speeds, based on official field measurements of noise from GEWE 1.5 sl turbines (GEWE Engineering 2004). According to the GEWE warranty, the maximum sound power level of each proposed turbine is 104 dBA for wind speeds of 7 meters/second (m/s) (measured at a height of 10 meters) or greater, as measured at the turbine hub height (65 meters). For a wind speed of 4 m/s, the specified sound power level of each turbine is 97.5 dBA. During the warranty period, the manufacturer warrants that noise measured at the hub height shall not exceed this level; if it did, the manufacturer would remedy this situation consistent with the warranty.

The ambient sound levels in the project vicinity also vary with different wind speeds. Therefore, the potential noise impacts from the wind turbines would differ with various wind speeds. Two wind speed scenarios were considered in the analysis:

- Wind Speeds of 4 m/s **-** The wind turbines are expected to commence operation at approximately 3 to 4 m/s (7-9 mph) winds. The sound power levels of wind turbines with 3 to 4 m/s wind speeds are expected to be lower than the sound level at the reference 8 m/s (18 mph) wind speed. However, at these lower wind speeds the ambient sound levels are also lower, and wind turbine noise may be considered more intrusive than at higher wind speeds where it may be masked as the wind creates more noise.

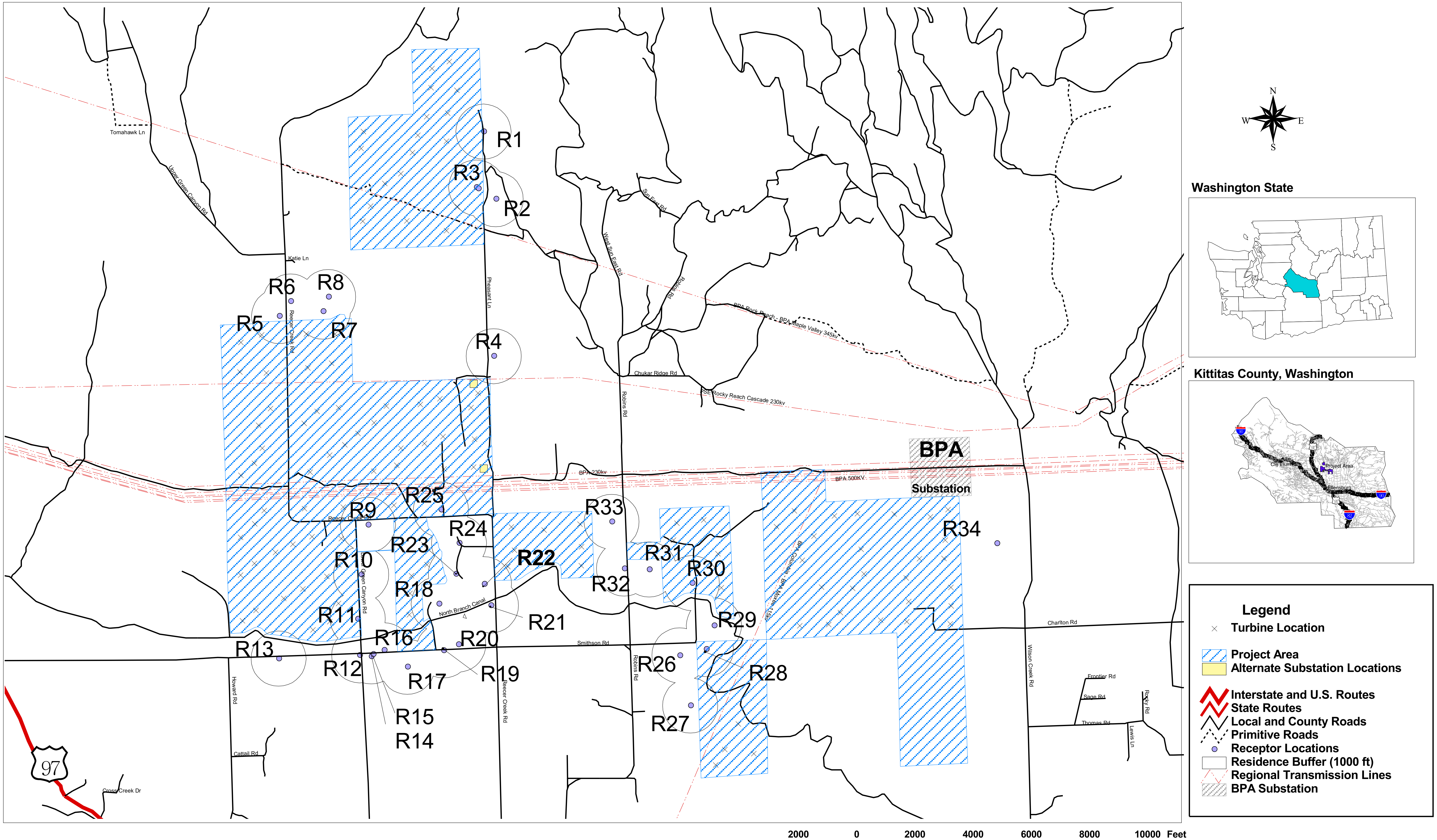
- Wind Speeds of 8 m/s – At wind speeds of 8 m/s (18 mph), the background sound levels would be expected to increase to where they would begin to mask the sound levels of the turbine noise.

The predicted sound power levels of the wind turbines were not provided for a specific noise descriptor (e.g., hourly L_{eq}, L_{90}), but are used here to represent an hourly L_{eq} or L_{25} sound level. Because L_{eq} and L_{25} would be expected to be very similar for wind turbine noise, the L_{eq} and L_{25} are used interchangeably in this analysis. The predicted sound levels can be considered similar to the L_{25} descriptor for comparison with the state noise limits. Also, the predicted sound levels can be considered similar to the L_{eq} for comparison with the measured ambient sound levels (L_{eq}s) when predicting potential sound level increases due to the project.

The noise modeling for the Desert Claim Wind Project was conducted using WindPRO, a computer model designed for assessing impacts of wind energy facilities. Details regarding the WindPRO model are included in **Appendix F**. WindPRO was used to predict sound levels at residential receptor locations, primarily locations within 1,000 feet of the project boundary. One receptor east of the easternmost project boundary also is included, although it is just beyond the 1,000-foot turbine setback. This receptor was included because there were no other receptors east of the project for which impacts were assessed. (Due to the number of residences in the project vicinity, the analysis focused only on the closest residences with the most potential to receive noise impacts from the project.) The receptor locations for the sound level predictions are shown in **Figure 3.9-2**. The noise model results for all receptor locations defined, including the more distant locations, are provided in **Appendix F, Exhibit 4**.

Modeled Noise Contours

Predicted noise contours generated by the model are displayed in **Figure 3.9-3.** The noise contours and receptors depicted in **Figure 3.9-3** include additional individual receptor locations that are not listed in subsequent predictions of sound levels at receptor locations. These additional receptor locations displayed in the graphic are situated at greater distances and are expected to receive lesser impacts than the specific receptor locations included in the following discussion.

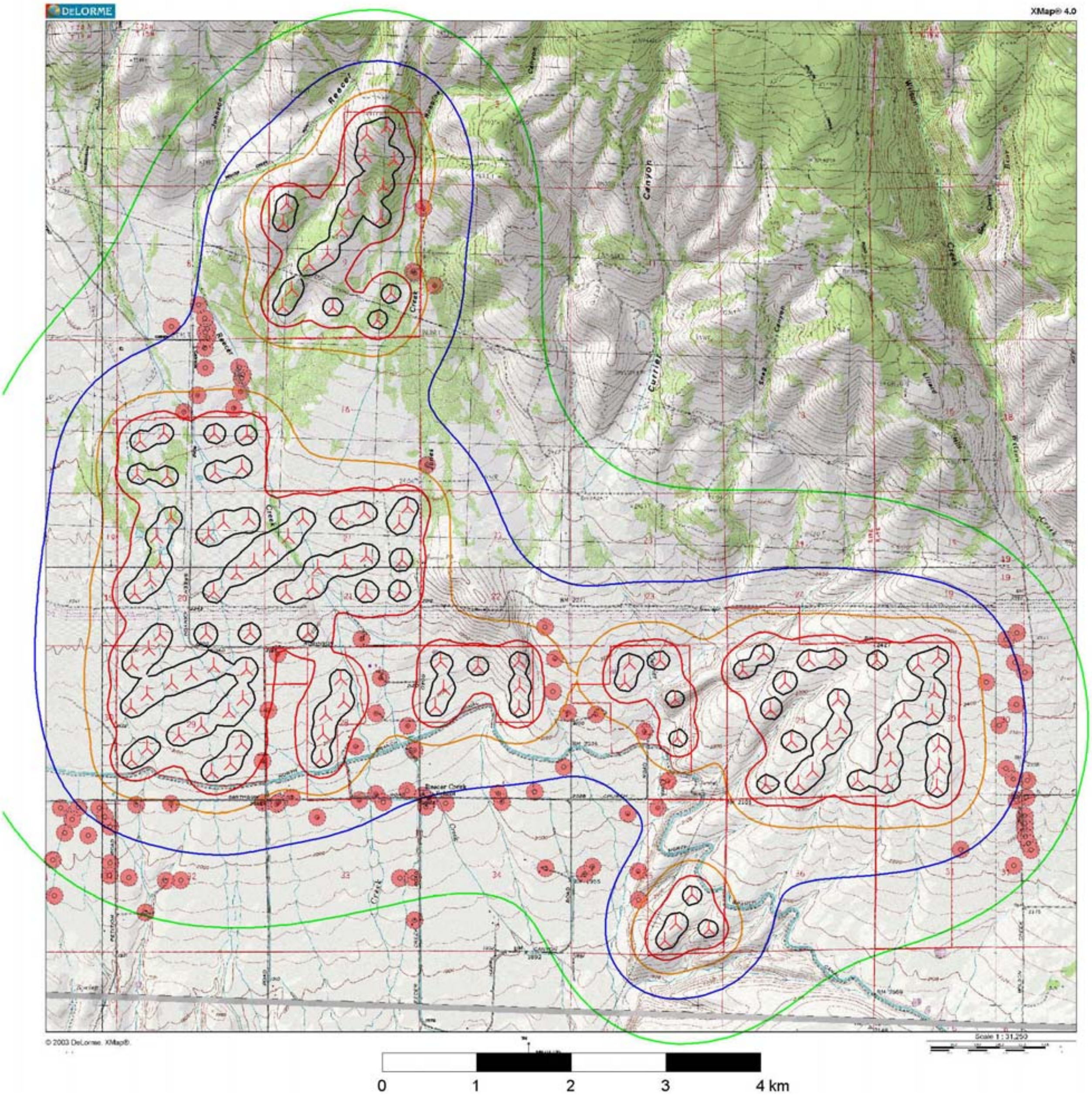


Source: Desert Claim LLC, 2003

Huckell/Weinman Associates, Inc.
HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.9-2
Sound Level Prediction Receptor Locations



Map: 030905 Figure 12 , Print scale 1:55,000, Map center UTM NAD27 Zone: 10 East: 685,077 North: 5,222,087

New WTG   Noise sensitive area

Height above sea level from active line object

35 dB(A)   40 dB(A)   45 dB(A)   50 dB(A)   55 dB(A)

Source: Wind Engineers, Inc.

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 3.9-3** **Modeled Noise Contours**

Sound Level Prediction Results

Using the methodology described above, wind turbine sound levels at 34 receptor locations near the project were predicted for the two wind scenarios. The predicted wind turbine sound levels and project-related sound level increases are displayed in **Table 3.9-6**. The existing sound levels shown in the table are the average measured hourly sound levels (L_{eq}) for wind speeds ranging from 3 to 4 m/s (shown in the 4 m/s column) and from 7 to 9 m/s (shown in the 8 m/s column). WindPRO predicted sound levels of the wind turbines for wind speeds of 8 m/s. To represent potential noise impacts from the turbines operating under less windy conditions, the levels provided for the wind speed of 8 m/s were adjusted downward by subtracting 6.5 dBA from the modeled levels to correspond to the specified sound level provided by the manufacturer for a wind speed of 4 m/s. The predictions indicate that project operation could increase sound levels at receptor locations by up to 7 dBA at wind speeds of 4 m/s, and that 8 of 34 receptors could experience project-related sound level increases of 5 dBA or more under this wind condition. Two receptors could experience sound level increases of 5 dBA or more at wind speeds of 8 m/s, while no increase was predicted for 16 receptors and the increase would be from 1 to 3 dBA for 12 other receptors.

Based on the impact criteria defined previously, the predicted noise impacts at all of the receptor locations at both wind speeds evaluated were determined to be either low or medium; none of the results were determined to be high impacts. The SEPA rules define significant as "a reasonable likelihood of more than a moderate adverse impact" (WAC 197-11-794). Therefore, the noise impacts associated with operation of the project would be insignificant. The resulting classifications of noise impacts (i.e., low, medium, and high) using the impact criteria defined above are displayed in **Table 3.9-7**.

Most of the receptor locations analyzed in this study represent residential structures located on Class C EDNA (i.e., agricultural) properties with an applicable 24-hour noise limit of 70 dBA. However, **Table 3.9-6** shows that the predicted wind turbine sound levels with wind speeds of approximately 4 m/s or less are at or below the more stringent 50-dBA nighttime noise limit applied to Class A receivers (i.e., residential properties) at all of the agricultural residences. At most of the receptor locations near the northern and western parcels, the predicted sound level increases resulting from the project with 4 m/s winds also are below 5 dBA, and thus the expected noise impacts would be low. At receptors R9 through R11, (**Figure 3.9-2)** the predicted sound level increases of 5 to 6 dBA with 4 m/s winds would represent medium noise impacts. For receptor locations near the eastern parcels, the predicted sound level increases of 5 to 7 dBA at receptors R27 and R30 through R33 represent medium noise impacts.

With wind speeds of 8 m/s, the predicted sound levels at virtually all of the receptor locations near the northern and western parcels (i.e., R1 through R25) remain below 50 dBA with predicted increases below 5 dBA, indicating low noise impacts. The exception is receptor R10, with a predicted wind turbine sound level of 50.1 dBA. This receptor location would receive medium impacts under the proposed design. None of the receptor locations near the northern and western parcels are expected to experience noise increases of 5 dBA or more in this case.

With wind speeds of 8 m/s, the predicted wind turbine sound levels at all receptor locations near the eastern parcels remain below 50 dBA, meeting the more stringent WAC noise limit for Class A receivers. However, the background sound levels in the vicinity of the eastern parcels do not increase as much with 8 m/s wind speeds as in other regions of the project vicinity, and the predicted increases over background sound levels tend to be higher at these agricultural residences (R26 through R33). Therefore, the estimated increases at two of the eight receptor locations (R30 and R33) are 5 dBA or greater and would constitute a medium noise impact.

Table 3.9-6
Predicted Sound Levels (dBA)

Receptor	EDNA	WAC Noise Limit[a]	Sound Levels at ~ 4 m/s				Sound Levels at ~ 8 m/s			
			Existing	Project Only	Overall	Increase	Existing	Project Only	Overall	Increase
Near Northern Parcel, represented by SLM1										
R1	Class C	70	39	40	42	3	47	46	49	3
R2	Class A	50	39	37	41	2	47	43	48	2
R3	Class C	70	39	40	43	4	47	47	50	3
North of Western Parcels, represented by SLM2										
R4	Class C	70	44	37	45	1	58	44	59	0
R5	Class C	70	44	42	46	2	58	48	59	0
R6	Class C	70	44	39	45	1	58	46	59	0
R7	Class C	70	44	42	46	2	58	49	59	0
R8	Class C	70	44	39	45	1	58	45	59	0
Vicinity of Western Parcels, represented by SLM3										
R9	Class C	70	40	43	45	5	57	50	57	1
R10	Class C	70	40	44	45	6	57	***50.1***	57	1
R11	Class C	70	40	43	45	5	57	50	57	1
R12	Class C	70	40	38	42	2	57	44	57	1
R13	Class C	70	40	38	42	2	57	45	57	0
R14	Class C	70	40	37	42	2	57	44	57	0
R15	Class C	70	40	37	42	2	57	44	57	0
R16	Class C	70	40	38	42	2	57	44	57	0
R17	Class C	70	40	35	41	1	57	42	57	0
R18	Class C	70	40	42	44	4	57	48	57	1
R19	Class C	70	40	36	41	2	57	42	57	0
R20	Class C	70	40	35	41	1	57	42	57	0
R21	Class C	70	40	37	42	2	57	44	57	0
R22	Class C	70	40	40	43	3	57	47	57	0
R23	Class C	70	40	41	43	4	57	48	57	1
R24	Class C	70	40	41	43	4	57	47	57	0
R25	Class C	70	40	41	43	4	57	48	57	1
West of Eastern Parcels, represented by SLM4										
R26	Class C	70	34	33	37	2	42	40	44	2
R27	Class A	50	34	37	39	5	42	44	46	4
R28	Class C	70	34	34	37	3	42	41	45	2
R29	Class C	70	34	37	39	4	42	43	46	4
R30	Class C	70	34	40	41	7	42	47	48	6
R31	Class C	70	34	38	40	5	42	44	46	4
R32	Class C	70	34	38	39	5	42	44	46	4
R33	Class A	70	34	40	41	6	42	46	48	5
East of Eastern Parcels, represented by SLM5										
R34	Class C	70	38	35	39	2	55	41	55	0

Table 3.9-6
Predicted Sound Levels (dBA)

Receptor	EDNA	WAC Noise Limit[a]	Sound Levels at ~ 4 m/s				Sound Levels at ~ 8 m/s			
			Existing	Project Only	Overall	Increase	Existing	Project Only	Overall	Increase

Notes:
[a] The WAC noise limit shown applies only to project-related noise, not to the overall sound levels (i.e., project + background). Also, because the wind turbines could operate any time of the day, the WAC noise limit shown for Class A receivers is the more stringent nighttime noise limit.
"Existing" denotes the average measured existing Leq.
"Project Only" denotes the predicted wind turbine sound levels at individual receptor locations (L25/Leq).
"Overall" denotes the cumulative sound levels, i.e., measured existing levels plus project levels.
"Increase" denotes the difference, due to the proposed project, between the overall sound levels and the existing sound levels.
Shaded cells indicate sound level increases of 5 dBA or more. ***Bold/italicized*** numbers are predicted wind turbine (project-only) sound levels that exceed 50 dBA.
Apparent discrepancies in the calculated increases are due to rounding of the levels to whole numbers.

Table 3.9-7
Noise Impact Determination

Receptor Location	Receiving EDNA	Impact Determination with Wind Speeds of			
		~ 4 m/s		~ 8 m/s	
		Impact due to Level	Impact due to Increase	Impact due to Level	Impact due to Increase
Near Northern Parcel, represented by SLM1					
R1	Class C	Low	Low	Low	Low
R2	Class A	Low	Low	Low	Low
R3	Class C	Low	Low	Low	Low
North of Western Parcels, represented by SLM2					
R4	Class C	Low	Low	Low	Low
R5	Class C	Low	Low	Low	Low
R6	Class C	Low	Low	Low	Low
R7	Class C	Low	Low	Low	Low
R8	Class C	Low	Low	Low	Low
Vicinity of Western Parcels, represented by SLM3					
R9	Class C	Low	Medium	Low	Low
R10	Class C	Low	Medium	Medium	Low
R11	Class C	Low	Medium	Low	Low
R12	Class C	Low	Low	Low	Low
R13	Class C	Low	Low	Low	Low
R14	Class C	Low	Low	Low	Low
R15	Class C	Low	Low	Low	Low
R16	Class C	Low	Low	Low	Low
R17	Class C	Low	Low	Low	Low
R18	Class C	Low	Low	Low	Low
R19	Class C	Low	Low	Low	Low
R20	Class C	Low	Low	Low	Low
R21	Class C	Low	Low	Low	Low
R22	Class C	Low	Low	Low	Low
R23	Class C	Low	Low	Low	Low
R24	Class C	Low	Low	Low	Low
R25	Class C	Low	Low	Low	Low
West of Eastern Parcels, represented by SLM4					
R26	Class C	Low	Low	Low	Low
R27	Class A	Low	Medium	Low	Low
R28	Class C	Low	Low	Low	Low
R29	Class C	Low	Low	Low	Low
R30	Class C	Low	Medium	Low	Medium
R31	Class C	Low	Medium	Low	Low
R32	Class C	Low	Medium	Low	Low
R33	Class C	Low	Medium	Low	Medium
East of Eastern Parcels, represented by SLM5					
R34	Class C	Low	Low	Low	Low

The predicted WindPRO sound levels on which the predictions displayed in **Table 3.9-6** are based have a ±1.5 dBA uncertainty, meaning that the actual sound levels could be up to 1.5 dBA more or less than the predicted levels. This uncertainty was not applied to the sound levels shown in **Table 3.9-6** nor to the resulting assessment of the degree of impacts displayed in **Table 3.9-7**. Inclusion of the ±1.5 dBA uncertainty inherent in the WindPRO modeling results could result in noise impacts that are slightly higher or lower than indicated in the predictions. If the predicted levels with an 8 m/s wind were uniformly increased by 1.5 dBA, the resulting sound levels could result in additional medium impacts due to overall levels exceeding 50 dBA at R7, R9, and R11. If the predicted levels with a 4 m/s wind were uniformly increased by 1.5 dBA, the resulting sound levels could result in additional medium impacts due to increases of 5 dBA or more at R18.

The model analysis and sound level predictions address the magnitude and extent of the potential operational noise impacts from the project. The timing aspects of those impacts are also relevant to interpreting the significance of the impacts. While operating wind turbines do produce noise from various sources, the turbine noise is expected to be distinctly audible (i.e., distinguishable from other sources) only a relatively small percentage of the year. The turbines are expected to produce distinctly audible noise approximately 22 percent of the time on an annual basis (i.e., about 1,900 hours). This would occur at times when the wind speed would be sufficient to operate the turbines, but not high enough to mask the turbine noise (see **Section 2.2.4.5** for additional discussion).

During the majority of the year, estimated to be 78 percent of the time, the turbines would not produce distinctly audible noise. There are two conditions under which the turbines would not produce distinctly audible noise. First, the turbines would not produce any noise when they are not operating. This is expected to be approximately 40 percent of the time, which means that there are approximately 3,500 hours during the year when the turbines would be idle and not producing power or noise. Second, the turbines would not produce any distinctly audible noise in high wind conditions (i.e., winds at or above approximately 18 mph or 8 meters/second) because at these speeds the wind noise would mask the turbine noise. Wind speeds are expected to be 18 mph or greater approximately 38 percent of the time on an annual basis. Combining the periods of no operation and high winds yields the expected result that the turbines would not produce distinctly audible noise 78 percent of the time, or approximately 6,800 hours per year. Conversely, the turbines would produce audible noise approximately 2,000 hours per year.

Potential Low-Frequency Noise

Although not specifically addressed in the State of Washington noise regulations, low-frequency sound that could disturb residents near the wind turbines has been identified as a concern. Historically, low frequency noise from wind turbines has been produced by the flow of air over the blades or around the nacelle or tower. However, as wind turbine technology has matured, several methods of reducing this type of noise have emerged. The following noise-reducing methods are outlined in the document, "Permitting of Wind Energy Facilities" distributed by the National Wind Coordinating Committee (NWCC 2002):

1) Orienting rotors on the "upwind" side of the turbine tower avoids the low-frequency sounds associated with the passage of the blades through the tower's wind shadow, as occurs on "down-wind" machines.

2) Tubular towers and modern nacelles are streamlined, and produce little or no sound with the passage of the wind.

3) As blade airfoils have become more efficient, more of the wind is converted into rotational torque and less into acoustic noise.

The Desert Claim project would use the “upwind” turbine design, in which the rotor is turned into the wind to place the generator and tower behind the blades. Also, the proposed tower and nacelle designs are more streamlined than those used in older turbine designs.

In order to characterize turbine noise at a location 1,000 feet downwind from a wind turbine, including the presence of high levels of low-frequency noise, MFG staff made a site visit to an operating wind farm that uses a type of turbine (a 1.5-MW unit with a 65-meter hub height) very similar to that proposed for the Desert Claim project. (A description of the site visit is included in **Appendix F, Exhibit 2**.) During the visit, turbine noise was evaluated at a distance 1,000 feet downwind from the turbines, both inside and outside of a vehicle. Also, turbine noise was evaluated for varying wind speeds occurring overnight, including both strong winds and light winds. Although turbine noise was audible at 1,000 feet downwind of the turbine when the winds were not gusting, there were no perceptible high levels of low-frequency noise from the turbines under any of the wind conditions, either inside or outside of the vehicle. Given this observation and the turbine/tower design features described above, low-frequency noise impacts from operation of the Desert Claim project are not anticipated.

Potential Tonal Noise

In addition to excessive low frequency noise, tonal noise also may be disturbing to residents near the wind turbines. Tonal noise is defined as noise at discrete frequencies. It can be caused by both mechanical sources and aerodynamic sources.

Tonal noise due to mechanical sources is typically associated with the rotation of mechanical equipment. Pure tones tend to be emitted at the rotational frequencies of shafts and generators and the meshing frequencies of the gears. The behavior of the tonality differs between turbine types and models based on how they are designed and manufactured by each turbine supplier. Furthermore, the tonality can vary significantly between tests of the same turbine model at different locations, even when the primary equipment is the same. Therefore, tonality cannot be accurately predicted prior to installation of a unit in a specific location. However, turbines can be and are designed to minimize mechanically-induced tonal noise. To reduce the potential for tonal noise, turbine manufacturers typically use various measures including special finishing of gear teeth, using low-speed cooling fans and mounting components in the nacelle instead of at ground level, adding baffles and acoustic insulation to the nacelle, using vibration isolators and soft mounts for major components, and designing the turbine to prevent noises from being transmitted into the overall structure. GEWE uses this approach in producing the 1.5 sl turbine model.

Aerodynamic noise is generated by the passage of air over the moving blades. Tonal components of aerodynamic noise may be generated by airflow over blunt trailing edges, or flow over slits and holes. Efforts to reduce tonal aerodynamic noise may include modifications to the blade design, e.g., the use of specially modified blade trailing edges.

Sound level information provided by the manufacturer for the proposed turbines specified that the measured tonality of the turbine was below the value defined as an audible tone in the standard IEC 61400-11:2002.

Also, as described above in the discussion of low-frequency noise and more fully in **Appendix F**, MFG staff made a site visit to an operating wind farm to characterize the types of noise produced by wind turbines. Turbine noise was evaluated for the existence of tones and pulses at a distance 1,000 feet downwind from the turbines, both inside and outside of a vehicle. During the overnight visit, winds of varying speeds were evaluated. With heavy winds, an aerodynamic swishing noise was clearly audible outside at the base of a turbine but was not noticed 1,000 feet downwind from the turbine. With moderate wind speeds, a low-level pulsing hum was slightly detectable 1,000 feet downwind of the turbine inside the vehicle, but no pure tones were measured. The pulsing hum was not noticeable inside the vehicle later under different wind conditions. With light winds, strong tones were noticed at the base of the turbine, but these tones were not perceived 1,000 feet downwind of the turbine.

Given the information provided by the turbine manufacturer and the results of this site visit, the potential for significant tonal noise impacts from the Desert Claim project is low. As discussed above, however, it is conceivable that individual turbines might produce tonal noise due to mechanical defects or unique site characteristics. Although it is difficult to predict the occurrence of tonal noise, the presence of tonal components could result in a greater prevalence of significant noise impacts than might otherwise occur, even assuming that the overall sound levels were the same. Typically, a 5-decibel penalty is imposed on noise with tonal content to account for the higher level of annoyance associated with tonal noise. Therefore, if the proposed Desert Claim wind farm produced tonal noise audible at a neighboring residence, significant noise impacts could occur at noise levels 5 decibels lower than the noise limits specified as expected to cause a significant noise impact. In other words, a sound level increase of 5 dBA with noticeable tonal components would be considered a high noise impact, and therefore significant.

3.9.3 Impacts of the Alternatives

3.9.3.1 Alternative 1: Wild Horse Site

Construction noise impacts for Alternative 1 would be very similar to those described for the proposed action. Based on the minimal existing development within 2 miles of the Wild Horse site, few if any local residents would experience construction noise and no significant impacts would occur.

Assessment of the potential operational noise impacts of Alternative 1 is based on noise analysis conducted for the Wild Horse Wind Power Project proposed by Zilkha Renewable Energy. 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. Although the exact turbine model to be used for the proposed Wild Horse Project has not been determined yet, conservative values for the type of equipment being considered for this project were used in the analysis.

The modeling results developed for the Wild Horse project indicate operation of wind turbines under Alternative 1 would comply with the WAC 173-60 requirements to not exceed 50 dBA at all Class A receivers (residential) and 70 dBA at all Class C EDNA (industrial/agricultural) property boundaries. Audible noise from the high-voltage transmission interconnection and substation equipment would comply with the same requirements. No long-tern noise impacts would be expected to result from operation of Alternative 1.

3.9.3.2 Alternative 2: Springwood Ranch Site

Construction of Alternative 2 would result in noise impacts similar to those described for construction of the proposed action. The on-site sources of those impacts would be confined to a somewhat smaller area compared to the proposed action, because the conceptual plan for Alternative 2 involves a smaller wind energy facility. The extent (distance traveled) of construction noise impacts would be similar, as would the duration of the construction period.

Potential noise impacts from operation of a wind power project at the Springwood Ranch site were not modeled for this EIS, due to the lack of on-site monitoring data and the conceptual nature of the project plan for this alternative. The noise attenuation relationships reflected in the predicted noise results for the proposed action would generally be applicable to Alternative 2, however. While there are some terrain differences between the sites, contours of operational noise under Alternative 2 would likely be similar to those indicated in **Figure 3.9-3**. As discussed in **Section 3.9.2.2**, operational noise levels at any receptors within 1,000 feet of the Springwood Ranch site would likely meet the 50-dBA nighttime noise limit applied to Class A receivers, and predicted sound level increases at such locations would likely be no more than 5 to 7 dBA. Based on **Figure 3.9-3**, the 45-dBA noise contour would likely extend approximately 0.3 mile (1,600 feet) from the outermost turbines on the site, while the 40-dBA contour would be about 0.7 mile (3,700 feet) distant.

Given the conceptual layout for Alternative 2 indicated in **Figure 2-16**, sensitive receivers in Thorp and along the Thorp Highway would be approximately 1.5 miles or more away from the nearest turbines and would not be affected by operational noise under Alternative 2. The nearest receivers to the Springwood Ranch site would be scattered farmsteads and rural residences near Taneum Creek to the south of the site; scattered rural residences near the junction of SR 10 and the Thorp Highway to the east of the site; and residences in the Sunlight Waters community near the northwest corner of the site. Two receptor locations near Taneum Creek appear to be within 1,000 feet of the nearest turbine sites, while several other receptors in this area are at least 2,000 feet distant. One receptor location near SR 10 and the east bank of the Yakima River is approximately 2,000 feet from the nearest turbine location, while other residences near the junction of SR 10 and the Thorp Highway are about 4,000 feet or more distant.

Several residences along the eastern edge of Sunlight Waters are within approximately 500 feet of one or two turbine locations in the northwestern corner of the Alternative 2 layout. These residences could be subject to operational noise in excess of the 50-dBA limit, and/or noise level increases in the vicinity of 10 dBA. These residences are on the upwind side of the Alternative 2 site, so identification of likely noise impacts would require site-specific noise analysis. Nevertheless, it is possible that Alternative 2 might result in significant noise impacts to Sunlight Waters residences unless the turbines in question were relocated or eliminated.

3.9.3.3 No Action Alternative

Under the No Action Alternative, the Desert Claim Wind Power Project would not be constructed. Existing sound levels from the site include agricultural and livestock production activities, which would continue in the future with or without the Proposed Action. No known noise impacts currently occur from these agricultural activities, and none would be anticipated to occur in the future.

3.9.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.9.5 Mitigation Measures

Several noise mitigation measures have been incorporated in the proposed project design. These measures include the following:

- Obtain and enforce a warranty from the selected turbine manufacturer that the maximum continuous sound power level produced by each turbine under all wind conditions would not exceed 104 dBA measured at the hub height.
- Establish minimum setbacks from individual wind turbines to nearby residences of 1,000 feet. This setback has been included in the project design.
- Provide sufficient spacing between wind turbine towers to minimize array and wake losses (i.e., energy losses created by turbulence between and among the turbines).
- Orient rotors on the “upwind” side of the turbine tower to avoid the low-frequency sounds associated with the passage of the blades through the tower’s wind shadow.

With these design features incorporated in the proposed action, no significant noise impacts were identified through the analysis of predicted sound levels at receptor locations. Because a number of local residents would experience some increased noise under some conditions and because there is a degree of uncertainty associated with the impact predictions, however, some additional noise mitigation measures would be appropriate for consideration. Specific applicable measures could include:

- Implement a noise-monitoring program under which baseline (pre-project) and with-project noise conditions would be determined and documented.
- Establish a process for recording, responding to, evaluating and resolving noise complaints that might arise during project operation.

3.9.6 Significant Unavoidable Adverse Impacts

The analysis of predicted noise levels indicated that low noise impacts would occur at almost all receptor locations near the project at higher wind speeds (8 m/s). Medium noise impacts were identified at two of the agricultural residences in the project vicinity at higher wind speeds, either due to overall sound levels exceeding 50 dBA or due to projected sound level increases of 5 to less than 10 dBA. At lower wind speeds (4 m/s), all receptors would experience low impacts based solely on the with-project noise level, although impacts for almost one-fourth of the receptors (8 of 34) were characterized as medium due to the level of increase over the existing condition. No high (i.e., significant, for purposes of SEPA analysis) adverse impacts were identified for any receptor location under either wind condition. The analysis also concluded that low-frequency noise impacts were not anticipated and that the potential for significant impacts from tonal noise is low. Based on the above conclusions, the Desert Claim project would not result in significant unavoidable adverse noise impacts. Adoption of mitigation measures involving noise monitoring and a noise-complaint resolution process would provide additional assurance that noise impacts in operation would not exceed allowable levels.

3.10 AESTHETICS/LIGHT AND GLARE

Kittitas County's Comprehensive Plan designates the lands of the Desert Claim project area as Rural in. The Kittitas County Zoning Code zones the project-area lands as Agriculture-20 and Forest and Range. The zoning code (KCC Title 17) does not designate or protect any visual resources in the vicinity of the project area. However, State Route (SR) 10, running northwest from Ellensburg along the Yakima River, has been recognized in American Automobile Association (AAA) and local tourist literature for the scenic value of its surrounding landscapes and vistas (Sagebrush Power Partners, LLC, 2003). The Swift Water Corridor Vision, prepared by Kittitas County's Corridor Planning Management Team in 1997, documents this corridor's scenic values, but the County has not formally adopted this Vision.

This visual analysis for the EIS is based on assessment methods employed by the U.S. Department of Transportation Federal Highway Administration (FHWA). The methodology was originally developed for FHWA by Jones & Jones Architects and Landscape Architects, Ltd. (Jones & Jones) in 1979 (American Society of Landscape Architects, 1979), and is based on a methodology developed by Jones & Jones in response to the National Environmental Policy Act (NEPA) of 1969. A fundamental aspect of this methodology, which also meets the requirements of the Washington State Environmental Policy Act (SEPA), is the evaluation of impacts to the visual quality of key views before and after the project is built.

Some of the material presented in this section was included in the Development Activities Application submitted to Kittitas County Community Development Services by the project developer, Desert Claim Wind Power LLC (2003). The analysis was based on research into wind energy aesthetics and public perception issues, field observation and photography of the project area and surrounding landscapes, review of the project characteristics and appearance as summarized in the Development Activities Application and the project's EIS scope summary, review of public comments, and review of USGS topographic maps.

Some key assumptions of this visual analysis approach are:

- The landscape setting makes a difference. These settings differ in their visual quality and the compatibility of any project differs with different landscape settings.
- The viewer makes a difference. Viewer groups differ in visual exposure to a project based on their population and distance. Viewers also differ in their sensitivity, that is, in their degree of visual receptivity, but not in their recognition of a positive or negative visual impact of a project.
- Major aspects of these concerns can be assessed, quantified and described objectively.

3.10.1 <u>Affected Environment</u>

3.10.1.1 Regional Landscape Setting

For the purpose of this analysis, the regional landscape is defined as the Kittitas Basin. The term 'basin' is used here rather than the more familiar 'valley' because the basin is a more inclusive physical description that includes the surrounding slopes, as well as the basin floor, which will be referred to here as the valley. The Kittitas Basin is a sub-basin of the Columbia Basin, the physiographic province between the Cascade and Northern Rocky Mountains (Highsmith, 1968). The basin is bordered on the north and west by the Stuart Range of the Wenatchee Mountains, on the south by Manastash Ridge and the Saddle Mountains, and on the east by the Columbia River. It is steeply sloping at the edges and mostly flat in the valley, although a prominent ridge running north from Ellensburg provides some distinct topographic relief. The Yakima River flows from northwest to southeast through the eastern portion of the Kittitas Basin. Interstate 90 (I-90) also crosses the basin from east to west.

Native vegetation in the valley is mostly shrub-steppe interspersed with some grassland steppe and narrow riparian corridors with wetlands at occasional impoundments. The foothills surrounding the valley are covered with shrub-steppe vegetation and the mountains to the north have ponderosa pine and Douglas fir forests. The climate of the Kittitas Basin is relatively dry because prevailing westerly winds from the Pacific Ocean leave most of their precipitation on the Cascade Mountains. Today, the valley landscape is dominated by agricultural uses, mostly cattle ranches and forage crops in the north and fruit orchards in the south. Most agricultural lands are irrigated, and there is an extensive network of canals, laterals and ditches. There is one city in the basin, Ellensburg, as well as two towns, Kittitas and Thorp. Unincorporated areas adjacent to Ellensburg are characterized by scattered suburban residential development, while rural residential uses are interspersed with agricultural uses throughout the basin.

The Desert Claim project area is located in the north central part of the Kittitas Basin on broad alluvial fan and foothill landforms. The project area is relatively flat and open, and slopes gently from north to south. The area is characterized by agricultural uses such as grazing and ranching, though there are some remaining patches of native grassland steppe and shrub-steppe vegetation. Creeks and intermittent streams flow generally north to south across the project area. High-voltage power lines cross the project area from east to west. The area is sparsely populated and contains several rural roads. **Figure 3.10-1** illustrates the location of the project area within the Kittitas Basin.

3.10.1.2 Landscape Units

The Kittitas Basin can be divided into a series of Landscape Units. A landscape unit is an area or volume of distinct landscape character and/or spatial enclosure that forms a discrete unit with its own sense of place at ground level. **Figure 3.10-2** illustrates the 27 landscape units identified in the Kittitas Basin. The Desert Claim project area spans the Northwest Valley, Northeast Valley, and Table Mountain Slope Landscape Units, but the affected environment extends to surrounding Landscape Units to an extent based on the project's visibility.

3.10.1.3 Project Visibility

The extent of the affected environment is determined by the project's viewshed. A viewshed is the area within which a viewer would have an unobstructed sightline of the project. **Figure 3.10-3** indicates the topographically determined potential viewshed of the top of the turbine blades, based on the maximum turbine envelope evaluated in the Draft EIS with a total height of 120 meters or 393 feet from the base to the tip of the rotor. (The actual viewshed area for the turbine model currently proposed by Desert Claim, which would have a maximum height of 103.5 meters or 340 feet, would be somewhat reduced from the area shown in **Figure 3.10-3**; the degree of difference is small enough that the graphic has not been revised, but will provide some level of visual mitigation for the modified project.) Points based on the turbine locations and heights were mathematically draped over a Digital Elevation Model (DEM) of the Kittitas Basin and visibility algorithms built into ESRI's Spatial Analyst extension for ArcGIS 8.2 Workstation were utilized to calculate the cumulative viewshed of these points. This analysis represents the maximum potential viewshed, but the actual viewshed of the turbines could be significantly reduced by nearby structures and vegetation that would be closer to a viewer and thereby obstruct views of the turbines.

Figure 3.10-1
Kittitas Basin and Project Area

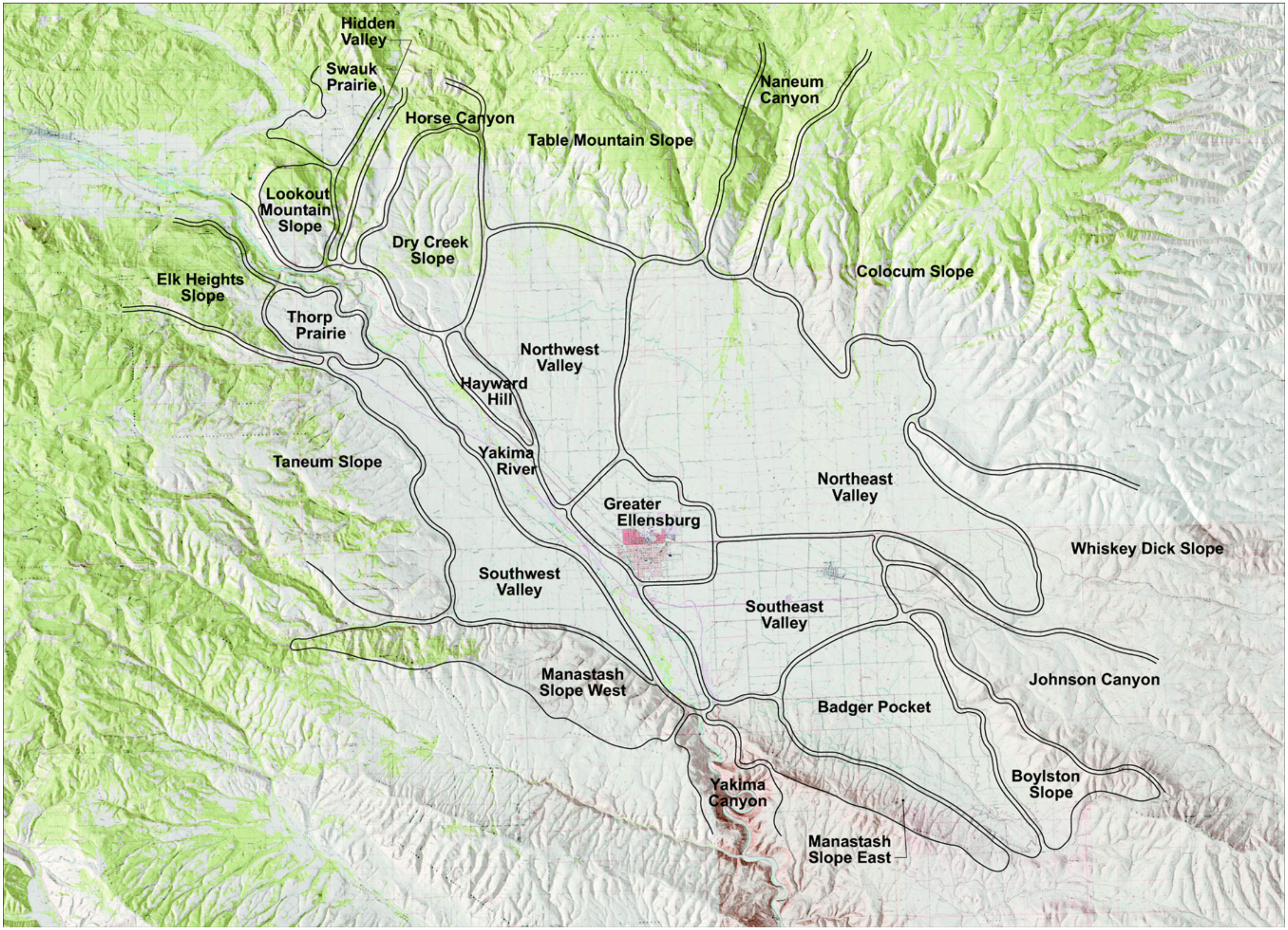


Figure 3.10-2
Landscape Units of the Kittitas Basin

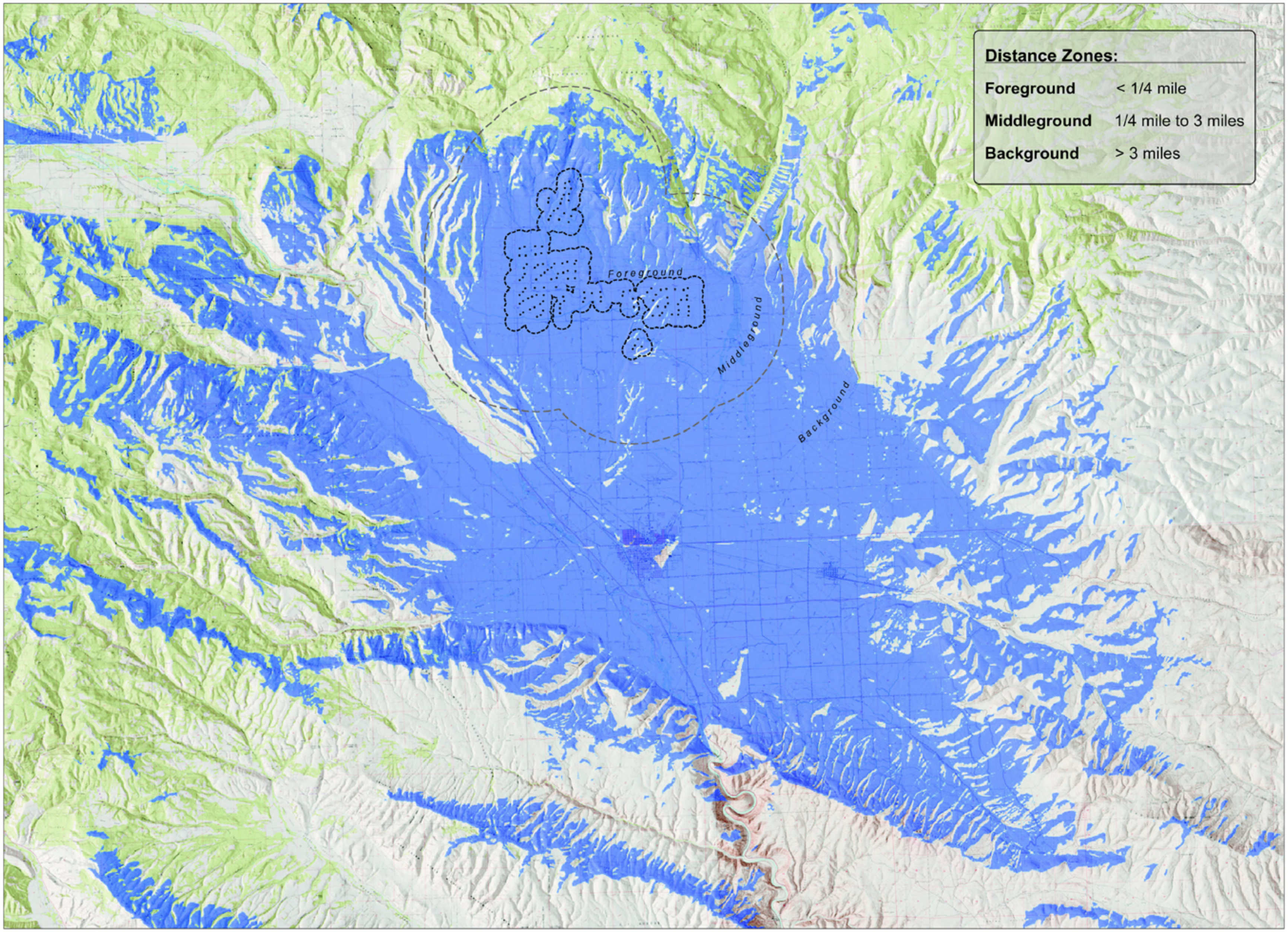


Figure 3.10-3
Project Area Viewshed

Project visibility is also affected by a viewer's distance from the project. Visual impact decreases as the distance between a viewer and the project increases. **Table 3.10-1** describes distance categories based on the system employed by the U.S. Forest Service and other agencies to define foreground, middleground, and background views (U.S. Forest Service 1973). The smaller end of the Forest Service distance ranges are used based on field observation of visual patterns perceived from each distance. **Figure 3.10-3** also distinguishes between these distance zones in the tower and blade viewsheds.

Table 3.10-1
Viewing Distance Zones

Distance Zones	Distance	Visual Patterns Perceived
Foreground	From observer out to ¼ mile.	Surface details.
Middleground	Beyond foreground out to 3 miles.	Masses, relationship between setting and project.
Background	Beyond middleground out to the horizon.	Flat planes.

3.10.1.4 Visual Assessment Units

In order to focus attention on the places from which the project would be most visible, it is necessary to combine Landscape Unit and visibility information into Visual Assessment Units. Essentially, the Visual Assessment Units are the portions of the Landscape Units from which the project would be significantly visible. Many of the Landscape Units identified in **Figure 3.10-2** were not defined as Visual Assessment Units because they would not be significantly affected by the project (i.e., the project would not be significantly visible from these units). Parts of some other Landscape Units were excluded from the Visual Assessment Units for the same reason. Some, such as the Manastash Slopes and Badger Pocket, are simply too far away from the project area to provide distinct views of project facilities. Major topographic features block views toward the project area from other units, such as Thorp Prairie and Swauk Prairie. Units such as Naneum Canyon and Lookout Slope also are entirely obstructed by vegetation and have no publicly accessible roads or viewpoints from which to view the project. The Northeast Valley and Yakima River Landscape Units also became Visual Assessment Units, but only up to a certain distance or over a certain portion.

There would be possible distant views of project facilities (primarily turbines) from some locations that are beyond the boundaries of the Visual Assessment Units defined for this analysis. At the Manastash Ridge scenic viewpoint on I-82, for example, the project area is visible, but at such a distance that project features would be indistinguishable. Impacts to views at these locations would be less significant than from the most distant views addressed in the Visual Assessment Units.

In **Section 3.10.1.6**, the existing conditions of each of these Visual Assessment Units are described, as well as the exposure and sensitivity of the various viewer groups in each unit, and the existing visual quality of representative key views from each unit. **Figure 3.10-4** identifies the eight Visual Assessment Units, and the locations and directions of key views for each unit (see subsequent discussion in **Section 3.10.1.6**).

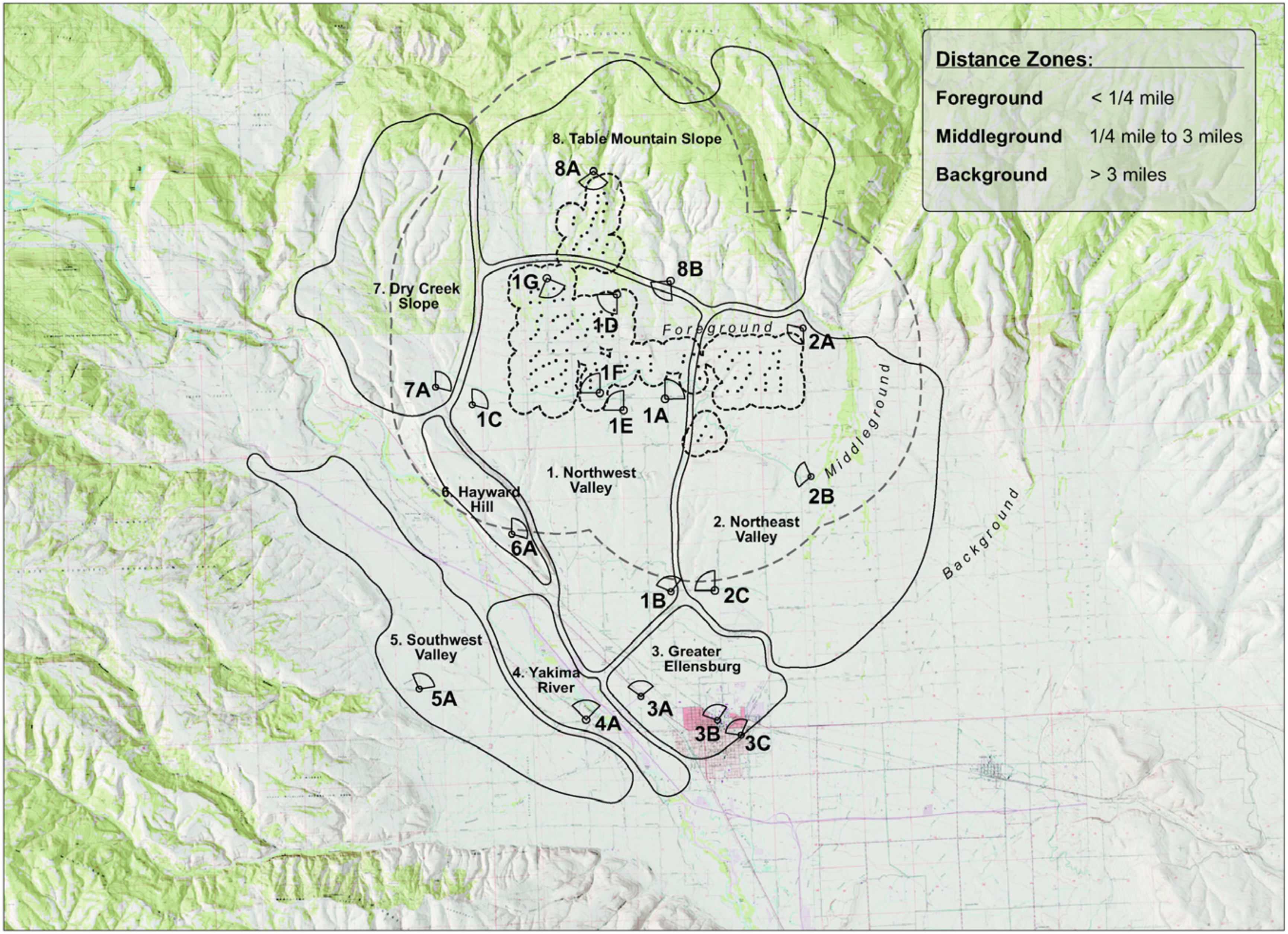


Figure 3.10-4
Visual Assessment Units and Key View Locations

3.10.1.5 Viewer Group Exposure and Sensitivity

For each Visual Assessment Unit, distinct viewer groups have been characterized. Viewer groups are classes of viewers that differ in their expected visual response to the project and its setting. Examples of viewer groups are rural residents, motorists on county roads, and outdoor recreation users. Their responses are affected by their exposure and sensitivity. Viewer exposure is primarily based on the number of people viewing the project, but also considers the degree to which viewers are exposed to a view by their physical location and the duration of the view. Viewer sensitivity is the degree to which viewers are likely to be receptive to the visual details, character, and quality of the surrounding landscape. Two principle factors affect viewer sensitivity: activity and awareness. Activity relates to whether the viewer's activity encourages him or her to look at the landscape or distracts the viewer from the landscape. Awareness relates to how a viewer's position, recent visual experience, or individual preconceptions and values affect their receptivity to visual character. **Tables 3.10-2** and **3.10-3** describe viewer exposure and sensitivity scales that will be used to characterize the viewer groups of each Visual Assessment Unit. In this analysis, viewer sensitivity is based primarily on viewer activity. While viewer groups often vary in their sensitivity, that is the *degree* to which a visual impact is felt, they rarely differ in their recognition of a positive or negative visual impact of a project.

Table 3.10-2
Viewer Exposure Scale

Rating	Explanation
3—High	High exposure applies primarily to a high number of viewers, as well as unobstructed views and foreground experience of the project.
2—Moderate	Moderate exposure applies primarily to a moderate number of viewers, as well as filtered views and a middleground experience of the project.
1—Low	Low exposure applies primarily to a small number of viewers, as well as blocked or non-existent views and background experience of project.

Table 3.10-3
Viewer Sensitivity Scale

Rating	Explanation
3—High	High sensitivity applies primarily to viewers whose activity and awareness make them very conscious of changes in the visual environment, such as rural residents and outdoor recreation users.
2—Moderate	Moderate sensitivity applies primarily to viewers whose activity and awareness make them mildly conscious of changes in the visual environment, such as tourists visiting the region, motorists on local roads, and urban residents.
1—Low	Low sensitivity applies primarily to viewers whose activity distracts and whose awareness is diverted from changes in the visual environment, such as university students, agricultural workers, and motorists on high speed roads.

3.10.1.6 Existing Visual Quality

Visual quality measures the degree to which a view expresses the essence of the Kittitas Basin, including landforms such as mountains, foothills, or alluvial fans; native vegetation such as shrub-steppe and riparian corridors; and built features such as farmsteads and canals. Visual quality relates to the intrinsic qualities of a landscape, so this analysis is based on the inherent capacity of a landscape to evoke a perceptual response rather than on individual preferences.

The visual quality of each key view can be described in terms of the overall vividness, intactness, and unity of the view (American Society of Landscape Architects, 1979). Vividness is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns. Intactness is the visual integrity of the natural and man-built landscape and its freedom from encroaching elements. Unity is the visual coherence and compositional harmony of the landscape considered as a whole.

Because it is not feasible or necessary to evaluate all possible views of a project, key views have been chosen that represent the range of visual resources in the vicinity of the proposed project. Representative key views have been chosen to reflect both views that would be seen by the largest numbers of people, i.e. high exposure, and views of people who would be most impacted, i.e. high sensitivity. Key views are distributed throughout the foreground zone, the middleground zone, and the background zone to reflect the range of viewing distances. There is an emphasis on views from publicly accessible places because these have the potential to be viewed by the largest number of people. The key views were photographed over several seasons so that variations such as snow on the mountains or dry summer vegetation could be illustrated. **Figure 3.10-4** illustrates the locations and directions of the key views.

To make this analysis relevant to this region, the vividness, intactness, and unity of the key views are compared to other views within the basin, rather than to nationally significant landmarks such as Niagara Falls or the Grand Tetons. In the evaluation of each key view, most immediate foreground elements such as pavement and street signs have been disregarded because their impact depends primarily on the observer's position.

Vividness, intactness, and unity are evaluated and assigned a score of 3 (high), 2 (moderate), or 1 (low) for each key view. These scores are added together and divided by three to determine an overall visual quality rating for each key view: high (3.0, 2.67), moderate (2.33, 2.0, 1.67), or low (1.33, 1.0). **Table 3.10-4** explains these visual quality ratings.

The following discussion summarizes the results of the assessment of viewer groups and visual quality of each Visual Assessment Unit. The summary for each unit includes a description of the landscape, viewer group exposure and sensitivity ratings, and the overall visual quality rating of the key views. Details of the assessment with respect to viewer group exposure and sensitivity and the visual quality attributes of the key views are provided in **Appendix G**.

Table 3.10-4
Visual Quality Scale

Rating	Explanation
High	High visual quality applies to key views with a score of 3.0 or 2.67 when their vividness, intactness, and unity scores are averaged. High ratings generally correspond to views that embody the fullest expression of intrinsic qualities potentially visible in the Kittitas Basin. These views have distinct and uninterrupted visual patterns and display overall harmony between built and natural features.
Moderate	Moderate visual quality applies to key views with a score of 2.33, 2.0, or 1.67 when their vividness, intactness, and unity scores are averaged. Moderate ratings generally correspond to views that embody an average expression of intrinsic qualities potentially visible in the Kittitas Basin. These views may lack outstanding or memorable expressions of regional character or may have been diminished by some visual encroachment or disorder, but they retain some appeal as the common visual experience of the basin.
Low	Low visual quality applies to key views with a score of 1.33 or 1.0 when their vividness, intactness, and unity scores are averaged. Low ratings generally correspond to views that embody a weak expression of the Kittitas Basin. These views may have discordant and incoherent elements, or may have major visual intrusions that do not relate harmoniously to the surrounding landscape.

Visual Assessment Unit 1: Northwest Valley

Landscape Description

This unit is located northwest of Ellensburg, between U.S. Highway 97 and the small ridge running north from Ellensburg. The unit slopes evenly and gently from north to south over broad alluvial fan landforms. It gradually changes from irrigated fields and windrows of locust, willows, and poplars in the south, to gray, green, and brown tints of earth and shrub-steppe vegetation in the north. Riparian corridors follow creeks and ephemeral streams north to south out of the foothills of the Wenatchee Mountains. It is generally open in character, and contains irrigated agricultural lands and seasonal grazing lands, as well as rural residential clusters, horse corrals, spring calving grounds, meadows, and barns. **Figure 3.10-5**, a photo of existing visual conditions at Key View 1E (from Reecer Creek Road), is considered representative of this Visual Assessment Unit. Photos for Key Views 1A-1D are included in **Appendix G**. In response to comments on the Draft EIS, additional key views in Unit 1 were investigated for the Final EIS. This resulted in the production and inclusion in the Final EIS of two additional key view simulations. Both of these are additional simulations produced from existing key view locations. The additional supplemental key views are 1F and 1G. These are included as **Figures 3.10-6** and **3.10-7**, respectively.

Figure 3.10-5
Existing View, Key View 1E
(looking northwest from Reecer Creek Road)

Figure 3.10-6
Existing View, Supplemental Key View 1F
(looking northwest from Smithson Road near CTC farm)

Figure 3.10-7
Existing View, Supplemental Key View 1G
(looking southeast from Reecer Creek Road immediately north of project boundary)

High voltage power lines run east-west across the northern portion of this unit. The density of development diminishes to the north, creating greater visual openness, and allowing views to surrounding hills and mountains. Suburban development is extending northward from Ellensburg. Second homes, ranchettes, and subdivisions are steadily transforming the rural landscape. Existing homes, farms, and roads create minimal light and glare impacts. Low-angle late afternoon light causes the high voltage power lines to shimmer and be visible from a considerably greater distance.

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents, agricultural workers, motorists on Reecer Creek Road, motorists on smaller county roads, and outdoor recreation users of the John Wayne Trail.

Rural resident.	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 3—High
Agricultural workers	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 1—Low
Motorists on Reecer Creek Rd.	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 2—Moderate
Motorists on county roads	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
John Wayne Trail users	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate

Visual Quality of Key Views-Existing

Key View 1A Overall Visual Quality: 3.0—High
Key View 1B Overall Visual Quality: 3.0—High
Key View 1C Overall Visual Quality: 2.0—Moderate
Key View 1D Overall Visual Quality: 2.0—Moderate
Key View 1E Overall Visual Quality: 2.0—Moderate
Key View 1F Overall Visual Quality: 2.33—Moderate
Key View 1G Overall Visual Quality: 2.0—Moderate

Visual Assessment Unit 2: Northeast Valley

Landscape Description

This unit is located northeast of Ellensburg, east of the small ridge running north from Ellensburg. The unit is gently sloping from north to south over broad alluvial fan landforms. The unit rises subtly in the west to form the ridge dividing the valley. The lower part of the unit contains vegetative windbreaks of poplars and willows, as well as narrow riparian corridors oriented north to south. Trees surround dispersed rural residences, ranch buildings, and farm equipment. Large grazing areas gradually transition to scattered patches of grassland steppe and to larger areas of shrub-steppe to the north. On the north side of the high voltage power lines, low shrub-steppe vegetation increases in density as it approaches the rugged terrain of the foothills. **Figure 3.10-8**, a photo of existing visual conditions at Key View 2A (from Wilson Creek Road), is considered representative of this Visual Assessment Unit. Photos for Key Views 2B and 2C are included in **Appendix G**.

Figure 3.10-8
Existing View, Key View 2A
(looking southwest from Wilson Creek Road)

This unit is predominantly a working landscape of livestock grazing and ranching. Bowers Field, Ellensburg's airport, is located in the southwestern corner of this unit. Most roads are paved, but some smaller county roads are unpaved. In most of the unit, views out are interrupted by low hills and filtered by wind rows, residential garden vegetation, and houses. Existing homes, farms, and roads create minimal light and glare impacts. Low angle late afternoon light causes the high voltage power lines to shimmer and be visible from a considerably greater distance.

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents, agricultural workers, motorists on county roads, and airport users.

Rural residents	Viewer Exposure: 1—Low	Viewer Sensitivity: 3—High
Agricultural workers	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 1—Low
Motorists on county road	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
Airport users	Viewer Exposure: 2—Low	Viewer Sensitivity: 2—Moderate

Visual Quality of Key Views-Existing

Key View 2A Overall Visual Quality: 1.67—Moderate
Key View 2B Overall Visual Quality: 2.0—Moderate
Key View 2C Overall Visual Quality: 2.67—High

<u>Visual Assessment Unit 3: Greater Ellensburg</u>

Landscape Description

This unit is located roughly in the center of the Kittitas Basin, east of the Yakima River and to the north of I-90. **Figure 3.10-9**, a photo of existing visual conditions at Key View 3C (from Reed Park), is representative of this Visual Assessment Unit. Photos for Key Views 3A and 3B are included in **Appendix G**. The unit can be divided into two distinct sub-units: the city center and its outskirts. The topography of the city is mostly flat except for several hills and small ridges in the eastern part of the city. Vegetation consists mostly of non-native species in gardens, parks, and on the Central Washington University campus. Further away from the city center, the vegetation is less dense. The city blends an old town center and retail district, commercial strips, residential neighborhoods, the campus, and some industrial uses and suburban subdivisions at its periphery. The outskirts of Ellensburg (mostly in unincorporated Kittitas County) are covered with low-density subdivisions interspersed with some ranches and farms. Vegetation and structures block or filter most views out of this unit. Existing homes, offices, and businesses create some light and glare impacts. Moving traffic on main streets creates considerable light impacts.

Figure 3.10-9
Existing View, Key View 3C
(looking northwest from Reed Park in Ellensburg)

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are city residents, suburban residents, university students, and tourists.

City residents	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
Suburban residents	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 2—Moderate
University students	Viewer Exposure: 1—Low	Viewer Sensitivity: 1—Low
Tourists	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate

Visual Quality of Key Views-Existing

Key View 3A Overall Visual Quality: 1.33—Low
Key View 3B Overall Visual Quality: 1.33—Low
Key View 3C Overall Visual Quality: 2.67—High

<u>Visual Assessment Unit 4: Yakima River</u>

Landscape Description

This unit crosses the southwestern part of the valley, west of Ellensburg. A photo of existing conditions at Key View 4A, which is representative of this unit, is included in **Appendix G**. The Yakima River is shallow and meandering through much of the Kittitas Basin. It has formed braided channels and carved a series of bank terraces along its corridor. In the river's floodplain grows thick riparian vegetation that filters or blocks many views out from the corridor. The river moves through both forested areas and open grasslands and agricultural fields spotted with horses and ranch buildings. I-90 follows this river corridor from Thorp Prairie to Ellensburg. Parts of scenic State Route 10 and the Thorp Highway also follow the river. Views of the nearby Manastash Ridge to the south and west of the unit are most prominent. Moving traffic on I-90 can cause significant light impacts to this view.

Viewer Group Exposure and Sensitivity

The primary viewer groups in this unit are rural residents, motorists on I-90, motorists on State Route 10, motorists on the Thorp Highway, and outdoor recreation users of the river corridor.

Rural residents	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
Motorists on I-90	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 1—Low
Motorists on State Route 10	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
Motorists on Thorp Highway	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
River corridor users	Viewer Exposure: 1—Low	Viewer Sensitivity: 3—High

Visual Quality of Key Views-Existing

Key View 4A Overall Visual Quality: 3.0—High

Visual Assessment Unit 5: Southwest Valley

Landscape Description

This landscape unit is located southwest of Ellensburg, between the foothills of Manastash Ridge and the Yakima River. The unit is generally flat and open, with a gradual slope from southwest to northeast over a broad alluvial fan. The unit contains vegetative windbreaks, agricultural fields, grazing areas, and small riparian corridors following creeks down the slope. New homes are emerging among existing ranches and farms. This landscape unit offers significant views to the western and southwestern slopes of Manastash Ridge. Views to the north are dominated by the riparian corridor of the Yakima River in the middleground and mountains in the background. **Figure 3.10-10**, a photo of existing visual conditions at Key View 5A (from Killmore and Robinson Road), is representative of this Visual Assessment Unit. Higher up the slope, there are some expansive views to the north over the basin. Existing homes, farms, and roads create minimal light and glare impacts.

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents, agricultural workers, and motorists on county roads.

Rural residents	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate
Agricultural workers	Viewer Exposure: 1—Low	Viewer Sensitivity: 1—Low
Motorists on county roads	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate

Visual Quality of Key Views-Existing

Key View 5A Overall Visual Quality: 2.33—Moderate

Visual Assessment Unit 6: Hayward Hill

Landscape Description

This landscape unit is located west of Ellensburg, between the Yakima River and U.S. Highway 97. A photo of existing conditions at Key View 6A, which is representative of this unit, is included in **Appendix G**. Hayward Hill is a ridge approximately 400 feet high, aligned northwest to southwest. It forms a distinct edge to the valley because of its dramatic topography. The hill is mostly covered by sparse shrub-steppe vegetation, except in small canyons where thicker vegetation grows. A large area of Hayward Hill was burned in a July 2003 wildfire, and the darkened south-facing slope of the hill was prominent from a considerable viewing distance. Existing homes and roads create minimal light and glare impacts.

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents and motorists on unpaved county roads.

Rural residents	Viewer Exposure: 1—Low	Viewer Sensitivity: 3—High
Motorists on unpaved roads	Viewer Exposure: 1—Low	Viewer Sensitivity: 2—Moderate

Figure 3.10-10
Existing View, Key View 5A
(looking north from the intersection of Killmore Road and Robinson Road)

Visual Quality of Key Views-Existing

Key View 6A Overall Visual Quality: 3.0—High.

Visual Assessment Unit 7: Dry Creek Slope

Landscape Description

This unit is located northwest of Ellensburg and north of Hayward Hill, between Horse Canyon and the valley. A photo of existing conditions at Key View 7A, which is representative of this unit, is included in **Appendix G**. It is made up of a series of hills and creek valleys. The overall topography slopes sharply from northwest to southeast. Shrub-steppe vegetation covers the southern lower elevations. Ponderosa pine forest gradually emerges to the north as the elevation rises. The sheltered canyons have thicker vegetation and riparian vegetation along the creeks. Power lines cross the unit from east to west and U.S. Highway 97 bisects the unit from north to south. Some rural residential development has occurred but it is only accessible from private roads. At the southernmost part of the unit, from U.S. Highway 97, there are views out to the valley, though most are somewhat obstructed by foreground landforms. Most public views east and west from the unit are territorial due to the dramatic topography and lack of public roads. The Wenatchee Mountains to the north are visible from many places. Existing homes, farms, and roads create minimal light and glare impacts. Low-angle late afternoon light causes the high voltage power lines to shimmer and be visible from a considerably greater distance.

Viewer Group Exposure and Sensitivity

The primary viewer groups in this unit are rural residents and motorists on U.S. Highway 97.

Rural residents	Viewer Exposure: 1—Low	Viewer Sensitivity: 3—High
Motorists on U.S. Highway 97	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 1—Low

Visual Quality of Key Views-Existing

Key View 7A Overall Visual Quality: 2.33—Moderate

Visual Assessment Unit 8: Table Mountain Slope

Landscape Description

This unit is located north of Ellensburg and forms the northern edge of the basin between the Dry Creek Slope Visual Assessment Unit and Naneum Canyon. A photo of existing conditions at Key View 8A, which is representative of this unit, is included in **Appendix G**. In response to comments on the Draft EIS, additional key views in Unit 8 were investigated for the Final EIS. This resulted in the production and inclusion in the Final EIS of one additional key view simulation for Unit 8. The additional simulation was produced from an existing key view location. The additional view from supplemental key view 8B is included as **Figure 3.10-11**.

Figure 3.10-11
Existing View, Supplemental Key View 8B
(looking southwest from Cole/Binette residence in Sun East)

Foothills and canyons leading steeply up to Table Mountain and the Wenatchee Mountains characterize this unit. Vegetation transitions from shrub-steppe to ponderosa pine forest. The topographic variations of foothills and canyons make this vegetation transition more complex. A series of riparian corridors run north to south along creeks emerging from the canyons. The unit has a significant residential subdivision of over 100 homes, called Sun East, that is accessible by a private gravel road. Views from the southern part of the unit are filtered or obstructed by riparian vegetation. Midway up the slopes there are expansive views over the valley. Distant views include Mount Adams beyond Manastash Ridge. Existing homes and roads create minimal light and glare impacts. Low-angle late afternoon light causes the high voltage power lines and metal roofs in the valley to shimmer and be visible from a considerably greater distance.

Viewer Groups and Visual Sensitivity

The primary viewer groups of this unit are rural residents at Sun East and outdoor recreational users.

Rural residents	Viewer Exposure: 2—Moderate	Viewer Sensitivity: 3—High
Outdoor recreation users	Viewer Exposure: 1—Low	Viewer Sensitivity: 3—High

Visual Quality of Key Views-Existing

Key View 8A Overall Visual Quality: 3.0—High
Key View 8B Overall Visual Quality: 2.67—High

3.10.1.7 Visual Environment of the Wild Horse Site (Alternative 1)

The Wild Horse site is a roughly 3- by 4-mile area located on the slopes of Whiskey Dick Mountain and the upland areas to its north. Most of the site consists of dry, rocky grasslands used for grazing, and areas covered with a mixture of sagebrush, bitterbrush and bunchgrasses. The site has an open, windswept and undeveloped appearance. The only structures on the site consist of a collection of antennae at the communication facility on Cribb Peak, a 3,558-foot elevation peak at the eastern end of the ridge formed by Whiskey Dick Mountain, and several meteorological towers at locations scattered across the site. The closest public roadways are the Vantage Highway, which lies 1.5 to 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 area is by way of rough jeep trails, which are private roads. **Figure 3.10-12** is a view to the Wild Horse site from Parke Creek Road to the west of the site.

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 (WDFW) as the Whiskey Dick and Quilomene units of the L. T. Murray Wildlife Area. These lands are managed to provide habitat for the Colockum elk herd, mule deer and other wildlife, as well as opportunities for hunting. There are no developed uses on these lands, and the only access is by a system of rough, unpaved roads. It is estimated that approximately 1,000 hunters use these lands annually. Gingko Petrified Forest State Park is a 7,470-acre state park that lies to the immediate east of the wildlife areas; it was established 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 facilities include the Heritage Area just north of Vantage, where there is an interpretive center and picnic area; and the Natural Area located along the north side of Vantage Highway, 2 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.

Figure 3.10-12
View to Wild Horse (Alternative 1) Site

The Kittitas County Comprehensive Plan designates the lands on the Wild Horse site as Rural, and the zoning designation is Forest and Range. The Comprehensive Plan does not identify any special scenic or visual resource values in the area, and does not include any policies that are specifically oriented to protection of scenic qualities on or near the Wild Horse site.

Zone of visual influence (viewshed) analyses indicate that the Wild Horse site and Alternative 1 have the potential to be visible to one degree or another over a wide area. However, foreground and middleground views of the site, particularly from viewing areas that might have some degree of sensitivity, are limited. The Wild Horse site is not visible from the developed areas of the Gingko Petrified Forest State Park. The closest views from a public roadway would be those from Vantage Highway, located 1.9 miles south of the site. The closest views from residential structures would be from the area approximately 1.5 mile and further to the north of the site's northern boundary, where there are a small number of seasonal cabins scattered across the area along upper Parke Creek. Most of the areas from which the Wild Horse site has the potential to be seen by large numbers of people are located 3 or more miles from the site, so the site appears in the landscape's background zone in views from these areas. These areas include the ranch lands and pockets of rural residential development located at the eastern edge of the Kittitas Valley, located 3 miles and further from the site; the area in around the community of Kittitas, located from 7 to 12 miles west of the site; and some areas east of the Columbia River, located 7 miles and further from the Wild Horse site.

3.10.1.8 Visual Environment of the Springwood Ranch Site (Alternative 2)

The Springwood Ranch is situated in the transitional area between the Cascade Mountain and Columbia Basin physiographic regions, near where the Yakima River enters the broad and relatively flat Kittitas Basin. For more discussion of the Kittitas Basin regional landscape, see **Section 3.10.1.1** Precipitation decreases significantly with movement eastward through this transitional area, and the natural vegetation type changes from the ponderosa pine zone along the eastern fringe of the mountains to the shrub-steppe zone.

The Thorp Prairie Landscape Unit includes all of the Springwood Ranch. In addition to this Landscape Unit, the viewshed for Alternative 2 includes parts of the Yakima River, Lookout Mountain, Dry Creek Slope, Hayward Hill, Southwest Valley, Taneum Slope and Elk Heights Slope Landscape Units. Characteristics for most of those Landscape Units are included in **Section 3.10.1.6** and in **Appendix G**. The landscape description for units that were not identified as Visual Assessment Units for the Desert Claim project are summarized as follows:

- The Lookout Mountain unit is located north of Thorp Prairie across the Yakima River. The unit is characterized by foothills and the forested southern slope of Lookout Mountain. In this unit, vegetation transitions from shrub-steppe to ponderosa pine forest. Several high-voltage power lines cross this unit from east to west. From the southern part of the unit, below the forested slope, there are clear views over bluffs and the Yakima River corridor. Rural residents comprise the primary viewer group, with a low viewer exposure and high viewer sensitivity.
- The Taneum Slope unit is south of Thorp Prairie. It is characterized by foothills and canyons leading up into Manastash Ridge. The unit is generally sloping towards the northeast, with numerous creeks flowing down to the Yakima River. In this unit, vegetation transitions from shrub-steppe to ponderosa pine with riparian corridors following the creeks. Viewers in this unit have middleground and distant views to Thorp Prairie and out over the Yakima Valley. Rural

residents comprise the primary viewer group, with a low viewer exposure and high viewer sensitivity.

- The Elk Heights Slope is located west of Thorp Prairie and to the west of I-90. The unit is characterized by foothills and forested mountains of Cle Elum Ridge. In this unit, vegetation transitions from a bit of shrub-steppe in its lowest eastern reaches to predominantly ponderosa pine forest. From the easternmost part of the unit, below the forested slopes, there are clear views across Thorp Prairie. The primary viewer groups in this unit are rural residents and motorists on I-90. The viewer exposure is low and the viewer sensitivity is high for the rural residents, while I-90 motorists have a high exposure and low viewer sensitivity.

The terrain on most of the Springwood Ranch is rolling, giving way to high bluffs along the steep and relatively narrow canyon that contains this reach of the Yakima River, to the north and east of the site. Taneum Creek flows through a shallow valley that crosses the property from southwest to northeast and divides the ranch into two areas of unequal size. Most of the site is grassland; tree cover is very limited, and confined almost exclusively to riparian areas, the Yakima River canyon, and north-facing slopes of some of the shallow draws that are present.

The small community of Thorp is located about ½ mile to the east of the extreme southeastern corner of the ranch. No other sizable developed areas are within view of the ranch, and Ellensburg is the next-closest community. I-90 provides visual access to most of the ranch. The freeway adjoins the southeastern section of the site and is generally within ½ mile of the property line in other locations. Views to the property from I-90 are generally unobstructed, and include virtually the entire ranch except for the canyon area along the river. SR 10 parallels the property for about 5 to 6 miles as the highway follows the east bank of the Yakima River, providing additional visual access to the ranch. In some locations views from SR 10 are limited to the canyon, while in other places more expansive views over the ranch and toward Manastash Ridge are possible.

Some developed features, primarily several homesites, are present in selected locations on or near the ranch. These are generally in the area near Taneum Creek and along the east side of the property, near Thorp. The main ranch house is located on a bluff overlooking Taneum Creek from the north. The old railroad right-of-way that is now the Iron Horse State Park passes along the edge of the ranch, generally adjacent to the west bank of the Yakima River, for several miles. Nearby off-site homes and the community of Thorp are visible at several locations, and I-90 is a prominent development feature from the ranch and the surrounding area. **Figure 3.10-13** is a view to the Springwood Ranch site from Taneum Road near the south edge of the site.

Regarding existing light and glare impacts, there is some outdoor lighting associated with the existing ranch buildings on the site. Occasional vehicle traffic on the existing roads within the site also represents a minor source of light and glare. The local road network surrounding the site accounts for the majority of existing light and glare in the vicinity. The high volume of traffic on I-90 produces reflected sunlight during daytime hours and illuminated vehicle lights at night. The Thorp Highway, SR 10 and Taneum Road are other sources of vehicle light and glare adjacent to the Springwood Ranch site. Outdoor lighting in the community of Thorp and at scattered residences in the surrounding area contribute to the local nighttime visual environment.

Figure 3.10-13
View to Springwood Ranch (Alternative 2) Site

3.10.2 <u>Environmental Impacts of the Proposed Action</u>

3.10.2.1 Construction and Decommissioning

Construction activities would last approximately 9 months. Trucks, cranes, and other heavy equipment would be visible in views toward the project area, especially from Smithson Road and nearby residences. Construction activities would create clouds of dust and areas of exposed soil that would contrast with the surrounding landscape. Dust clouds and exposed soil would be especially evident during the first few months of construction because this is the period when roads, tower foundations, power collection and communication lines, and the project substation would be constructed. The construction of the turbines would follow and during this stage the large construction cranes erecting the towers, nacelles, and blades would be the most dominant visual aspect of construction. The visual changes associated with the construction activities would have a moderate, but temporary, visual impact on views from nearby residences and roads in the Northwest Valley and Northeast Valley Visual Assessment Units. The construction-related visual impact from more distant viewpoints would be low.

If project construction occurred in phases, the effect on the level of visual impacts would be to extend the total duration of temporary disturbance from project construction, but to reduce the intensity or magnitude of impacts for any one phase. Construction activity and visual features would result in temporary, moderate visual impact on views from nearby residences and roads in the Northwest Valley and Northeast Valley Visual Assessment Units. Viewers in these units would likely not be exposed to relatively near views of the project in all construction phases, however, as the phases would likely be distributed geographically. Construction–related visual impacts from more distant viewpoints would still be low and temporary, but would extend over a longer total duration.

The project operating life is assumed to be 30 years. Decommissioning at the end of that period would involve removal of all project features and restoration of the disturbed lands. Visual impacts of this temporary process would be similar to those experienced during construction. Replacement, or repowering, of the turbines could occur based on new technology in the future. Visual impacts of this temporary process would be similar to those experienced during construction.

3.10.2.2 Operation

Evaluation of the operation impacts of the proposed project was based on comparison of "before" and "after" versions of the representative key views. The "before" views were assigned existing visual quality ratings (**Section 3.10.2.6)** based on their vividness, intactness, and unity. The "after" views are computer-generated photosimulations of the proposed turbines in the same key view setting. The "after" views were assigned proposed visual quality ratings based on the same standards of vividness, intactness and unity.

The large scale (primarily the height) of the turbines would be a major component of the long-term visual impact of the project. With a maximum height of 340 feet to the tip of the turbine blades, the turbines would likely be taller than any existing structures in Kittitas County. Larger buildings in Ellensburg typically do not exceed approximately 50 to 60 feet in height. Steel-lattice towers on the high-voltage transmission lines common to the region typically range from 125 feet to 175 feet tall, or somewhat less than half the height of the proposed wind turbines. The Space Needle in Seattle, a well-known regional landmark, is 605 feet high.

In addition to the turbines, the proposed project would include a number of other structures that would have limited visual impacts: a small transformer at the base of each turbine, a series of junction boxes, possibly some aboveground collection lines where the use of underground cable is not feasible, a 2-acre substation, overhead lines to the major transmission lines, an operations and maintenance facility, five 50-meter meteorological towers, and various new access roads. These features would be much smaller and have much less visual impact than the turbines. They would only be visible in the immediate vicinity of the project and could be designed to blend into the surroundings.

Evaluation Criteria

Table 3.10-5 defines impact level ratings used to assess the significance of potential visual impacts from the project. The impact ratings are based on a comparison of the visual quality ratings, described in **Table 3.10-4**, of the "before" and "after" versions of the key views. The impact ratings include consideration of the viewer exposure and sensitivity of the primary viewer group for each key view, as documented in **Section 3.10.1.6**. The methodology for assessing the level of visual impact is described in **Appendix G**.

Table 3.10-5
Definition of Aesthetic Impact Levels

Rating	Explanation
High	Overall visual quality is substantially decreased (score decrease of 1.0 or greater) and turbines are visible in areas with high viewer exposure or sensitivity.
Moderate	Overall visual quality is moderately decreased (visual quality rating decrease of 0.67) and turbines are visible in areas with moderate to high viewer exposure or sensitivity.
Low	Overall visual quality is minimally decreased (visual quality rating of 0.33 or less) or the turbines are visible in areas with low viewer exposure and sensitivity.

Key View Simulations

The visual impact analysis included preparation of simulations of future views of the proposed project from all of the key viewpoints identified in **Section 3.10.1.6**. For each key view, the photo of the existing view was compared with the simulated future view to determine the specific changes to each visual quality element (vividness, intactness and unity) that would occur with the addition of the project to the landscape. A level of visual impact for each view was assigned by combining the with-project visual quality rating with the applicable viewer exposure and viewer sensitivity ratings for each view.

The simulations prepared for the Draft EIS were based on a defined maximum turbine envelope, which consisted of a turbine with a maximum height above ground level of 120 meters or 393 feet. As discussed in Section 2.2, Desert Claim has subsequently determined it would use a turbine model with a maximum height of 104 meters or 340 feet. This model is 53 feet shorter than the maximum turbine height assumed for the Draft EIS analysis. The difference in height would be noticeable to the casual observer if the two models were viewed at the same time, and there are some locations near the project area from which a

393-foot turbine (the maximum envelope) would be visible while a 340-foot turbine (the model to be used in the project) would not be visible. Nevertheless, Kittitas County concluded that the difference in scale of the turbines was not sufficient to warrant reproduction of the simulations based on the shorter turbine model and the original turbine layout. Therefore, the key view simulations presented in the Draft EIS have been re-used for the Final EIS, and are based on a 393-foot turbine height and the project configuration documented in the Draft EIS. These graphics overstate the height and the visual impact of the turbines that would be developed under the proposal.

Appendix G includes a complete set of existing and simulated conditions for each of the key views. The appendix also provides detailed documentation of the operation period impact assessment for each Visual Assessment Unit. Several of the simulations are included here in **Section 3.10.2** to illustrate the long-term changes in visual quality that would occur with the development of the project.

Figures 3.10-14 through **3.10-20** are simulated views of future, with-project conditions at Key Views 1E, 1F, 1G, 2A, 3C, 5A and 8B. These simulations correspond to the existing views shown in **Figures 3.10-5** through **3.10-11**. The simulations illustrate a representative range of conditions including relatively near to distant views and visual impacts classified as high, moderate and low. Simulations for the remaining key views analyzed for the EIS are provided in **Appendix G**. In response to comments on the Draft EIS, three additional key views near the project area (Key Views 1F, 1G and 8B) were investigated for the Final EIS. **Figures 3.10-15, 3.10-16** and **3.10-20** show simulated views from these supplemental key views. The simulations in these three graphics depict the 340-foot turbine model and the modified turbine layout now proposed by Desert Claim, as described in **Section 2.2**. **Appendix G** includes detailed documentation of the operation period impact assessment for each supplemental key view.

At Key View 1E (shown in **Figure 3.10-14**), along Reecer Creek Road in the Northwest Valley unit, the dramatic height and the light color of the wind turbines would be seen in the foreground and middleground, where they would break up the skyline and interrupt the view to the mountains. The intactness and unity of this scene would both be reduced from ratings of 2 to 1, and the overall visual quality rating would likewise be reduced from 2 to 1. The level of visual impact at this location was classified as high. Similarly, the existing visual quality would be reduced from 2.33 to 1.33 for Key View 1F and from 2 to 1 for Key View 1G, based on the simulated views presented as **Figures 3.10-15** and **3.10-16**, respectively.

Figure 3.10-17, simulating the view at Key View 2A along Wilson Creek Road in the Northeast Valley Floor unit, illustrates a situation in which the turbines would be relatively prominent but would not have a significant impact on visual quality. In this location (and in other locations near the existing high-voltage transmission lines that cross the project area), the power lines already disrupt the vividness and intactness of the view and the turbines would have little incremental effect on the overall visual quality.

Figure 3.10-18 represents a location with a moderate level of visual impact. In this simulated view from Reed Park in Ellensburg (Key View 3C), the turbines in the distance would diminish the dramatic view of the mountains contrasted with the city, and thereby reduce the vividness of the scene. The unity of this scene would also be reduced, as the turbines would interrupt the continuity of the existing view that includes the city, the valley floor, foothills and mountains. The overall visual quality rating in this location would be reduced from the existing 2.67 (high) to 2 (moderate) with the project, resulting in a visual impact rating of moderate.

Figure 3.10-14
Simulated View, Key View 1E

Figure 3.10-15
Simulated View, Key View 1F

Figure 3.10-16
Simulated View, Key View 1G

Figure 3.10-17
Simulated View, Key View 2A

Figure 3.10-18
Simulated View, Key View 3C

Figure 3.10-19
Simulated View, Key View 5A

Figure 3.10-20
Simulated View, Key View 8B

The simulation for Key View 5A (**Figure 3.10-19**) in the Southwest Valley unit illustrates what would likely be a typical condition for many locations on the valley floor. The turbines would be visible and would contrast in color with the foothills, but the viewing distance would be such that the turbines would not be strong features in the scene; they would be less noticeable than the existing development in the area. The view of the project would not reduce the vividness, intactness or unity of the scene, resulting in no change to the existing visual quality and a low level of visual impact.

Figure 3.10-20 represents another location with a moderate level of visual impact. In this simulated view from a residence in the Sun East development in the Table Mountain Slope unit (Key View 8B), the turbines would diminish the appreciation of Mount Adams and add some clutter to the middleground view, but would not have a drastic effect on the overall setting. The presence of the project would reduce the vividness and unity of this scene (from 3 to 2 in each case), while the intactness would retain a rating of 2. The overall visual quality rating in this location would be reduced from the existing 2.67 (high) to 2 (moderate) with the project, resulting in a visual impact rating of moderate.

Evaluation of Modified Turbine Layout and Height

The original key view simulations for the Draft EIS (**Figures 3.10-11** through **3.10-14 in that document**) and those in **Appendix G** are based on the original project layout and maximum potential turbine height of 393 feet, as described in the Draft EIS. Since the publication of that document, further study and project definition have led Desert Claim Wind Power LLC to modify the proposed turbine layout and select a turbine model that is smaller than the maximum size depicted and analyzed in the Draft EIS. As indicated previously, the selected turbine model has a maximum height of 340 feet to the top of the blade. The modified project configuration was developed primarily in response to issues relating to project safety, and to environmental constraints identified in the Draft EIS, but also in an effort to mitigate visual impact by using a smaller turbine.

The modified project layout and smaller turbines would reduce aesthetic/light and glare impacts compared to the results documented in the Draft EIS. One improvement from an aesthetic perspective is that the modified project configuration would result in grouping of turbines into more distinct clusters. Several of the “sore thumbs” (outlying turbines that stick out from the rest) or “missing teeth” (gaps between turbines that make the overall layout hard to perceive) that were evident in the turbine layout presented in the Draft EIS are no longer apparent with the modified turbine layout. The modified layout is preferable visually to the somewhat more dispersed field of turbines originally proposed, but the clusters are still quite close together and might not always be perceived as distinct groups from eye level. While the lesser height of the proposed turbine model would make the turbines less obtrusive than the larger turbines evaluated in the Draft EIS, thereby reducing the aesthetic/light and glare impacts of the project to a certain degree, , the reduction in height amounts to a 13.5 percent change that would not be enough to significantly alter the overall visual effect of the turbines.

Impact Summary

This updated impact summary is based on evaluation of the supplemental key view simulations as well as the original key view simulations prepared for the Draft EIS, with consideration for the influence of the modified turbine layout and reduced turbine height. The actual impacts would in many cases be less than those depicted by the original key views, due to the modified turbine layout and reduced turbine height, and in no case would the impact be greater due to the modifications to the proposed project.

Table 3.10-6 summarizes the assessment of long-term visual impacts of the project (based primarily on the visibility of the turbines) from representative key views that are characteristic of the intrinsic visual qualities of the Visual Assessment Units. The views showing the greatest degree of visual impact were 1A, 1E, 1F, and 1G in the Northwest Valley Visual Assessment Unit. These four key views are all close to the proposed project boundary, placing them within the foreground distance zone. Key views 1F and 1G, in particular, are representative of views that would exist for some landowners adjacent to or very near the project. All of these views have foothills of the Wenatchee Mountains or Manastash Ridge as their background, have the turbines near the foreground of the view (approximately ¼ mile from the nearest turbine), and look out over relatively flat terrain. Under these circumstances, the turbines' color contrasts sharply with the browns, greens and blues of the foothills and sky, and the turbines' size is such that the turbines break the skyline and dominate the view. The arrangement of the turbines appears overwhelming because from eye level it looks like a large continuous cluster with little topographic or geometric order. Rural residents of this unit would be the viewers most affected by this change in visual quality; their proximity suggests a moderate exposure rating and their activity and landscape appreciation suggest a high sensitivity rating. Some residents of the Northwest Valley unit would experience relatively near views, as shown in the simulations for key views 1E or 1F, while other residents in this unit would have more distant views similar to the simulation for key view 1B (Figure G32 in **Appendix G**).

Views 1A, 1E, 1F and 1G were the only key views for which the level of visual impact was rated as high. The level of visual impact was considered to be moderate for 6 of the 19 key views. These views were 1B and 1D in the Northwest Valley Visual Assessment Unit, 3C in the Greater Ellensburg Visual Assessment Unit, 6A in the Hayward Hill Visual Assessment Unit, and 8A and 8B in the Table Mountain Slope Visual Assessment Unit. These views tend to be from high points at moderate distances from the project (1 to 4 miles). Under these circumstances, the turbines' color contrasts somewhat with the valley floor's varied texture of natural and human features, but not as significantly as against the natural foothills and sky. These high points allow long views over the valley, but they also mean that the turbines rarely break the skyline in these views. With greater distance from the viewer, the turbines occupy less of the view and are comparable to powerlines, fences, and other human-made features in the foreground of many views.

The remaining 9 views were assigned low impact ratings. The visual quality of these views would not be changed significantly with the project, primarily due to their distance from the project and/or the pre-existence of disrupting visual elements, especially suburban development around Ellensburg. Details supporting the summary of changes in visual quality for each key view are provided in **Appendix G**.

In summary, the degree of long-term visual impact created by the project would be largely dependent upon location within Kittitas County and proximity to the project. The project would be most apparent to many of the rural residents in the northwest quadrant of the Kittitas Valley, particularly those within foreground viewing distance (approximately ¼ or 1/2 mile) of large concentrations of wind turbines. Viewed from most adjacent or nearby residences, the project would be visually dominant due to the size, number and arrangement of the turbines. For this area and viewer group, the visual impacts would be significant. Surrounding the zone of high visual impact would be a larger band, generally corresponding to the middleground distance zone (out to a distance of about 3 miles), within which the turbines would be prominent from many or most viewpoints, but would not dominate the scene. Visual impacts from most locations within this zone would be moderate rather than high, but in some cases might still be considered significant. The project would be noticeable in longer-distance views from many elevated positions in the rest of the valley but would not have a significant impact to visual quality, especially when compared with existing development. The Desert Claim project would not be visible from many of the level, vegetated places in the valley, including most residences in Ellensburg, Kittitas, and Thorp.

Table 3.10-6
Summary of Visual Impacts

Key View	Primary Viewer Exposure	Primary Viewer Sensitivity	Existing Visual Quality	With Project Visual Quality	Level of Visual Impact
Unit 1: Northwest Valley Floor					
1A	2	3	3.0	1.67	High
1B	2	2	3.0	2.33	Moderate
1C	2	2	2.0	2.0	Low
1D	2	3	2.0	1.33	Moderate
1E	2	3	2.0	1.0	High
1F	2	3	2.33	1.33	High
1G	1	3	2.0	1.0	High
Unit 2: Northeast Valley Floor					
2A	2	3	1.67	1.33	Low
2B	1	2	2.0	2.0	Low
2C	2	2	2.67	2.33	Low
Unit 3: Greater Ellensburg					
3A	2	2	1.33	1.33	Low
3B	1	1	1.33	1.33	Low
3C	1	2	2.67	2.0	Moderate
Unit 4: Yakima River					
4A	1	2	3.0	2.67	Low
Unit 5: Southwest Valley Floor					
5A	1	2	2.33	2.33	Low
Unit 6: Hayward Hill					
6A	1	3	3.0	2.33	Moderate
Unit 7: Dry Creek Slope					
7A	2	1	2.33	2.0	Low
Unit 8: Table Mountain Slope					
8A	2	3	3.0	2.33	Moderate
8B	3	3	2.67	2.0	Moderate

3.10.2.3 Light and Glare

The Federal Aviation Administration (FAA) requires that objects more than 200 feet in height be appropriately marked as a safety measure for aircraft traffic. The proposed marking system, noted in **Section 3.13.5.2**, is a dual lighting system with red lights for nighttime and medium intensity flashing white lights for daytime and twilight use. Two of these systems would be mounted on top of the generator housing of each of 48 wind turbines marking the perimeter of the 120-turbine project.

Experience at the Stateline and Nine Canyon wind projects in Washington suggests that the daytime white flashing lights, which flash about 40 times per minute and are approximately 20,000 candelas in intensity, would be visible, but not very intrusive because they do not contrast significantly with daylight conditions. As for the nighttime flashing red lights, the intensity is stepped down to 2000 candelas and they flash only about 22 times per minute, roughly 1 second on and 2 seconds off. The flashing red lights contrast significantly with the nighttime sky and the lights would be similar in appearance to those observed on many cell towers around the country. There is relatively little existing exterior light in the vicinity of the project, so the flashing red lights would be a very noticeable aspect of the project for residents around the Northwest Valley and Table Mountain Slope Visual Assessment Units. Both the white and red lights have their own internal shielding which directs the light out level and upward from the unit, instead of down toward the ground, but the FAA does not typically allow external shielding that might allow directional shielding to protect homes to the north which are at or above the elevation of the nacelles. The impact would be greater if the flashing lights are not synchronized to flash in unison, but this technology exists and can be integrated in the project.

Comments on the Draft EIS expressed concern that the project safety lights would interfere with the ability to view the night sky, and specifically with popular stargazing activity from Table Mountain. Outdoor lighting can diminish the visibility of objects in the night sky, through a phenomenon known as skyglow. Skyglow is the haze or glow of light emitted above a source of outdoor lighting; it is a combination of upward-directed light emitted directly from the source, light reflected from illuminated surfaces, and light reflected from airborne particles. Skyglow is evident over large distances, particularly from elevated vantage points, and is not a localized condition. The largest existing sources of skyglow in the Kittitas Valley area are the concentrations of exterior lights in the Ellensburg and Yakima urban areas (Kittitas County 2000). The Desert Claim turbine safety lights would be at an elevation approximately 3,000 to 4,000 feet below the top of Table Mountain and would not be in a direct line of sight for people engaged in stargazing activities on Table Mountain (or other higher-elevation points nearby). The incremental contribution of approximately 50 small, blinking red lights at an intensity of 2,000 candelas to existing skyglow in the area would be negligible and would not be measurable. The project lights would not have any identifiable direct or indirect effect on the ability to observe celestial features from popular local vantage points. The ability to view objects in the night sky is and would remain dependent primarily on the amount of skyglow created by urban development in the region, and on domestic lighting associated with rural developed uses.

The project operations and maintenance facility and substation(s) would be minimally lit at night for purposes of operational safety and security. This would create sources of light where there generally are limited existing exterior lights. The impacts associated with this low level lighting would be minimal, especially if the lights were generally kept off and triggered on when necessary by motion sensors.

Blade glare or glint (also known as "flashing") is the intermittent reflection of sun off the glossy surface of rotating turbine blades. It is typically a short-term condition, but can be a recurring annoyance. Its occurrence depends on a combination of circumstances arising from the orientation of the nacelle, the angle of the blade, and the angle of the sun. The reflectivity of the surface of the blades is also important, and this is to some extent influenced by the color and age of the blade. Matte-surface finishes can be specified to minimize glare or glint effects.

Blade glint is an aspect that could be a potential distraction to drivers, as the effect can be noticed over distances of as much as 6 to 9 miles. Based on geometry and timing considerations, however, it is unlikely that blade glare or glint would be more than an occasional and minor nuisance. Drivers or other viewers who could experience blade glint at long distances would see intermittent pinpricks of light flashes, and the phenomenon would be transitory as they traveled out of view or to a different viewing angle; there is no evident risk that drivers at some distance from the project would be blinded by large, sudden flashes of light. Drivers at relatively close range would be viewing turbines at considerably steeper angles and would not likely experience blade glare or glint. Sunlight reflection from wind turbine blades has not been identified as a significant environmental problem in the U.S., although it has been more noticeable in higher-latitude areas such as northern Europe (Manwell et al. 2002).

3.10.2.4 Shadow Flicker

Shadow flicker, or strobe effects, can arise within or near houses when an operational wind turbine is located in a position where the blades pass across the sun, causing a flickering shadow. This potential effect would occur only where a turbine is relatively close to a dwelling, and at very low sun angles. Although flickering is only likely to occur for a short duration and at certain times of the year, it can be annoying to people living near a turbine. This issue is discussed in more detail in **Section 3.8**.

3.10.3 <u>Impacts of the Alternatives</u>

3.10.3.1 Alternative 1: Wild Horse Site

The aesthetic, light and glare issues of potential concern for Alternative 1 are the same as described for the proposed action. To structure the analysis of the aesthetic impacts of the proposed Wild Horse project, consultants working for Zilkha Renewable Energy divided the project area into 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 conditions of views from these areas toward the Wild Horse site were documented. Within each viewing area, a Simulation Viewpoint (SV) was selected as a location for a photo that would be used to develop a simulated view that would provide the basis for visualizing the project's potential visual effects on that viewing area. 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. The work conducted for Zilkha is reported in this EIS to document the visual impacts of Alternative 1.

The visual impact assessment conducted for the Wild Horse proposal was very similar in approach to that described in **Section 3.10.2** for the Desert Claim project. It was based on evaluation of the changes to the existing visual resources that would result from construction and operation of a wind energy project at this location and included assessment of the "after" views provided by the computer-generated visual simulations in comparison 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 impact ratings 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.

The types of visual impacts during the 12-month construction period for Alternative 1 would be the same as described in **Section 3.10.2.1**. Close-at-hand views for this alternative would be limited to those from nearby segments of Vantage Highway. The visual changes associated with the construction activities would be moderately to highly visible and would have a moderate level of visual impact. From more distant viewing locations, the visual effects would be relatively minor and would 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 would take place would not be visible behind the ridgeline formed by Whiskey Dick Mountain. Consequently, the visual impact of construction activities in views from these areas would be low.

During the operational period, many of the Alternative 1 turbines would be clearly visible along the ridgeline of Whiskey Dick Mountain, on the mountain's southern slopes, and on the ridge lands to the north. The aesthetic impacts of the visual changes brought about by the presence of the project in views of this landscape would vary from low to moderate, and would be less than significant. The greatest visual change would be in views of the site from lands to the immediate west, north, and east, where up to 100 turbines would be visible on the high-elevation plateau north of Whiskey Dick Mountain. The visual impact in these areas would be moderate, however, because of the low numbers of viewers. Moderate visual impacts would also occur in views toward the project from Vantage Highway and from the rural residential areas at the eastern end of Kittitas Valley. From the community of Kittitas and the areas around it, and from the areas to the east of the Columbia River, the project would appear as elements in the distant landscape and would have relatively little impact on the overall quality of the view. Because the 230 kV project feeder line to the BPA system would pass through an area with few viewers, it would have a low level of visual impact. The PSE feeder line would be more visible from publicly accessible viewing areas, but because its siting and design would be consistent with other elements of the existing landscape, its overall visual impact would be moderate at most. The PSE interconnect substation would be visible from I-90 and nearby areas, but would be visually consistent with existing infrastructure in the vicinity and would have a relatively low impact on existing visual conditions.

The lighting system employed to comply with FAA safety requirements and the impacts of those lights for Alternative 1 would generally be as described in **Section 3.10.2.3**.The flashing red lights would be most noticeable in the areas within a mile or so of the project, but the impacts on potential viewers would be negligible because there are no residences or public roads in these areas.

The O&M facility and substation(s) for Alternative 1 would 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 would not be substantial, particularly because there are few viewers in the areas to the immediate west, north, and east where they would otherwise be most visible. The potential impacts of the night lighting required for operational safety and security would be attenuated by the lighting mitigation measures that have been built into the project's design.

3.10.3.2 Alternative 2: Springwood Ranch Site

The visual impacts of constructing and decommissioning Alternative 2 would be of the same type as those described previously for the proposed action and Alternative 1. Because Alternative 2 would involve only 40 to 45 wind turbines, compared to 120 turbines for the other alternatives, construction activity would be less extensive overall. The duration of construction would be essentially the same, approximately 9 months. Trucks, cranes, and other heavy equipment would be visible in views toward the project area, especially from I-90 and nearby residences. The visual changes associated with the construction activities would have a temporary, but moderate visual impact on views from nearby residences and roads in the Thorp Prairie Visual Assessment Unit. The construction-related visual impact from more distant viewpoints would be low.

Alternative 2 would have significant visual impacts during operation. The visual quality of expected future views would be markedly affected by the size, color and arrangement of the turbines. In views from I-90, many of the turbines would be quite noticeable because they would be in the middleground (from ¼ mile out to 3 miles), their light color would contrast with the brown and green foothills beyond, and the turbine profiles would break the skyline. There would be similar impacts on views from SR 10 and the Thorp Highway. Views from rural residences would include the additional impact of experiencing the turbine's strong vertical forms across the wide-open, horizontal space of Thorp Prairie. From all views, the turbine arrangement would appear cluttered and overwhelming because it would be unrelated to a topographic or geometric order and it would include too many turbines in a continuous cluster (Gipe, 2002). Overall, development of Alternative 2 would significantly change the aesthetic character of the local landscape, especially as viewed from I-90.

Aviation marking lights required for Alternative 2 would result in significant additional impacts on nearby residents and passing motorists. Flashing white lights during the day would be noticeable, but not significant due to the lack of contrast with daylight. However, flashing red lights at night would be visible from I-90, the Thorp Highway and SR 10, and from residences in the immediate vicinity and in Thorp. Security lighting at the operations and maintenance facility and project substation would have minimal impact on the nighttime visual environment if it were tied to motion sensors. Blade glint or glare from sunlight reflecting off moving blades could be an annoyance to eastbound drivers on I-90 late in the day.

3.10.3.3 No Action Alternative

Under the No Action Alternative, the visual quality of the surrounding environment would not be influenced by the proposed project. Visual character in and near the project area would continue to be influenced by existing land uses, and by potential future changes in land use. Continued development pressure on rural land near Ellensburg might cause some of the project area to be subdivided for housing, while low-density rural residential uses would likely expand. Alternative generating resources might be built in response to regional power demand (instead of the proposed project); if this occurred, it could have negative visual impacts of varying degrees in locations that cannot be predicted.

3.10.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are discussed in **Chapter 4**.

3.10.5 Mitigation Measures

The Draft EIS identified a variety of possible mitigation measures related to visual impacts of the project, which were presented as measures involving visual integration, ecological restoration and management, equipment maintenance and community outreach. Most of these were generic (rather than site-specific) measures identified in published reviews of the aesthetic impacts of wind energy development. The modified project configuration described in **Section 2.2** of the Final EIS responds to and includes a number of the possible mitigation measures identified in the Draft EIS, particularly some of the measures relating to methods of visual integration, including grouping turbines together, removing the “sore thumb” and “missing teeth” turbines, setting turbines back from ridgelines, and placing all project cables underground. The following mitigation measures remain applicable, to varying degrees (e.g., Desert Claim is applying to FAA for permission to use the minimum number of required lights on the turbines), for consideration on the proposed project (or Alternative 1 or 2):

Visual integration:

- To the extent this has not already been accomplished, relocate selected turbines to create more distinct visual units, breaking the project into distinct groupings of turbines and leaving some open space between these groups (Nielsen, 2002).
- Limit the number of turbines in each cluster to 10-15 turbines (Brittan, 2002).
- Relocate selected turbines to better follow and reinforce the natural topography. This approach would be most appropriate for any turbines that still occur near ridgetops.
- Relocate selected turbines to establish clear visual order through geometric arrangements with uniform spacing, This approach would be most appropriate for the remaining turbines that occupy the very gradual slopes of the alluvial fans.
- Construct required ancillary structures of local materials and maximize their fit in the vernacular landscape by studying local building types and siting them sensitively.
- Use native shrub-steppe vegetation around buildings and equipment boxes to integrate the structures into the surrounding landscape.
- Use existing roads to access turbines. Minimize or eliminate new roadbuilding.
- Do not piggyback advertising, cell antennas, or other clutter on the turbines. Do not prominently display the logo of the manufacturer on the nacelle.
- Sculpt natural landforms and plant foreground screening native vegetative along some nearby roads and around residenceswith expected significant visual impacts.

- Use low-reflectivity, neutral-color finishes for turbines, equipment boxes, substation equipment, and operations and management building. Earth-tone finish would blend in best with the surrounding landscape.
- Use only minimum required lighting on turbines (aviation warning lighting) required by the FAA, and minimize security lighting at the substation and O&M facility. Make any ground level security lighting motion-sensitive so that most of the time it does not impact the night landscape.
- Use lighting devices designed to be least visible from ground level.
- Synchronize blinking of aviation warning night lights and maximize period in light-off condition.

Ecological restoration and management of disturbed areas during and after construction:
- Keep construction time to a minimum.
- Remove construction debris.
- Locate construction staging and storage areas away from adjacent county roads.
- Replace native vegetation disturbed in non-road surface areas or non-turbine areas.
- Seed or cover temporarily stockpiled materials and disturbed sites to reduce dust and prevent erosion.

Equipment maintenance:
- Maintain uniform, high-quality turbine towers, nacelles, and blades. Any replacements should maintain uniform height, model, color, etc.
- Remove or promptly repair all parts of non-functioning turbines.
- Keep operation and maintenance area and turbines clean.
- Keep vehicles and maintenance equipment on site away from residences and public access areas.

Information and education related to the project and wind energy:
- Notify the local community of the timing and duration of construction.
- Build a facility for information displays in Ellensburg or near the project.
- In association with WSDOT and Kittitas County, provide signs and safe areas for public viewing with interpretation signs.

3.10.6 Significant Unavoidable Adverse Impacts

Development of the project as proposed would result in significant unavoidable adverse impacts to the visual environment, especially for nearby rural residents in the northwest quadrant of the Kittitas Valley, including part of the Northwest Valley Visual Assessment Unit and the lower foothills of the Table Mountain Slope Visual Assessment Unit. Project facilities, primarily the wind turbines, would be a dominant element of the visual environment for residents and others within short-range viewing distance of the project. Wind turbines would be visible to varying degrees from portions of several other visual assessment units in the Kittitas Basin, although in these cases the views of the turbines would be more distant and the level of visual impact would generally be low. These impacts are summarized in **Section 3.10.2.2**. With considerable efforts to mitigate the project through visual integration, ecological restoration, sound maintenance, and community information from siting through operation, the visual impact has been or could be reduced to a degree. This mitigation process would not, however, lead to a project that would be invisible. On the contrary, it would yield a project that would be quite noticeable but that fit better with the landscape of the Kittitas Basin and the aesthetic values of the people who live there.

3.11 RECREATION

This section addresses the impacts of the Desert Claim Wind Power Project on existing recreation opportunities and facilities in the project area and vicinity. The proposed project would be wholly contained on private land. Recreational activities presently can occur on project-area lands only with permission of the landowners. These permitted recreation activities would, for the most part, be able to continue. Public access via County roads to recreational opportunities on surrounding lands would not be affected on a long-term basis. Recreational users active on surrounding lands would experience some indirect effects from the proposed project, primarily through views of project facilities.

3.11.1 <u>Affected Environment</u>

3.11.1.1 Desert Claim Project Area

The proposed wind power project would be developed on 5,237 acres in Kittitas County, Washington. With the exception of one parcel in the northern part of the project area, on which the Washington Department of Natural Resources (DNR) owns mineral rights, all of the land is entirely owned by eight private local landowners. There is no public access to any of the proposed project lands, and there are no recreational facilities within the project area.

Outdoor recreation can occur within the project boundary only with specific permission from an individual landowner. Recreational activities that have occurred in the past within the project area have included hunting, horseback riding, and snowmobile and off-road recreational vehicle (ORV) use. Most private landowners in the area have posted no hunting signs.

3.11.1.2 Surrounding Area

Outdoor recreational opportunities in the vicinity of the proposed project (within approximately 10 miles) include a number of recreational opportunities on federal, state, city, and private land. Developed recreational facilities in the vicinity of the project are limited.

<u>Federal Lands</u>

The primary, publicly available, outdoor recreation resource in the project vicinity is the Wenatchee National Forest (WNF), managed by the U.S. Forest Service. The southern boundary of the WNF is approximately one-half mile from the northernmost parcel within the project area. Most visitors to WNF lands in the project vicinity access recreational destinations from U.S. 97. The national forest is also accessed thought the project area along Reecer Creek Road, or east of the project area via Wilson Creek Road.

Recreational activities on WNF lands include camping, hiking, horseback riding, mountain biking, snowmobile and ORV use, cross-country skiing and hunting (USFS 1990a). Reecer Creek Road (designated as USFS Road 35 within the national forest) crosses through the western portion of the project area. The Reecer Creek Sno-Park is located approximately 0.5 miles from the nearest project area boundary, along the east side of the road at a prominent curve at the north edge of Section 8 and the end of the paved County road. This facility consists of a small parking area that is plowed in the winter (when necessary) to provide access for winter recreationists. The road continues for 12 miles past the project, accessing the higher elevations of Table Mountain. The 4-unit Lion Rock Campground is located near the end of the road (USFS 1990b). Road 35 accesses a network of multiple spur roads that are used for ORV riding in the summer and snowmobiling in the winter. There are also several trails that are accessed from roads near Lion Rock. Parking along Reecer Creek road is also common, primarily in the winter (USFS 1990a), as winter recreationists park at varying locations along Road 35 depending upon the location of the snow level.

The U.S. Department of the Interior, Bureau of Land Management (BLM) administers a relatively small land base in Kittitas County. The BLM lands include parcels in the Yakima River Canyon south of Ellensburg, which are popular for several types of river recreation. The BLM maintains several access sites along the river. The access sites provide parking and restroom facilities for boaters, anglers and other users. Informal overnight camping also occurs at these sites.

The Bureau of Reclamation operates the Yakima Reclamation Project, which includes or regulates many of the most significant water features in the basin. Yakima Project features include the Keechelus, Kachess, and Cle Elum Reservoirs. Recreational facilities have been developed at all thee of these reservoirs, although the faculties are maintained by the USFS. The USFS also has responsibility for managing the surface and shoreline areas of the reservoirs.

State of Washington Resources

The Washington State Parks and Recreation Commission (WSPRC) manages the state park system in Washington. Three units of the state park system are located in the project vicinity. They are Lake Easton State Park (west of the community of Easton), Iron Horse State Park and Olmstead Place State Park (southeast of the project area, between Ellensburg and Kittitas). Iron Horse State Park is a long, linear park occupying the former right-of-way of the Milwaukee Railroad from Snoqualmie Pass to the Columbia River. The multi-use John Wayne Memorial Trail is located within Iron Horse State Park. In addition to the state parks, the WSPRC also operates Sno-park facilities at 10 locations in the region (Kittitas County 1999).

The Washington Department of Fish and Wildlife (WDFW) manages several access sites intended primarily to allow angler access to lakes or streams. Four of the sites are located on the Yakima River, which is a popular trout fishery, in the reach between Easton and the Yakima Canyon (Kittitas County, 1999). Three sites are on small lakes that are stocked for fishing, including Lavender Lake near Easton and two sites south of Ellensburg. The Washington Department of Natural Resources (WDNR) does not maintain any developed recreation facilities in the project vicinity. However, state-owned lands administered by WDNR are generally open to dispersed (informal) public recreational use.

Local Government

The City of Ellensburg provides several municipal parks. One of these, Irene Rinehart Riverfront Park, is a relatively large, regional-scale park located on the Yakima River southwest of the city. Other Ellensburg recreation resources include Kiwanis, Memorial, Reed, Whitney, Mountain View and West Ellensburg Parks. Kittitas County operates one developed recreational facility, a public boat ramp and water access site on the Columbia River at Vantage. Kittitas County also operates the county fairgrounds, which has both outdoor and indoor facilities available to the public.

Private Sector

There are 13 developed recreation sites in the general vicinity of the proposed project, principally located along the I-90 corridor between Easton and Ellensburg. These sites include eight commercial campgrounds, three golf courses and a winter sports site (Kittitas County 1999). Private landowners in the vicinity of the proposed project may use their lands for a variety of on-site recreational activities or may allow others to use their lands for such activities, as is the case for the lands within the proposed project area.

3.11.1.3 Wild Horse (Alternative 1) Site

Discussion of Kittitas County recreation resources presented in **Sections 3.11.1.1** and **3.11.1.2** also applies to the Wild Horse site. Existing recreation conditions on the Wild Horse site and surrounding lands are similar to those described for the Desert Claim project area, in that there are no recreational facilities and no general public access to the site. Most of the site is privately owned, although WDNR administers approximately 1,920 acres of the site. Because there are no public roads accessing the site, recreational use can only occur with the permission of the private landowner that controls the site. At least in the recent past, hunting has traditionally been allowed to occur on the private lands within the Wild Horse site.

The Schaake and Quilomene Wildlife areas, administered by the WDFW, are adjacent to the Wild Horse site and are managed to accommodate both hunting and non-consumptive wildlife use. They are part of a complex of lands that are managed to provide habitat for the Colockum elk herd and other wildlife, and support big-game hunting during the fall season. Annual hunting use of the WDFW lands is estimated at approximately 1,000 hunters.

The nearest developed recreation facilities to the Wild Horse site are at Gingko Petrified Forest State Park, administered by the Washington State Parks and Recreation Commission. The Natural Area unit of the park, located 2 miles west of Vantage on the Vantage Highway (approximately 7 miles southeast of the Wild Horse site), includes a trail system with an interpretive trail. An interpretive center and picnic area are located in the Heritage Area of the park, just north of Vantage on the Columbia River. Kittitas County also maintains a public boat launch facility at Vantage.

3.11.1.4 Springwood Ranch (Alternative 2) Site

The Springwood Ranch is a privately-owned property that is not and has not been open to the public for recreational use. Any such use of the property itself in the past has presumably been incidental use by the owners and invited guests, and perhaps occasional hunting by permission of the owners. The property does have natural and cultural attributes that would provide opportunities for recreation, however. The primary feature of potential recreation interest would likely be the Yakima River, including the adjacent riparian corridor and bluffs. In addition, the Iron Horse State Park/John Wayne Trail passes through the ranch for approximately 6 miles, and represents potential access for a variety of trail-based uses.

There are few regional recreation resources near the Springwood Ranch other than the river and Iron Horse State Park. One of the four Iron Horse trailheads is located at Thorp, providing parking space for a small number of vehicles. (As of October 1998, the park right-of-way at the Taneum Road crossing near Thorp was posted as closed to recreational use because of safety hazards.) An old grist mill in Thorp is primarily an historical-interest site, although current and planned recreational improvements will support some types of day-use activities. One WDFW access site is located about 5 miles upstream from the northern end of the property, and another is approximately 3 miles downstream from the southeastern corner of the ranch. This reach of the Yakima River receives some recreational boating use, including boat fishing, kayaking/canoeing and rafting. Given the access to or near the river provided by the Thorp Highway and SR 10, there is also likely to be bank fishing use of the Yakima River in the vicinity of the Springwood Ranch.

3.11.2 Environmental Impacts of the Proposed Action

3.11.2.1 Construction

Overall, direct impacts to recreation resources and opportunities during construction of the Desert Claim project would be very low or negligible. Current recreation activity within the project area, which consists of (at most) limited informal use with landowner permission, would be curtailed during construction. After construction was completed, most recreational activities that are currently possible would be able to resume at current levels.

There are a limited number of potential indirect impacts from construction of the proposed project on recreational opportunities in the surrounding area. Noise during construction might be audible intermittently on recreational lands near the project area, or to private landowners using their properties for recreation. If project construction activities occurred during the winter, they would likely be evident at the Reecer Creek Sno-Park, for example. Similarly, visitors at Reecer Creek or on nearby public lands might experience views of project construction sites (see **Section 3.10 Aesthetics** for additional discussion). Recreational visitors traveling along U.S. 97 and the County roads within the project area might experience occasional congestion and delays from trucks hauling turbine components and construction equipment or materials, or from construction of project access road connections to County roads. Both of these types of impacts would be localized and small in magnitude, would occur on an intermittent basis, and would be temporary in duration. Neither type of impact would prevent current uses or cause a large disruption to use of the existing recreational opportunities in the project vicinity. Therefore, recreation impacts during project construction would be insignificant. If project construction occurred in phases, the effect on the level of recreation impacts would be to extend the total duration of temporary disturbance from project construction, but to reduce the intensity or magnitude of impacts for any individual phase. Construction–related recreation impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant in a phased-construction scenario.

3.11.2.2 Operation

With one possible exception, all recreational activities previously allowed by permission of project-area landowners would be allowed to continue during the operational phase of the proposed project. The exception would be hunting. Currently, the project area is all private land, open to hunting only with the owners' permission; it is expected that the current level of hunting within the project area would continue with the landowners' permission. This might, however, be reduced or eliminated within the project boundary to avoid possible damage to turbines or other project facilities. (WDFW has expressed reservations over a prospective hunting closure within the project area, based on concerns over possible property damage from big-game animals, and recommended use of management options other than a complete closure. Resolution of this question would likely occur through development of habitat and wildlife mitigation plans for the project.) Because project-area lands are not managed for public recreation, the possible loss of this limited opportunity would not be a significant recreation impact.

No USFS, BLM, DNR, State Parks, WDFW or private-sector recreational facilities would experience direct impacts from the project. Potential indirect impacts of the proposed project on existing recreation opportunities on nearby federal, state, and private lands and facilities would be very low. Such indirect impacts would primarily be limited to views of the project facilities (principally the turbines) from selected areas used for recreation; see **Section 3.10 Aesthetics** for discussion of the visibility of project facilities.

Based primarily on public comments during scoping or review of the Draft EIS, other possible indirect effects on recreation would include potential exposure to noise, mechanical hazards or shadow flicker. People recreating on private lands in the near vicinity of the project boundary might be able to detect audible noise from operating wind turbines under some conditions; as discussed in detail in **Section 3.9**, project operation noise increases above background sound levels would generally be minor and would be noticeable only within approximately one-quarter mile or less of a turbine. Given the safety-zone setbacks incorporated in the modified project configuration (e.g., 487 feet from the project boundary, adjoining property lines, public roads, existing utility corridors, and the KRD canal), people on properties or rights-of-way near the project would be protected from potential mechanical hazards and would not need to adjust current recreational activities in response to such hazards. As discussed in more detail in **Section 3.8**, recreational users within approximately 2,000 feet of an operating turbine might at times experience shadow flicker. These occurrences would be confined to rare and very specific conditions (lack of cloud cover, sufficient wind for turbine operation, low sun angles at the beginning or end of the day, specific viewing angle, etc.), would be limited to short durations when they did occur (typically on the order of one-half hour or less per occurrence), and would occur for a limited total duration (a maximum of about 50 hours per year, based on the analysis results for residential receptors). Because the maximum potential modeled exposure is based on a stationary residential receptor, for a person engaged in outdoor activity, exposure to shadow flicker would likely be a transitory experience that amounted to an annoyance or distraction; a person in motion would typically move into and out of the relatively narrow band of the turbine shadow in a brief time.

Operation of the project would not change the existing access conditions along public roads that are currently used to reach recreational opportunities on the Wenatchee National Forest or elsewhere in the vicinity, so the ability of recreational users to access public lands for recreation would not be affected by the project. Visitor use levels for recreational opportunities in the project vicinity are not expected to change as a result of the project.

The project would be expected to provide an uncertain degree of attraction for tourists who would otherwise not visit the project area. Some tourists traveling through Kittitas County on I-90 might see the turbines in the distance and be prompted to make a side trip to get a closer view of the project. Other visitors might respond to publicity about wind farms in general or the Desert Claim project in particular by planning a visit to the project area as part of a trip itinerary. To accommodate such prospective visitors, the applicant would maintain a small visitor information facility at a publicly-accessible site in or near the project area. The facility would likely include a roadside pullout or parking area, a kiosk with information displays, and appropriate roadside signage with directions for visitors. The additional visitors might cause a small increase in the volume of traffic on roads near the project, but it is unlikely that the number of project visitors would be large enough to have a noticeable effect on the ability to access recreational opportunities in the surrounding area.

Some review comments on the Draft EIS stated or implied that adverse impacts associated with the Desert Claim project and/or other proposed wind energy projects would result in significantly reduced recreation and tourism visitation in Kittitas County, presumably in response (at least primarily) to the visibility of wind turbines. While it is generally accepted that many recreational and tourist visitors to Kittitas County value the relatively unspoiled scenery, it does not logically follow that a significant number of these visitors would avoid the County if wind turbines were developed and were visible from substantial portions of the County. Visual impacts of wind farms are most evident within the foreground and middleground distance zones (see **Section 3.10.1**). The area within approximately 3 miles of the Desert Claim project has minimal recreational facilities and accounts for an extremely small proportion of total recreation and tourism use in the County; as discussed above, recreation impacts within this area would be insignificant.

Recreational/tourist visitors elsewhere in Kittitas County would at most be exposed to background views of wind turbines at long distances. A large share of the recreational visitors to Kittitas County use the forested areas in the upper county and would typically not come within viewing range of wind turbines. Some anglers and boaters using the Yakima River might be exposed to distant views of Desert Claim wind turbines on the way to their recreational destination, but it is doubtful that many of these users would choose to recreate elsewhere in response to these views. Similarly, it is highly unlikely that many visitors coming to Ellensburg for cultural attractions (such as visiting museums or galleries, festivals, or the fair and rodeo) would choose not to visit in response to transitory, long-distance views of wind turbines from I-90. In summary, the Desert Claim project is not located in an area of intensive recreational use, the primary recreation attractions in Kittitas County are located at some distance from the Desert Claim project site (and the locations for the other proposed wind projects), and development of the wind energy project is not likely to have a significant effect on the baseline level of recreational and tourism use in the County.

3.11.3 <u>Impacts of the Alternatives</u>

3.11.3.1 Alternative 1: Wild Horse Site

Construction activities for Alternative 1 would not directly affect any existing recreation facilities, as there are no such facilities in or adjacent to the project area. Recreational visitors using the nearby WDFW wildlife areas or the Ginkgo State Park facilities might notice construction activities on the site or project-related construction traffic, including transportation of turbine components, and might be subject to occasional traffic delays or detours. Existing recreational use of the project area, which is limited to hunting with the specific permission of the current landowner, would presumably be displaced to the extent that the construction period coincided with hunting seasons. Project decommissioning would have essentially the same effects on recreation as described for project construction.

Because limited access to the project site for hunting has been permitted in the past and the site is adjacent to WDFW wildlife lands that are used for hunting and wildlife habitat, it is conceivable that some hunting activity would be allowed during the operating period. In fact, the Zilkha proposal for operation of the Wild Horse project would allow some hunting to continue, with specific permission. Under this scenario, the long-term impacts on recreational use of the site would be negligible. If hunting were determined to be incompatible with operation of a wind energy project, access for hunting would not be allowed and the existing hunting use would be displaced. Based on the existing level of use for the WDFW lands, which are likely to attract considerably more activity than the Wild Horse site, if hunting use on the site were displaced it would constitute a minor loss of recreational opportunity.

3.11.3.2 Alternative 2: Springwood Ranch Site

Impacts of Alternative 2 on recreation would be of the same type as those described for the proposed action and Alternative 1, primarily involving temporary displacement of any existing recreational activities during the construction period and probable limitations on selected types of recreation during long-term operation of the project. As discussed in **Section 3.11.1.4**, the Alternative 2 site is privately owned and is not known to be generally available for recreational activities. Some informal recreational use may occur with permission of the landowner.

The primary distinction between Alternative 2 and the other action alternatives concerns recreational activities that occur adjacent to the Springwood Ranch. The Iron Horse State Park/John Wayne Trail passes along much of the northern and eastern edge of the site, as does the Yakima River. Recreational users of the park and the river would experience noise, views of construction equipment and activities, and possibly blowing dust during the construction period. Following construction, users of these resources would be exposed to views of wind turbines and other project facilities at some specific locations. These impacts are discussed in **Section 3.10**.

3.11.3.3 No Action Alternative

Under the no-action alternative the proposed Desert Claim Wind Power Project would not be built. No turbines would be sited and no construction activities would occur. There would be no impacts on the current recreational opportunities within or adjacent to the project area. On-site recreational activities would continue to be allowed, by permission of landowners only, as they are now. Off-site recreational opportunities and resources would also presumably continue, as they exist currently. Tourist traffic would not increase due to potential interest in the wind power turbines.

3.11.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.11.5 Mitigation

The impact analysis did not identify significant adverse impacts on recreation resources and no mitigation measures are required or identified for consideration.

3.11.6 Significant Unavoidable Adverse Impacts

The construction or operation of the proposed project is not expected to create any significant adverse impacts to recreation. The expected effects of the Desert Claim Wind Power Project on recreational activities and opportunities would be limited to possible ambient noise and congestion in some locations during construction, the potential elimination of the possible opportunity for permission-only hunting on project-area lands, possible minor distraction or annoyance effects on recreational users of adjacent lands, and the creation of a possible point of interest for tourists visiting the area. The possible increase in traffic due to the proposed project is discussed in more detail in **Section 3.12** (**Transportation**) of this document. While these impacts would be unavoidable, as discussed in **Section 3.11.2** they would not be significant and/or would not be adverse.

3.12 GROUND TRANSPORTATION

3.12.1 <u>Affected Environment</u>

3.12.1.1 Existing Project Vicinity Road Network and Traffic Controls

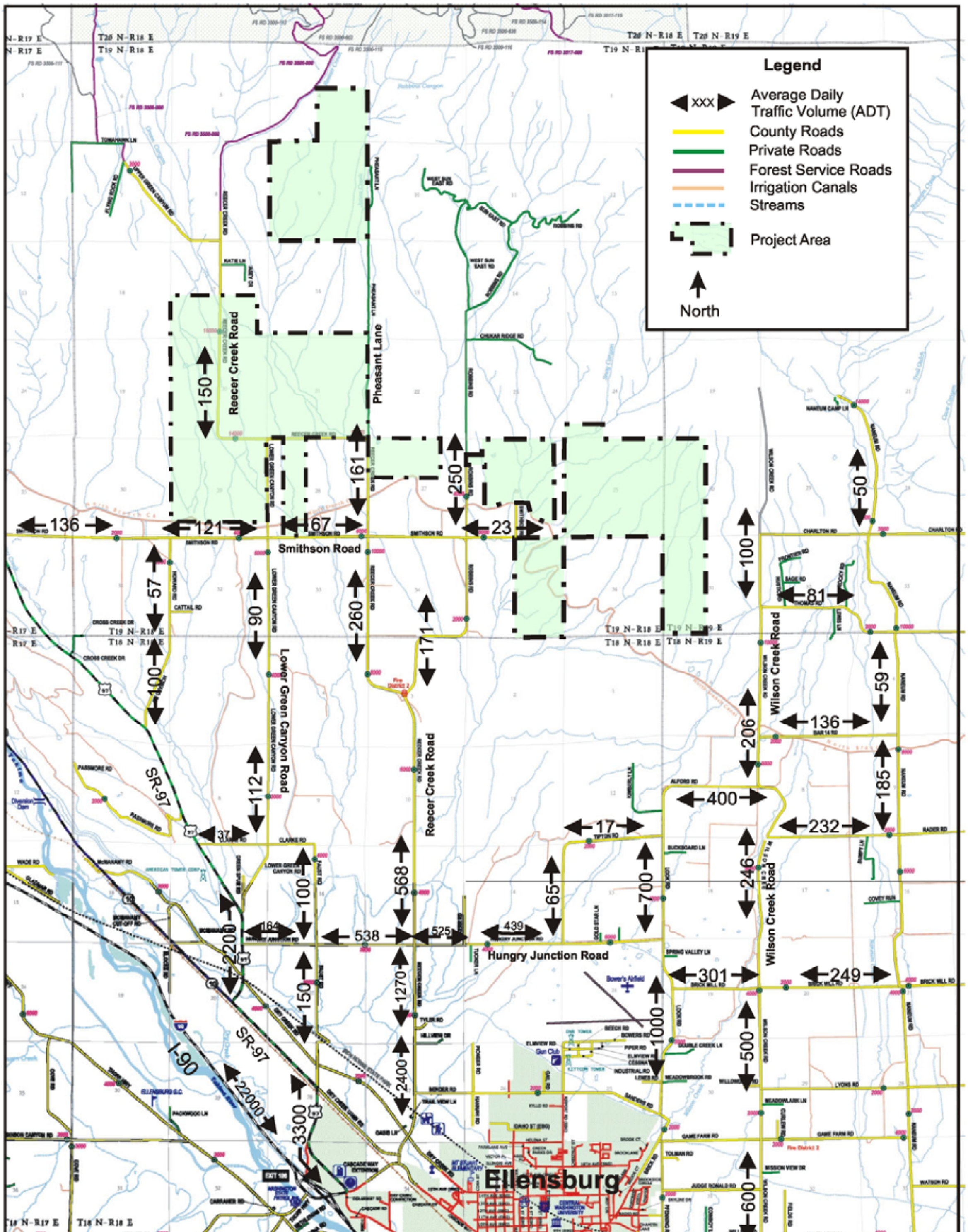
The Desert Claim project area is served by a discontinuous system of two-lane county roads. Most paved road segments are approximately 20 feet in width with gravel shoulders of varying widths. The road network is organized in a north-south and east-west grid pattern that generally follows township and section lines. Speed limits range from 25 miles per hour (mph) to 45 mph.

The road network primarily serves existing agricultural and rural residential land uses. These land uses are typically accessed via dirt or gravel private roads and driveways that intersect the county road system. The road network appears to be well maintained and in good condition.

Key elements of the road network in the project area and the surrounding portion of the Kittitas Valley include the following (see **Figure 3.12-1**):

> **Interstate 90** (I-90) is a fully–controlled, limited-access freeway that provides regional and instate access to Ellensburg and the project area. Near Ellensburg, it is classified by the Washington State Department of Transportation (WSDOT) as a rural interstate and has a posted speed limit of 70 mph. In the vicinity of Ellensburg, I-90 has two travel lanes in each direction and an average daily traffic volume (ADT) of 22,000 vehicles.
>
> **State Route 97** (SR-97) connects I-90 and Ellensburg with SR-2 to the north. In the vicinity of the I-90 interchange and the Dolarway Road/Cascade Way Extension intersection, SR-97 is classified as a principal arterial and is a fully-controlled, limited-access highway. North of the intersection area, SR-97 is classified as a rural principal arterial.
>
> **Smithson Road** is a two–lane, paved county road oriented east-west that provides access to the western portion of the project area from SR-97. Smithson Road terminates just east of its intersection with Robbins Road.
>
> **Reecer Creek Road** is a two–lane, paved county road oriented north-south that provides access between Ellensburg and the western portion of the project area. This road becomes an unpaved Forest Service road (Road 35) to the north of the project area and provides access to national forest lands.
>
> **Wilson Creek Road** is a two–lane, paved county road oriented north-south that provides access between Ellensburg and the eastern portion of the project area.
>
> **Hungry Junction Road** is a two–lane, paved county road oriented east-west that provides the most northerly access between SR-97, Reecer Creek Road, and Wilson Creek Road. It should be noted that Hungry Junction Road has a relatively steep climb just west of its intersection with Tipton Road.

All intersections within the study area are controlled by either all-way or two-way stop signs.



Source: Kittitas County Public Works, 2003

Huckell/Weinman Associates, Inc. HWA	**Kittitas County Desert Claim Wind Power Project EIS**	**Figure 3.12-1** **Existing Road Network and Average Daily Traffic Volumes**

3.12.1.2 Existing Traffic Volumes

Existing average daily traffic volumes (ADT) for the local road network (Kittitas County Public Works, 2003a) are also illustrated in **Figure 3.12-1**. The segment of SR-97 immediately north of its junction with I-90 has an ADT volume of approximately 3,300 vehicles. The ADT on SR-97 drops to 2,200 vehicles immediately north of its junction with SR-10. The ADT on I-90 is 22,000 vehicles immediately west of the I-97 interchange.

Traffic volumes on county roads within the project area are relatively low and well within the capacity of the road network; they tend to average from 25 to 160 vehicles per day. Volumes on road segments near the City limits of Ellensburg tend to average between 1,000 to 2,400 vehicles per day. The design capacity of these road segments is approximately 1,000 to 1,200 vehicles per *hour*.

3.12.1.3 Existing Traffic Operations

Because of the relatively low traffic volumes on county roads and at intersections, it may be assumed that volume to capacity ratios for the affected facilities are very low and that road segments and intersections operate at an acceptable level of service (LOS). Peak hour traffic volumes typically occur during the PM peak hour commute period of 4 to 6 PM and approximate 10 percent of the daily volume. It follows that PM peak-hour volumes on county roads within and adjacent to the project area would range from 16 to 240 vehicles per hour. A level-of-service (LOS) analysis for a two-lane road segment incorporates vehicle volumes, lane width, shoulder width, vehicle speed, terrain, number of access points, and vehicle mix, as well as other factors. These factors are input into a mathematical model that computes the percent time-spent-following another vehicle. These percentages are divided into level of service categories that range from LOS-A to LOS-E to provide a simple mechanism to convey the operational performance of a road segment. LOS-A represents a free flowing condition where the time-spent-following is less than or equal to 40 percent, while LOS-E reflects a breakdown in traffic flow where the time-spent-following is greater than 85 percent.

Road segments that currently have a peak hour volume of 20 vehicles operate at LOS-A with a time-spent-following rate of 3.5 percent. Busier road segments with a peak hourly volume of 240 vehicles have a time-spent-following of approximately 21% but remain at LOS-A. The peak hourly volume would have to exceed 500 vehicles for the LOS to drop to LOS-B.

Intersections in the vicinity of the project are typically controlled by stop signs on the minor approaches (two-way stop controlled). The intersection of Reecer Creek Road with Hungry Junction Road is used to illustrate intersection operations in the area. PM peak hour volumes were extrapolated from the daily volumes presented in **Figure 3.12-1** to complete a sample LOS analysis. Based on this extrapolation, it is assumed that the northbound approach carries 80 vehicles and the southbound, eastbound, and westbound approaches each carry approximately 28 vehicles during the PM peak hour. The LOS analysis concludes that the stop-controlled approaches would both operate at LOS-A with slightly less than 10 seconds of average delay per vehicle. Given the low volume of traffic on these roads, it may be assumed that other intersections with similar peak hour traffic volumes also operate at LOS-A.

In general, it may be concluded that traffic operations in the area are very good and vehicles experience minimal delays on road segments and at intersections. This is primarily due to the relatively low traffic volumes.

3.12.1.4 Other Transportation Modes

The Kittitas County Airport (Bowers Field) is located immediately north of Ellensburg and south of the project area. It is classified as a Stage 1 airport and accommodates approximately 55,000 takeoffs and landings per year (Bucher, Willis & Ratliff 2004). Air traffic conditions and impacts are discussed in detail in **Section 3.13**.

The Burlington Northern/Santa Fe Railroad (BNSF) operates rail lines that carry freight through Ellensburg on a daily basis. There are a number of rail spurs in the vicinity of Ellensburg to accommodate local demand for freight service. Passenger service is currently not available, but could be provided in the future if current State of Washington planning efforts conclude it is economically feasible and funding for the service is secured.

3.12.1.5 Wild Horse Site (Alternative 1) Baseline Conditions

The Wild Horse site is located in a rural area with low population density to the northeast of the town of Kittitas. Access to the project site itself is by gravel roads that are privately owned and not open to general public access. Key transportation routes in the vicinity include I-90, approximately 4 miles to the south of the site; the Old Vantage Highway, a County road located 2 miles to the south; and No. 81 Road, a County road that extends north from Kittitas to the Old Vantage Highway. I-90 interchanges nearest the site are located at Kittitas (approximately 10 miles to the west) and Vantage (9 miles east).

Traffic volumes on this segment of I-90 are approximately 15,000 vehicles per day, somewhat lower than reported in **Section 3.12.1.1** for the area west of Ellensburg. The ADT volume for the Old Vantage Highway ranges from approximately 1,100 to 1,500, depending on location. The major roadways in the vicinity of the Wild Horse site currently operate at LOS C or better.

3.12.1.6 Springwood Ranch Site (Alternative 2) Baseline Conditions

The Springwood Ranch site is situated approximately 7 miles northwest of Ellensburg. The road network serving this area includes I-90, SR 10, Thorp Prairie Road and the Thorp Highway. I-90 passes near the southwestern side of the property for several miles, with two travel lanes in each direction. Thorp Prairie Road generally runs parallel to the freeway and immediately adjacent to Springwood Ranch. Just east of the site, Thorp Prairie Road becomes Taneum Road, which links with the Thorp Highway and the unincorporated community of Thorp. In the site vicinity, Thorp Prairie Road consists of two lanes with two-foot wide shoulders and ditches on both sides of the road. The posted speed limit is 45 mph. The Thorp Highway abuts the southeastern part of the site. SR 10 parallels the northern/eastern side of the property, on the opposite side of the Yakima River, for several miles.

Traffic controls at the I-90 ramps for Elk Heights Road consist of stop signs. A stop sign is also located at the intersection of Thorp Prairie Road and Elk Heights Road. The roads adjacent to the site serve existing farms and ranches. Counts recorded in 1999 indicated that traffic volumes at these intersections are very low, with weekday afternoon volumes of 5 or fewer vehicles (Kittitas County, 1999), and conditions have not changed significantly in the past few years.

3.12.2 <u>Impacts of the Proposed Action</u>

Transportation impacts resulting from the modified project configuration evaluated in the Final EIS would be essentially the same as for the proposed action evaluated in the Draft EIS. Construction and operation impacts would be the same in type, intensity and duration as described in the Draft EIS. The modified project configuration would result in limited and subtle shifts in the location or extent of potential transportation effects, primarily as a result of some changes in the locations of intersections of the project access road system and existing public roads. In addition, there would be somewhat less project construction activity in the southeast corner of the project area and somewhat more activity in the northwestern portion of the project area. Transportation impacts during construction and operation would remain insignificant with the modified project configuration.

3.12.2.1 Construction Impacts

Potential construction impacts include additional traffic generated by construction workers, the delivery of construction materials, and the transport of wind turbine components that would be assembled on-site.

It is anticipated that during periods of peak construction activity there would be from 80 to 100 workers on site. This workforce could generate as many as 80 inbound trips during the AM peak hour and 80 outbound trips during the PM peak hour. These additional trips would be well within the capacity of the local road network and would not noticeably or significantly affect existing levels of service.

Construction materials such as gravel, concrete, and building materials would be delivered on an intermittent basis throughout the construction period. The delivery of such materials would likely reach its peak during the construction of the internal road network and when the concrete foundations for the turbine towers are poured. The number of truck trips on public roads and the road segments impacted would depend upon the source of the concrete or gravel. Truck trips on public roads would be minimized if gravel was transported from an existing pit near the project area and if a temporary concrete batch plant was located within the project area or at a nearby gravel pit. If the source of concrete and gravel were an existing local supplier (such as Ellensburg Cement Products located on SR-97), delivery schedules for materials would be fall within the daily operations capacity of the supplier and the number of hourly truck trips would be limited by the number of trucks available to deliver material and/or the production capacity of the facilities. The existing concrete production capacity at Ellensburg Cement Products (for example) is 120 cubic yards per hour with a fleet of 12 trucks available for delivery (personal communication). Based upon this facility's production and delivery capacity, truck trips between a concrete and gravel supplier and the project area would not likely exceed 20 trips per hour (10 inbound to the project area and 10 outbound) during periods of peak construction activity.

A system of project access roads is proposed to provide connections to all 120 turbines, the project substation, and other key project facilities. The proposed configuration of the project access road system is shown in **Figure 2-12**. The project roads would connect with the existing public road system at a number of locations including (generally from east to west):

- a point near the east end of Smithson Road;
- a point on Robbins Road approximately one-half mile north of the North Branch canal;
- six points along various sections of Reecer Creek Road; and
- three points on Pheasant Lane.

The project access roads would be one-lane roads with a 15-foot-wide travel surface for straight sections and up to a 20-foot-wide travel surface for curved sections. Project access roads would have a compacted gravel surface. **Figure 2-13** shows a typical cross-section for the project access roads. Existing private roads on the project area properties would be utilized to the greatest extent possible in developing the access road system, so as to minimize the need for new road construction. Gates would be provided where project access roads intersect with county roads or private roads to prevent unauthorized access to the project area.

Detailed plans for the project road system and the connections to county roads would be prepared following micro-siting of the turbines. Project access roads would be designed pursuant to County road standards, and would be constructed in coordination with Kittitas County Public Works and Community Development Services.

Potential short-term impacts resulting from the construction of project access roads would be potential delays or detours necessitated by construction activities on or adjacent to county roads. Construction activities could also require temporary modifications to intersections of county roads to accommodate trucks transporting tower components, and damage to road surfaces could result from transport of components or construction materials.

Kittitas County staff comments (personal communication, D. Surlock, Kittitas County Public Works, March 6, 2003) on the Notice of Application suggested that the applicant construct a public road extension from the intersection of Wilson Creek Road and Charlton Road (near the eastern edge of the project area) west along the section line to Smithson Road (near the middle of the project area) to provide a more direct route for emergency access. Similarly, Kittitas County Public Works comments on the Draft EIS suggested that a road with an east-west orientation should be constructed to allow for fire control and emergency operations between Smithson Road and Wilson Creek Road (see Comment Record 3 in **Appendix I**). The modified project configuration described in detail in **Section 2.2** includes an east-west project access road approximately 2 miles in length extending eastward from Smithson Road, which would serve the purposes indicated in the Kittitas County requests. This road would be accessible for emergency use by public service providers (e.g., the Kittitas County Sheriff's Department and Kittitas County Fire District #2), but would not be open to general public use.

Each wind turbine unit would consist of three tower sections, the nacelle, hub assembly, three rotors, and one controller. The sizes of these components and truck requirements are summarized in **Table 3.12-1;** the shaded cells under the 'Loaded Truck' heading show which truck loads would exceed those limits. All loads transported on WSDOT rights-of-way must be within the legal size and load limits or must have valid oversize and/or overweight permits. Based on the information provided by Desert Claim LLC, all trucks would require WSDOT permits for transporting oversized loads. It should also be noted that the allowable operating hours for such permits are restricted during peak commute periods on segments of I-5 and I-90 in the Puget Sound region. This could further restrict the frequency of truck trips if the turbine components are delivered through western Washington. There is an overheight restriction on eastbound I-90 at Exit 62 (Stampede Pass/Lake Kachess); loads over the legal height of 14 feet are required to bypass this restricted area by exiting the roadway via the eastbound off-ramp and reentering via the eastbound entrance ramp. All loads are anticipated to meet legal axle weight requirements.

In their review comments on the Draft EIS (see Comment Record 2 in **Appendix I**), WSDOT identified six pending highway repair or improvement projects involving SR-97, I-90 and SR-970 that might affect transportation related to the Desert Claim project. Some of these projects appear likely to be completed before Desert Claim project construction would likely begin, while others, if not so completed, might cause delays in transport of project components to the site or influence use of alternative access routes discussed below.

Tower components would likely be transported in three sections of approximately 66 to 75 feet each, with one section per truck. Rotors would likely be transported two or three at a time on one truck. The nacelles and associated components would require slightly more than two additional trucks per turbine. Therefore, there would be approximately 14 truck trips (7 inbound, 7 outbound) per turbine for delivery of turbine components. Delivery of turbine components for the entire project (120 turbines) would require 1,640 trips (820 inbound, 820 outbound). The frequency and duration of these truck trips would be dependent upon the specific construction schedule determined by the applicant and the construction contractor. The ability of the supplier to manufacture and deliver the components might affect the frequency and duration of the deliveries. The ultimate constraint on the frequency of truck trips might be the availability of specialized transporters capable of accommodating the components.

Some of the transporters used to deliver components would be low-slung with approximately 8 inches of ground clearance. These vehicles can accommodate a maximum rise or drop of 6 inches in 50 lineal feet. County roads used as transport routes would have to be inspected to identify road segments that would require grading to provide adequate clearance. Most of the transporters would also require a turning radius at intersections that exceeds that found at a typical county intersection. Turning locations would have to be inspected to determine how intersection would have to be modified to accommodate the turning radius of transporters. It is anticipated that both the inside and outside portions of the turning radii would have to be built up with crushed rock and/or asphalt concrete to provide a wider intersection.

Table 3.12-1
Wind Turbine Component Sizes and Transporter Truck Requirements*

Component (quantity)	Load Size			Loaded Truck				
	Length	Width	Height	Length **	Width**	Height**	Axles	Max Axle Weight (lb)
Nacelle (1)	29’	11’6”	12’8”	111’2”	11’6”	15’4”	11	20,000
Hub (1)	10’5”	10’5”	12’7”	78’	10’5”	14’8”	6	15,500
Rotors (2)	124’	8’8”	9’8”	88’	8’8”	14’8”	6	<20,000
Tower (top)	75’	9’11”	9’11”	95’	9’11”	14’11”	5	<20,000l
Tower (mid)	67’	9’11”	9’11”	99’7”	9’11”	13’2”	7	<20,000
Tower (base)	66’	13’5”	13’5”	99’7”	13’5”	15’7”	8	19,228
Controllers (3)	10’5”	7’8”	10’3”	71’	8’6”	14’1”	5	<20,000
WSDOT Legal Limits				68’	8’6”	14’		20,000

*Note that the numbers presented in this table are approximate and that actual component dimensions might vary depending upon the supplier, and that truck sizes might vary depending upon the transporter combinations used.
**Shaded columns indicate oversize vehicles which will require a permit form WSDOT.

The transport of wind turbine components to the Ellensburg area could be by truck or rail. (Depending upon the turbine model selected by the applicant, the turbine components might be manufactured overseas and shipped by water to a port in the Northwest, likely Seattle or Portland.) If transported to the Ellensburg area by rail, the components would be transferred to trucks at an existing railroad spur.

Transporters would likely exit I-90 at the SR 97 exit on the west side of Ellensburg and use one of three routes to access the project site. The first route would require a left turn through the Dolarway

Road/Cascade Way Extension intersection, continuing northbound on SR 97. From SR 97 transporters would turn right onto eastbound Smithson Road, which accesses the project site. The second route would require trucks to turn onto Lower Green Canyon Road from SR 97 and travel north to the project site. The third route would require transporters to travel further on Cascade Way Extension and turn left (north) onto Reecer Creek Road to access the project site. These three alternatives would provide direct access to the western portion of the project area. Delivery to the eastern portion of the project area could be accomplished via the proposed project access road extending eastward from Smithson Road. Alternatively, the Wilson Creek Road could be used to deliver components to the extreme eastern portion of the project area. The Wilson Creek route would require travel through a more densely populated area where there is a greater probability of encountering overhead structures that do not meet the clearance requirements. There is also not a clear route from I-90 to Wilson Creek Road that avoids populated areas.

Potential impacts associated with the delivery of turbine components include the physical degradation of the road surface, due to the weight and/or required turning radius of the trucks, as well as potential interruptions to general traffic flow resulting from detours or delays necessitated by a transporter's low travel speeds and maneuvering requirements at intersections. It is standard practice for transportation agencies, including WSDOT and Kittitas County Public Works, to require developers to repair roadway damage resulting from their construction activities. Therefore, it is assumed the applicant would be required to restore affected roadways to the condition the road was in prior to the project's construction activities. Therefore, there would be no long-term impacts to the road system.

The combined effects of traffic generated by construction workers, material deliveries, and delivery of turbine components would be minimal for a number of reasons. First, trips generated by construction workers and deliveries should not overlap because workers are typically on-site before deliveries begin and leave after the last delivery of the day. There is the potential of material deliveries and turbine deliveries overlapping. However, because turbine component deliveries would have to be scheduled and tightly controlled, it is feasible to communicate with and coordinate material deliveries so they use alternate routes or schedules to avoid potential conflicts with deliveries of turbine components.

The combined effects of trips generated by workers or deliveries would not affect the level of service at intersections or along road segments. The volume of project-generated trips combined with existing traffic would not be sufficient to cause a change in the level of service on existing public roads near the project. However, the delivery of turbine components would cause temporary delays resulting from the lower speed of the transporters and their turning requirements.

If project construction occurred in phases, the probable effect on the level of ground transportation impacts would be to extend the total duration of temporary disturbance from project construction, but also to reduce the intensity or magnitude of impacts for any individual phase. Construction would likely be phased for separate geographic portions of the project area, in which case specific areas of the existing road network probably would not be affected repeatedly by all phases of construction activity. Even in a phased-construction scenario, construction–related ground transportation impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant.

3.12.2.2 Operational Impacts

Project Activities

In operation, the Desert Claim project would employ approximately 10 people to maintain the turbines and related facilities. Employees would generate up to 10 inbound trips during the AM peak hour and 10 outbound trips during the PM peak hour. Additional trips generated by service and supply deliveries would be occasional and negligible in volume. The traffic directly associated with project operations and maintenance would not impact existing levels of service on public roads in the project vicinity.

Tourist Activity

It is anticipated that the presence of the wind farm could generate some level of interest that would draw tourists to the area and increase traffic volumes on roads adjacent to the project area. Several operating wind energy facilities were contacted in order to better understand potential tourist interest in wind farms and the facilities that wind farm operators provide to accommodate tourists. Information gathered from projects around the country (projects near Altamont Pass and Palm Springs, California, the Stateline project near Walla Walla and the Green Mountain project in Pennsylvania) as well as a few outside of the U.S. is summarized below.

Many existing wind farms do not experience significant tourist interest because they are in remote locations. Others, however, are marketed as tourist attractions and provide a range of services to accommodate visitors. A number of factors determine the level to which these projects provide accommodations for visitors, including:

- proximity to heavily traveled roadways;
- proximity to large population centers;
- proximity to other tourist attractions; and the
- type of tourists visiting the area.

Some existing wind farms are located near heavily traveled roadways and in existing tourist-driven settings, and therefore provide a more developed level of visitor services. Wind Mill Tours of Palm Springs, California, for example, provides large parking lots with the ability to accommodate multiple tourist buses and recreational vehicles. The operation also includes tour guides, a gift shop, and other accommodations that would be expected of a major tourist attraction. Wind Mill Tours has been marketed as a stand-alone tourist destination, and the Clean Power Now Organization estimates that 10,000 to 12,000 tourists visit Wind Mill Tours every year.

Some wind farms that are not heavily advertised and are not located near heavily populated areas have still taken tourism into account. The Codrington Wind Farm in Australia, for example, provides what is termed a “roadside car-park” where tourists can safely pull off of the roadway, park their vehicles, and view the wind farm from a platform. Codrington Wind Farm also provides close-up tours, via a mini-bus, which departs from the car-park.

A number of organized wind farm tours in the United States are associated with educational institutions. Most tours of the Stateline Wind Energy Center, a large wind farm southwest of Walla Walla, Washington, begin and end at the Whitman College campus, located in Walla Walla. Civic promotional programs implemented by local chambers of commerce will often include neighboring wind farms as part of their list of tourist attractions.

Given that the Desert Claim project would be visible from portions of I-90 and SR-97 and that the Ellensburg area currently experiences significant tourism activity, it is possible that the Desert Claim project would generate some amount of tourist interest. In addition, Central Washington University and local schools could contribute interest in educational trips to the wind farm. Additional tourist trips could also occur if community interests actively promoted the wind farm as a tourist destination along with other Ellensburg-area tourist activities and attractions.

While it is assumed that the Desert Claim project would draw tourists, the level of future tourist activity cannot be specifically predicted. Based on project size and setting characteristics, none of the operating projects contacted for tourism information represents a comparable facility that could be used as a benchmark for projecting a level of tourist activity. It is reasonable to assume that potential visitation to the Desert Claim project would be considerably less than the 10,000 to 12,000 annual visitors reported for the Wind Mill Tours operation, however, because that operation is specifically developed and marketed to serve tourists visiting a heavily-developed wind energy area with multiple operating projects.

Tourists stopping in the roadway or attempting to turn around on narrow public roads near the Desert Claim project could create a potential safety concern. Safety concerns could be addressed by providing directions for tourists along specific roads adjacent to the project area and installing facilities along this route to provide short-term, off-road parking, viewing opportunities and interpretive information. One or two road-side stops that provide parking for a minimum of 10 vehicles and are designed to allow recreational vehicles enough maneuvering space to turn around would be appropriate for the project.

An additional option would be to plan a circular tourist route, which could originate at the I-90 interchange on the west edge of Ellensburg and proceed via Reecer Creek Road to Smithson Road to SR-97 and back to I-90. Signage could be provided at key intersections in the area to direct wind farm tourists to this route and provide directions back to Ellensburg and I-90.

3.12.3 <u>Impacts of Alternatives</u>

3.12.3.1 Alternative 1: Wild Horse Site

Construction

Two routes have been proposed for construction and operation traffic to the Wild Horse site. Transporter Route 1 begins in the City of Seattle and heads east on I-90, passes through the town of Kittitas (Main St.), then heads north on No. 81 Road before reaching Old Vantage Highway and the site access point. Roads maintained by the town of Kittitas have the capacity to accommodate lower speed vehicles and are usually used for local residential or agricultural traffic. Therefore, Transporter Route 1 would only 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 on I-90 and passes through the town of Vantage before continuing westbound on Old Vantage Highway to the site access point. 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 overlength delivery vehicles would use Transporter Route 2.

Under this alternative the number of turbines constructed would be approximately the same as the proposed action, so the number of construction workers and trucks delivering materials and tower components would approximately the same as described for the proposed action. Potential impacts of construction include degradation of the road surface caused by trucks delivering tower components. Due to the low existing traffic volumes, roadways in the project vicinity would continue to operate at LOS C or better with the traffic generated by Alternative 1 construction activity. Therefore, Alternative 1 would not have a significant impact on existing levels of service in the local area.

Operation

When operational the facility would likely have the same number of workers on-site as the proposed action. Trips generated by the workers would be similar and they would likely travel through the town of Kittitas to access I-90 if they live outside of the local area. The small number of trips generated by workers would not affect local traffic operations or change the existing levels of service.

The wind turbines would be further from I-90 and likely less visible than the proposed action, and it is anticipated that relatively few travelers on I-90 would leave the freeway to take a close look at the facility. Providing interpretive facilities for tourists would not likely be necessary unless the local community establishes a marketing program to draw tourists from I-90 to the wind farm and local businesses.

3.12.3.2 Alternative 2: Springwood Ranch Site

The Springwood Ranch site is located west of Ellensburg and immediately north of I-90. Under this alternative the northwestern portion of the site would be developed as a wind farm with fewer turbines (40 to 45) than the proposed action (120).

Primary access to the site would be from I-90 at the Elk Heights interchange (milepost 94). This interchange provides access to Thorp Prairie Road, which is adjacent to the west side of the site, and Taneum Road immediately south of the site. The Springwood Ranch site and surrounding area is in agricultural use and has few residences.

Existing traffic volumes at the Elk Heights interchange are extremely low, with fewer than 15 vehicles entering or exiting I-90 during the PM peak hour. The intersection of Elk Heights Road and Thorp Prairie Road (adjacent to the intersection) is estimated to serve around 10 vehicles during the PM peak hour.

Construction

Under this alternative there would be fewer turbines constructed so the number of trucks delivering materials and tower components would be less than with the proposed action. The number of construction workers might be similar to or less than the proposed action, while the duration of construction would be about the same (9 months). Potential impacts of construction include degradation of the road surface caused by trucks delivering tower components. Due to the very low existing traffic volumes the traffic generated by construction would not affect level of service and there would be few opportunities for slow moving trucks delivering turbine components to delay local traffic.

The delivery of turbine components might be more difficult than described for the proposed action due to the physical constrictions of the Elk Heights interchange and the adjacent intersection of Elk Heights

Road and Thorp Prairie Road. In addition, the Thorp Prairie Road has numerous horizontal and vertical curves that might be problematic for transporters with low clearances. If the turbine components were delivered from western Washington, the distance traveled on I-90 would be less than under the proposed action there would be slightly less impact to I-90 traffic. In particular, turbine transporters for Alternative 2 would not be using I-90 in the vicinity of the US 97 interchange.

Operation

When operational the Alternative 2 facility would likely have fewer workers on-site than the proposed action. Trips generated by the workers would be proportionally less than the proposed action and they would not affect the existing level of service at local intersections.

The wind towers would be closer to I-90 than with the proposed action and it is anticipated that some travelers on I-90 would leave the freeway to take a closer look at the facility. In order to avoid tourists making u-turns on county roads with narrow or no shoulders, it would be necessary to construct a turn around and small off-road parking area at a suitable viewpoint on Thorp Prairie Road. Interpretive information could be included at this location.

3.12.3.3 No Action Alternative

If the proposed action is not constructed, the existing land uses would remain and there would likely be a modest growth in the number of rural residences within the project area. This would result in an equally modest growth in average daily traffic volumes. The increase in traffic volumes would not likely be noticeable to the average motorist traveling on the local road network, and would not significantly affect existing traffic operations.

3.12.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.12.5 Mitigation

3.12.5.1 Construction

Construction traffic impacts should be mitigated though the development and approval of a Construction Traffic Management Plan that would address transportation and access concerns during the construction period. The plan would be subject to review and acceptance by Kittitas County and would be incorporated in the development agreement required by Kittitas County's review process for wind power facilities. The review process for development agreement conditions would include other agencies with jurisdiction and expertise (such as WSDOT and the Kittitas County Sheriff's Department). The plan would define access routes and procedures to be used by various types of construction equipment and material shipments, approved hours of operation for construction traffic, safety provisions and other management requirements. The plan would also describe how turbine components would be transported safely and efficiently while minimizing impacts to the local road system. The Construction Traffic Management Plan would confirm or modify the transporter routes examined in the EIS, and provide detailed information on the suitability of the identified road segments to accommodate vehicle loads. It would identify any permanent or temporary improvements to road surfaces necessary to accommodate transporters with low clearances, and any needed temporary improvements to intersections to accommodate the turning radius of transporters.

Gates at project access roads should be set back far enough from the edge of the public road to accommodate the length of trucks entering or leaving the project area so they do not encroach upon the public road when gates are being opened or closed. In addition, the area between the gates and the public roads should be paved in order to keep gravel off of the public road and the pavement edges flared to provide an adequate turning radius for entering and exiting trucks.

The potential cumulative impact associated with turbine components being delivered to different project sites at the same time could be avoided by conditioning the required vehicle permits to limit the number of trips per day or require contractors to coordinate deliveries.

3.12.5.2 Operation

Wind farm operations would likely generate some number of tourist trips to the project area that would need to be accommodated and managed. Monitoring of tourist activity associated with the project would be desirable, since the magnitude of tourism is unknown.

Prior to the beginning of power generation, it is recommended that the applicant prepare a Tourism Management Plan that describes how tourists visiting the site would be accommodated. The goal of the plan would be to encourage and accommodate tourist activity while minimizing the impacts to safe vehicle circulation on constricted county roads. This plan should identify tourist routes, outline a directional and information signage plan, and establish the location and number of roadside interpretive sites that would be constructed and maintained by the applicant. Such sites should be located at viewpoints and distributed so that tourists would not be tempted to make u-turns on county roads or private driveways. Short-term parking should be provided for up to 10 vehicles with adequate space for recreational vehicles to turn around. The plan should also include a description of the interpretive facilities and information that would be provided and site amenities such as picnic facilities or rest rooms. The plan would be subject to review and acceptance by Kittitas County in conjunction with a development agreement. The review process for the development agreement would include other agencies with jurisdiction and expertise (such as WSDOT and the Kittitas County Sheriff's Department).

In review comments on the Draft EIS, Kittitas County Public Works suggested that a tourist kiosk should be located along the SR-97 corridor or along Smithson Road adjacent to the Desert Claim project area. Operation and maintenance of this facility would be a project responsibility, and plans should allow for increased capacity if warranted by increased tourism use.

3.12.6 Significant Unavoidable Adverse Impacts

Development of the Desert Claim Wind Power Project would generate a relatively small increase in vehicle traffic on the local road system during the construction period. It is not likely that this increase in volumes would be noticeable to the average motorist, or would result in a decreased level of service. Physical impacts to roadways from construction disturbance and the transport of turbine components and construction equipment would be mitigated through required terms of the development agreement. Traffic volumes generated directly by project operations and maintenance activities would be negligible. Assuming that a tourism management plan is implemented, potential tourist traffic resulting from public interest in the project is not expected to generate large traffic volumes on local roads, and would not result in traffic interference or safety hazards. Therefore, no significant unavoidable adverse impacts to the local ground transportation system would result from the construction or operation of the project.

3.13 AIR TRANSPORTATION

The proposed Desert Claim Wind Power Project would involve the construction of 120 wind turbine generators within an area between 2.9 to 7.9 nautical miles (NM) north of Bowers Field, the Kittitas County Airport serving Ellensburg, Washington. (All mileage-based distance references in this section are stated in terms of nautical miles; a nautical mile is approximately 6,076 feet, or about 1.15 statute miles.) The proposed height of each turbine structure, from base to blade tip, would be a maximum of 340 feet (approximately 104 meters) above ground level (AGL). The height of the proposed wind turbines and the location of the project relative to Bowers Field raise issues concerning potential conflicts with the airspace used by air traffic to and from the airport.

3.13.1 Affected Environment

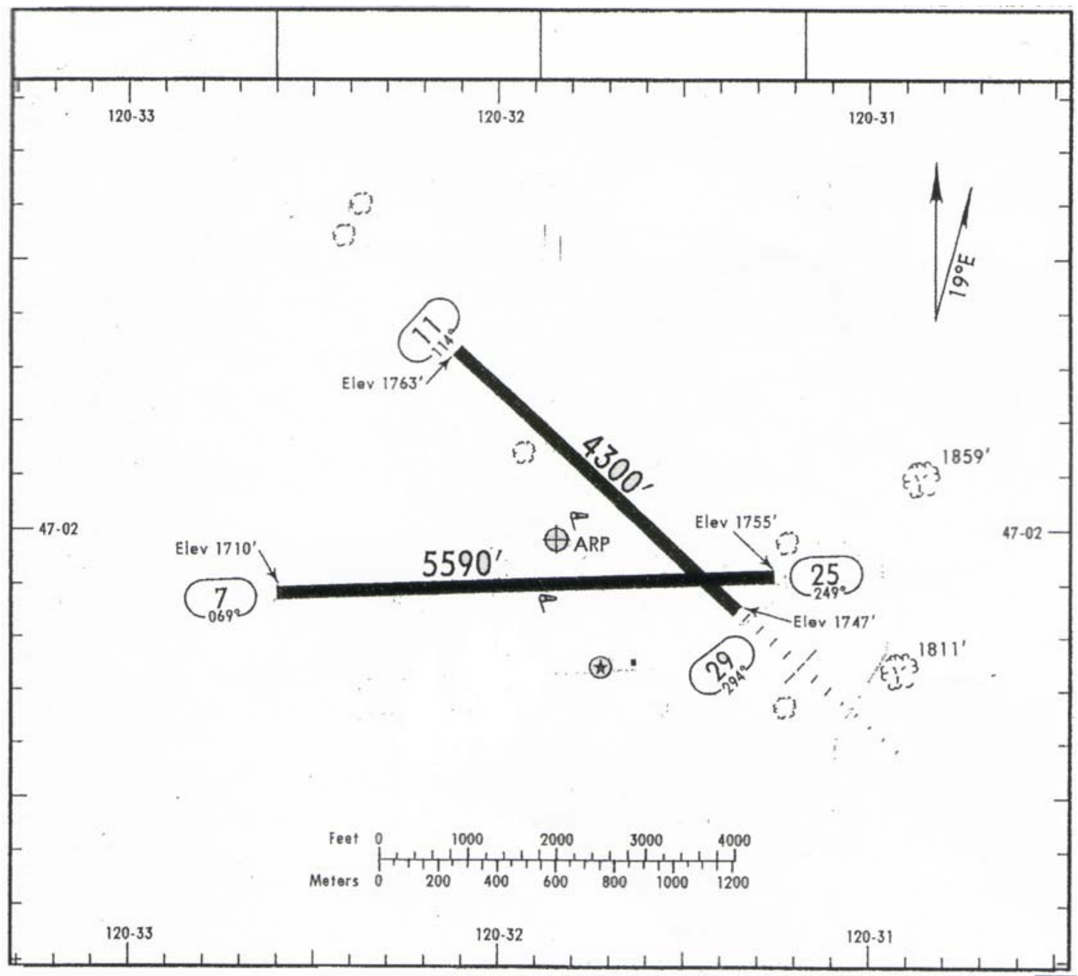
3.13.1.1 Airport Facilities

Bowers Field is a public use, general aviation airport owned by Kittitas County and administered by Kittitas County Public Works (2003). The airport was originally built as a military facility during World War II and was deeded to Kittitas County in 1948. The airport is located 2 miles north of the northern city limits of Ellensburg (at coordinates 47-01-58.900N/120-31-50.500W) at an elevation of 1,763 feet above mean sea level (AMSL). The airport property occupies a total area of 1,240 acres. Ground access to the airport from Ellensburg is via Airport Road and Bowers Road. **Figure 2-2** (see **Section 2.2**) shows the location of Bowers Field relative to Ellensburg and the Desert Claim project area.

Midstate Aviation, a privately-owned firm established as a fixed-base operator (FBO), provides aircraft fueling, parking, maintenance, instruction and charter flight services at Bowers Field (AirNav LLC, 2003). The airport currently serves single-engine, twin-engine, turboprop and business turbojet aircraft. There is no scheduled, commercial flight service at Bowers Field; the nearest available commercial services are located at McAllister Field in Yakima (Kittitas County Public Works, 2003).

The airport has two runway surfaces, both of which are paved, that converge in a V-shaped configuration pointing to the east (see **Figure 3.13-1**). The main runway is designated as Runway 11/29, based on the magnetic heading applicable to an approach/departure course on this runway oriented northwest-southeast. Planes landing or taking off to the northwest on this surface are using Runway 29, while planes landing or taking off to the southeast are using Runway 11. Runway 11/29 has a concrete surface, is 4,300 feet long by 150 feet wide, can accommodate aircraft weighing up to 100,000 pounds, and is equipped with transmitter-activated runway lights that operate from sunset to sunrise (Kittitas County Public Works, 2003). Runway 29 is also equipped with runway end identifier lights (REILs), lead-in lights, distance-to-go markers and Visual Approach Slope Indicators (VASI). A VHF Omni-Directional Range (VOR) transmitter located 2.5 miles east of the airport provides a non-precision approach aid for landing.

Runway 7/25 has an asphalt surface, is 5,590 feet long by 150 feet wide, and follows a west-east orientation (Kittitas County Public Works, 2003). Planes landing or taking off to the west on this surface are using Runway 25, while planes landing or taking off to the east are using Runway 7. This facility is also equipped with distance-to-go markers. Runway 7/25 has a single-wheel weight limitation of 28,000 pounds. This facility is closed from December 15 through February 28 of each year (g.c.r. & associates, inc. 2003), is not maintained during the winter and may be used only during daylight hours the rest of the year. Weeds are reported growing in cracks in the pavement in the first 2,000 feet of Runway 7/25 (AirNav LLC, 2003; g.c.r. & associates, inc., 2003).



Source: Ecology and Environment, Inc.

Huckell/Weinman Associates, Inc. HWA	Kittitas County Desert Claim Wind Power Project EIS	**Figure 3.13-1** **Bowers Field Runway Configuration**

Ground facilities at Bowers Field include a fueling facility, a 20,000 square-foot main hangar, 12 County-owned t-hanger rentals, 10 private t-hanger rentals and 18 tie-downs available from Midstate Aviation. There is no control tower at Bowers Field. Kittitas County has zoned an 80-acre parcel of the airport property for industrial park or commercial development (Kittitas County Public Works, 2003).

Other public air transportation facilities in Kittitas County include the Cle Elum Municipal Airport and the De Vere Field Airport, both located east of Cle Elum. These two public facilities are over 15 miles west of the Desert Claim project area and their areas of protected airspace, as defined by Federal Aviation Administration (FAA) regulations (see discussion below), are well separated from the project area.

There is also a private airport facility, identified as JKD Farms, located about 7 miles southeast of the Desert Claim project area. Comments on the Draft EIS also indicate that another private airstrip, identified as the Flying Rock Ranch, is located near Reecer Creek at an unspecified distance from the project area. The FAA does not protect airspace around private airports. If the JKD Farms airfield were to be treated as a public airport, the area that would be considered protected airspace would still be several miles distant from the Desert Claim project area.

3.13.1.2 Air Traffic Operations

Air traffic operations that are relevant to the impact assessment for the Desert Claim project primarily include operating conditions at Bowers Field and airspace considerations relative to en-route air traffic, approach procedures for air traffic arriving at Bowers Field, and departure procedures for air traffic departing Bowers Field. These topics are discussed under separate headings below.

The Federal Aviation Administration (FAA) issues regulations and procedures that govern aircraft operations at both the national and local levels. Those regulations and procedures typically apply to or specify their applicability to different types of aircraft. Aircraft are defined as Category A, B, C or D aircraft based primarily on their design speed range for approaching airports. **Table 3.13-1** summarizes the four categories and examples of the respective types of aircraft in each. Aircraft categories are discussed subsequently with respect to approach and departure procedures and traffic patterns for visual operations.

Table 3.13-1
Aircraft Categories

Category	Aircraft Type	Example Aircraft
A	single-engine, propeller	Beech Bonanza, Cessna 172
B	light, twin-engine, propeller, turbo-prop, some business jets	Beech Baron and Kingair Cessna 400 series, Cessna Citation
C	many business jets, some commercial jets	newer Lear jets Boeing 737
D	larger business jets larger commercial jets some military jets	Gulfstream II and IV, older Lear jets Boeing 747 and 777

Bowers Field Operating Conditions

Current reports indicate that 52 aircraft are based at Bowers Field. The distribution of these aircraft includes 45 small, single-engine (Category A) aircraft, 4 multi-engine aircraft (likely Category B, or possibly Category C), 2 helicopters and 1 glider (AirNav LLC, 2003; c.g.r. & associates, inc., 2003). The two helicopters are fire-fighting aircraft operated by the Washington Department of Natural Resources (WDNR). No tanker aircraft are based at or operate out of Bowers Field, primarily because of weight restrictions applicable to the taxiways (personal communication, C. Stivers, Midstate Aviation, Ellensburg, Washington, August 11, 2003).

Total aircraft operations at Bowers Field were estimated by one source at 30,945 per year (c.g.r. & associates, inc. 2003), representing an average of 85 operations per day. Locally-based general aviation accounts for a reported 53 percent of the operations, with transient general aviation accounting for 40 percent and air taxi operations for about 6 percent of the operations (AirNav LLC, 2003). Information in the Airport Master Plan Update for Bowers Field (adopted in July 2004) indicates the level of 30,945 annual operations applied to 1998, while operations were reported at 55,000 for the year 2000 and 51,400 currently (Bucher, Willis and Ratliff, 2003). Midstate Aviation administers a certified flight-training program operated by Central Washington University that has an enrollment of approximately 185 students; the aircraft fleet operated by Midstate accounts for approximately 44,000 annual operations. Local users flying aircraft based at Bowers Field account for another 6,500 flight operations per year.

Over the year it appears that approximately 60 to 70 percent of all Bowers Field aircraft operations occur on Runway 11/29 (Bucher, Willis and Ratliff, 2004), with the bulk of that activity on Runway 29. There are a number of reasons for this. The winds at Bowers Field are predominantly from the north and northwest, and Runway 29 most frequently provides the orientation into the wind that is typically preferred for takeoffs and landings. Runway 29 is also the only Bowers Field runway with lighting of any kind. This includes a 2-box Visual Approach Slope Indicator (VASI), medium intensity approach lights, runway end identifier lights and runway edge lights.

The other three runways (11, 7 and 25) account for the remaining operations at Bowers Field, amounting to about 40 percent or less of the annual total. As indicated previously, Runway 7/25 is closed from December 15 through February 28 and is used in daylight hours only the rest of the year. Runway 25, which provides a westerly orientation for takeoffs and landings, is the most frequently used of these three runways. CWU typically designates Runway 7/25 as the active runway for flight training activity during calm wind conditions. Operations on Runway 7, which involve an easterly approach/departure, occur primarily in summer daylight hours when winds are light and variable. Runway 11 is seldom used because local wind conditions typically preclude its operational utility. Based on their operating limitations, the respective proportions of total annual operations are likely in the range of 20 to 30 percent for Runway 25, 5 to 10 percent for Runway 7, and less than 5 to less than 10 percent for Runway 11.

En-Route Traffic

En-route air traffic consists of aircraft operations that are not actively involved in approach or departure procedures associated with an airport facility. The Desert Claim project area underlies a portion of several low-altitude airways used by aircraft flying over Kittitas County, including airways designated as V187, V2 and V298. The minimum authorized en-route altitude for any of these airways is 6100 feet AMSL, as depicted on the published sectional and en-route air navigation charts. Aircraft activity in the local area also includes general aviation operations that are not actively using low-altitude airways. These activities are required to observe standard FAA regulations concerning minimum altitudes above the ground or obstructions on the ground.

Approach Procedures for Arriving Traffic

Aircraft landing at Bowers Field can use either instrument flight rule (IFR) or visual flight rule (VFR) procedures for their arrival. Applicability of IFR or VFR procedures depends upon the equipment in each aircraft, the certification of the pilot and the weather conditions at the time. These arrival procedures are discussed below.

Present Instrument Approach Procedures

There are currently three instrument arrival procedures in use for aircraft approaching Bowers Field. They are depicted in **Figures H1, H2** and **H3** in **Appendix H**, which are reproductions of the approach plates displayed on the published aeronautical charts. All three procedures are initiated from east of the airport and terminate at the airport, or involve missed approaches for which the aircraft turn left (south) and remain south of the airport while circling for another approach. Additional characteristics for these procedures are summarized as follows:

- Instrument Arrival Procedure 1 is a VOR or GPS-A procedure that can be used by Category A and B aircraft for landing on any Bowers Field runway that is active and open.
- Instrument Arrival Procedure 2 is a VOR or GPS-B procedure that can be used only by Category A aircraft for landing on any Bowers Field runway that is active and open.
- Instrument Arrival Procedure 3 applies to a straight-in GPS approach to Runway 25 and a circling approach to any other active and open runway, and can be used by Category A, B, C and D aircraft.

The third instrument procedure (GPS approach to Runway 25) is unusual in several respects. While the procedure can be used by all four categories of aircraft, larger aircraft cannot land on Runway 25 because of the weight limit (28,000 pounds) on that runway; larger aircraft use this procedure for an initial straight-in approach to Runway 25, then circle to land on Runway 29. In addition, this procedure is the only instrument approach procedure that can be used at night by Category C and D aircraft, even though Runway 25 itself cannot be used in darkness.

FAA Order 8260.3B prescribes the U.S. Standard for Terminal Instrument Procedures (TERPs), which defines the protected airspace associated with instrument approach procedures. Given the characteristics of the existing approach procedures, the protected approach airspace is to the east and south of Bowers Field and is well clear of the Desert Claim project area.

Potential Future Instrument Approach Procedures

The Airport Master Plan adopted by Kittitas County in July 2004 indicates there are four additional instrument approaches to Bowers Field that have been proposed. They include straight-in approaches to Runways 25 and 29 and two airport approach (circling) procedures; all four proposed approaches apply to Category A or Category A and B aircraft (Bucher, Willis and Ratliff 2004).

Because all of the existing and proposed approach procedures are initiated from east of Bowers Field, it is conceivable that approach procedures that are initiated west of the field might be developed in the future. In part because flight restrictions associated with the Yakima Training Center intermittently preclude use of the existing instrument procedures, there is local interest in developing additional approach procedures (Bucher, Willis and Ratliff 2003). Any such approaches from the west would only apply to operations using Runways 7 or 11.

Recent discussions with staff based at Bowers Field and FAA staff indicated there are no known plans to develop an instrument approach to Runway 11. Based on the high terrain west of Runway 11 and the limited use of this runway, it is unlikely that an instrument approach for Runway 11 would be developed. Nevertheless, the Kittitas County Airport Advisory Committee indicated there was some interest in possible future development of an instrument approach to Runway 11.

Similarly, there are no known plans to develop an instrument approach to Runway 7. If the FAA at some time issued a future GPS approach to Runway 07, the protected airspace associated with that approach would be to the west of Bowers Field and would not overlie the Desert Claim project area. In that event, it is possible that a transition or initial approach route would overfly the project area. The high terrain north and west of Bowers Field would require approaching aircraft to use altitudes above 6000 feet AMSL over a large portion of the project area, however, and any required descent from this altitude could be easily accommodated over the lower-elevation portion of the project area.

Visual Flight Rule (VFR) Procedures

All aircraft approaching Bowers Field under visual flight rules (VFR) follow a left-hand traffic pattern for all runways, as prescribed by the FAA. That is, normal turns that must be made on approach, either to line up with the runway or to circle to land, are made to the left rather than to the right. A left-hand traffic pattern is the standard FAA prescription for uncontrolled airports, although there are numerous airports around the U.S. for which a right-hand traffic pattern has been adopted to accommodate local conditions.

As is the case for instrument approach procedures, airspace associated with the VFR traffic pattern is protected. FAA Order 7400.2E is the governing policy document that prescribes the traffic pattern airspace dimensions. The size of the traffic pattern airspace is governed by the categories of aircraft that can operate at a given airport. If only Category A aircraft are operating at an airport, the protected VFR traffic pattern airspace would extend for 1.25 mile from the airport on the maneuvering side of any runway. The airspace protection expands to 1.5 miles for Category B aircraft, 2.25 miles for Category C aircraft and 4 miles for Category D aircraft.

Bowers Field is officially considered capable of accommodating Category D aircraft, the highest of the four categories, based on the 100,000-pound weight capacity of Runway 11-29 (and as indicated by the specifications for the GPS approach procedure for Runway 25). The width of the traffic pattern for Category D aircraft extends for 4 miles from the airfield on the maneuvering (turning) side. Consequently, depending on runway use, the largest area of the traffic pattern would extend 4 miles to the south or to the north of Bowers Field. Staff from the fixed-base operator at Bowers Field indicated that most of the traffic within the pattern actually remains within approximately 1 mile on either side of the airport, because virtually all aircraft using Bowers Field are Category A and B aircraft. Nevertheless, the applicable FAA criteria protect airspace around Bowers Field out to 4 miles to serve the possible or occasional use by the larger aircraft.

Airspace protection within the specified distance range does not extend upward from the ground level throughout the two-dimensional extent of the protected zone. Instead, the protected airspace is a three-dimensional volume that has a floor elevation that reflects a sliding scale based on elevation above the ground and distance from the runway. FAA Order 7400.2E also specifies obstruction standards that apply to tall structures that might penetrate this traffic pattern airspace. The obstruction standard criteria are related to the runway elevation, the distance from the structure to the runway and the total height of the obstacle, as discussed in more detail in **Section 3.13.2**.

Departure Procedures

Aircraft departing under visual flight rules (VFR) can climb, turn and depart the Bowers Field Air Traffic Area in any direction they choose to commence the en-route portion of their flight. However, instrument flight rule (IFR) departures flown under actual instrument conditions must conform to the departure procedures published by the FAA.

The FAA (2003) recently issued Notice to Airmen (NOTAM) FDC 3/9524, effective October 30, 2003, which announced the adoption of a new Instrument Departure Procedure for Bowers Field. An earlier departure procedure had been cancelled through a previous NOTAM issued during 2002. The new procedure adopted by the FAA reads as follows:

> (1) TAKEOFF MINIMUMS:
> RWY 7, 11: 4600-3 or standard with minimum climb of 290 feet per NM to 7800.
> RWY 25: 4700-3 or standard with minimum climb of 340 feet per NM to 7800.
> RWY 29: 4600-3 or standard with minimum climb of 320 feet per NM to 7800.
>
> (2) TEXTUAL DEPARTURE PROCEDURE
> RWY 7, 29: Climbing right turn direct ELN VORTAC
> RWY 11, 25: Climbing left turn direct ELN VORTAC
> All aircraft continue climbing in the ELN VORTAC holding pattern (W, Right Turns, 087.41 inbound) to MEA/MOCA for route of flight.

Under this procedure, aircraft departing to the east on Runway 7 make a climbing right turn to the south, aircraft departing to the northwest on Runway 11 make a climbing left turn to the southwest, and those departing to the west on Runway 25 make a left turn to the south. Consequently, this procedure requires all IFR aircraft departing Bowers Field on Runways 7, 11 and 25 to stay well to the south of the Desert Claim project area.

With respect to Runway 29, the procedure directs aircraft departing to the northwest to make a climbing right turn, taking them to the northeast and over the Desert Claim project area. The procedure includes a minimum climb gradient of 320 feet per mile up to an altitude of 7,800 feet, however, which also requires the aircraft to be above the obstacle clearance minimums specified in the TERPs (see previous and subsequent discussion). The end of Runway 29 is at elevation 1,763 feet. At 3 miles from the end of the runway, for example, the minimum climb gradient restriction for Runway 29 requires all aircraft to be at an altitude of at least 2,723 feet. The prescribed climb gradient essentially defines a floor elevation for the protected airspace associated with the departure procedure, although the TERPs also require a minimum clearance above obstructions in the area.

3.13.1.3 Alternative 1 and 2 Sites

Alternative 1: Wild Horse Site

Baseline conditions with respect to air transportation for the Wild Horse site are, in general, the same as or very similar to those described previously for the Desert Claim project area. The primary difference between the sites concerns their geographic relationship to Bowers Field and air traffic using that facility.

The western edge of the Wild Horse site is located 13 miles due east of Bowers Field. Ground elevations within the site range from approximately 2,700 to 3,700 feet above sea level, or 1,000 to 2,000 feet higher than Bowers Field. The Wild Horse site underlies several low-altitude airways used by aircraft flying over Kittitas County, as discussed previously for the Desert Claim site. Similarly, aircraft traveling to Bowers Field under instrument flight rules typically fly over or near the Wild Horse site on approach to Runways 29 and 25. Aircraft departing Bowers Field under instrument flight rules would make turns to the south, southwest or northeast, and would not overfly the Wild Horse site as a part of the departure procedure. The airspace protected under the existing left-hand VFR traffic pattern extends 4 miles to the east from Bowers Field, and therefore ends approximately 9 miles from the Wild Horse site.

Bowers Field is the closest public airport to the Wild Horse site. The JKD Farms private airfield (discussed previously) is located approximately 8 miles to the southwest of the Wild Horse site. There is no protected airspace associated with this facility.

Alternative 2: Springwood Ranch Site

Baseline conditions with respect to air transportation for the Springwood Ranch site are similar to those described previously for the Desert Claim project area. The primary difference between the sites concerns their geographic relationship to Bowers Field and air traffic using that facility.

The eastern edge of the Springwood Ranch site is located 8 miles northwest of Bowers Field. Ground elevations within the site range from approximately 1,700 to 2,300 feet above sea level, or up to about 500 feet higher than Bowers Field. The Springwood Ranch site also underlies low-altitude airways used by aircraft flying over Kittitas County, as discussed previously for the Desert Claim site. Aircraft traveling to Bowers Field under instrument flight rules typically would not fly over or near the Alternative 2 site on approach to Runways 29 and 25. Aircraft departing Bowers Field under instrument flight rules would make turns to the south, southwest or northeast, and would not overfly the Springwood Ranch site as a part of the departure procedure. The airspace protected under the existing left-hand VFR traffic pattern extends 4 miles to the west from Bowers Field, and therefore ends approximately 4 miles from the Springwood Ranch site.

The Cle Elum Municipal Airport and DeVere Field are located approximately 7 miles and 5 miles, respectively, from the northwestern corner of the Springwood Ranch site. Any protected airspace associated with these facilities would not overlap with the project area for Alternative 2.

3.13.2 Environmental Impacts of the Proposed Action

The proposed locations for the 120 turbines to be constructed as part of the Desert Claim project range in elevation from 2,001 feet to 3,629 feet above mean sea level; 96 of the turbines (80 percent of the total) would have a base elevation of less than 2,400 feet. The turbines would all be 340 feet in height, resulting in total above-sea-level structure heights ranging from 2,341 feet to 3,969 feet. **Table H1** in **Appendix H** identifies the site elevation and total height above mean sea level (ground elevation plus structure height) for all proposed Desert Claim wind turbines. The location, base elevation and height of the proposed wind turbines in relation to the FAA obstruction standards would determine whether the project would present a potential conflict with protected airspace. Because of their height, the proposed turbines would also be subject to FAA marking and lighting requirements. The airspace and marking and lighting issues are discussed separately below.

3.13.2.1 Airspace Issues

In the performance of the EIS analysis, regulatory standards were considered pertaining to objects affecting navigable airspace as prescribed by FAA Federal Aviation Regulation (FAR) Part 77. These standards included FAA Order 8260.3B, the U.S. Standard for Terminal Instrument Procedures (TERPs); FAA Order 7400.2E, Procedure for Handling Airspace Matters; and FAA Advisory Circular 70/7460-1K, Obstruction Marking and Lighting.

FAR Part 77 establishes the criteria according to which FAA notification requirements and obstruction standards are determined. The maximum no-notice height (the maximum structure height for which notice to the FAA is not required) is 200 feet above ground level (AGL). Based on this criterion, the Desert Claim project applicant would be required to notify the FAA of the proposed locations for all of the turbines, as all turbines would exceed the notification limit. A few of the turbines (10 total, identified in **Table H1** of **Appendix H**) located within 6 NM of Bowers Field also would exceed the obstruction standards of paragraph 77.23 (a.)(2), which would require the FAA to conduct an extended study of the proposed project.

Exceeding the obstruction standard requires only that the FAA conduct an extended study, however, and in and of itself does not show a negative impact on the protected airspace. Rather, the existence of potential airspace impacts depends on whether any of the proposed structures would penetrate airspace protected by the FAA. Normally, the FAA would classify structures that would require a change to an existing or planned IFR minimum flight altitude, a published or special instrument flight procedure, or an IFR departure procedure for a public-use airport as a “Hazard to Air Navigation.” In this case, the only negative airspace impact from the proposed project is the penetration of the protected VFR traffic pattern airspace by 10 wind-turbine structures, which are also identified in **Table H1**.

Potential airspace impact issues apply to the various components of air traffic operations, which include en-route traffic, arriving traffic and departing traffic. Based on the existing conditions described in **Section 3.13.1**, the following discussion addresses the relationship of the proposed project to these air traffic operations.

En-Route Traffic

As indicated previously, the Desert Claim project area underlies a portion of several low altitude airways. The lowest protected airway level depicted on en-route and sectional charts is 6100 feet AMSL, while the maximum proposed structure height within the project area is 4,078 feet AMSL. Consequently, the minimum authorized en-route altitude for each airway exceeds the maximum structure height by more than 2,000 feet. This margin is well above the obstacle clearance level of 1,000 feet that would be required by FAA regulations, and allows for an additional clearance buffer of more than 1,000 feet. Therefore, there would be no identifiable project impacts on en-route air traffic.

Approach Procedures

Three instrument arrival procedures are currently in use for Bowers Field (see **Figures H1** through **H3),** as discussed in **Section 3.13.1.2.** As indicated, all approaches using these procedures are initiated from east of the airport and terminate at the airport, or have missed approaches that turn left and remain south of the airport. Because all traffic using these existing procedures remains east or south of Bowers Field and well clear of the Desert Claim project area, the proposed wind turbines would be in accordance with TERPs criteria regarding obstructions and would not be in conflict with arriving aircraft operating under existing IFR procedures. Similarly, the four proposed procedures recently identified involve approaches to Runway 25 or 29 from the east or south, and the Desert Claim project would have no influence on the viability of these potential new approaches.

Section 3.13.1.2 also addressed the possibility that new instrument procedures involving approaches to Bowers Field from the west might be developed in the future. One prospective future instrument arrival procedure identified would involve an approach to Runway 7 from the west. While a GPS approach to Runway 7 would not overlie the Desert Claim project area, it is possible that a transition or initial approach route would cross the project area. The surrounding terrain would require aircraft to remain at altitudes above 6,000 feet AMSL over a large portion of the project area, however, indicating the required minimum altitude would provide a clearance buffer of more than 1,000 feet above the elevation of the turbines. Therefore, the proposed turbines would not exceed the TERPs standards and there would not be a potential impact on protected airspace that might be associated with a hypothetical future instrument approaches to Runway 07.

The Kittitas County Airport Advisory Committee indicated there was some interest in possible future development of an instrument approach to Runway 11, and concern over possible influence of the Desert Claim project on such an approach. In response, County EIS consultant staff from Aviation Systems, Inc. investigated a potential instrument approach to Runway 11. Based on professional experience and knowledge of FAA requirements for such procedures, Aviation Systems specified a hypothetical straight-in instrument approach to Runway 11. The analysis concluded that the minimum altitude at a final approach waypoint 5 miles west of the airport would need to be 4,000 feet AMSL, which would be well above the elevation of any of the nearest Desert Claim turbines (see **Figure H4** in **Appendix H**). Therefore, Aviation Systems concluded that the Desert Claim project would have no impact on the airspace for that approach, and would not preclude development of a straight-in instrument approach to Runway 11 based on standard FAA protocol.

In summary, the EIS impact analysis examined prospective future instrument arrival procedures for Bowers Field. Although instrument approaches to either Runway 7 or Runway 11 are considered to be unlikely candidates for future adoption, the Desert Claim Wind Power Project would not have an adverse impact on such approaches to either runway.

Instrument Departure Procedures

A new FAA-approved instrument departure procedure for Bowers Field air traffic became effective October 30, 2003, as discussed in **Section 3.13.1.2**. The FAA previously issued a notice that the former procedure was unusable and cancelled it in 2002.

The protected airspace associated with operations on Runways 7, 11 and 25 under the new procedure is located well to the south of the Desert Claim project area. Therefore, the project would have no impact on operations using the instrument procedure for departures from Runways 7, 11 and 25.

The new procedure directs aircraft departing Bowers Field on Runway 29 to make a climbing right turn, taking them to the northeast and over the Desert Claim project area. The project facilities would represent a conflict with this procedure only if the turbines exceeded a height at which departing aircraft at the minimum altitudes indicated by the procedure would not have sufficient obstacle clearance. The minimum altitudes corresponding to the climb rate prescribed by the new procedure include 2,083 feet at 1 NM from the end of the runway, 2,403 feet at 2 NM, 2,723 feet at 3 NM, 3,043 feet at 4 NM, and so on (increasing at a rate of 320 feet in altitude per NM of distance). At these minimum altitudes, aircraft must still have an obstacle clearance margin calculated at a rate of 48 vertical feet per NM of distance. The total elevation of a wind turbine located 3 NM northeast of the end of the runway, for example, would need to be at least 144 feet (48 feet times 3 miles) below the minimum altitude of 2,723 feet (i.e., no higher than 2,579 feet) to avoid conflicting with the departure procedure.

From the location and elevation data for the proposed wind turbines (in **Table H1**), it can be determined that none of the proposed turbines would conflict with protected departure airspace for operations using Runway 29. Turbine 120 for example, would be located 3.05 NM from the end of Runway 29 and would have a total finished elevation of 2,341 feet; this is well below the maximum allowable height of 2,579 feet relative to the departure procedure airspace at this location (although this turbine would exceed the obstruction standard relative to the VFR traffic pattern, as discussed subsequently). Similarly, Turbine 80 would have a total elevation of 2,459 feet at a location nearly 4 NM from the runway, where the maximum allowable height would be 2,851 feet. In summary, all of the proposed turbines would have a total finished elevation that remained below the maximum allowable height, based on the required clearance margin and minimum altitudes for instrument departures from Runway 29. Therefore, the project would have no impact on Bowers Field operations using the instrument departure procedure.

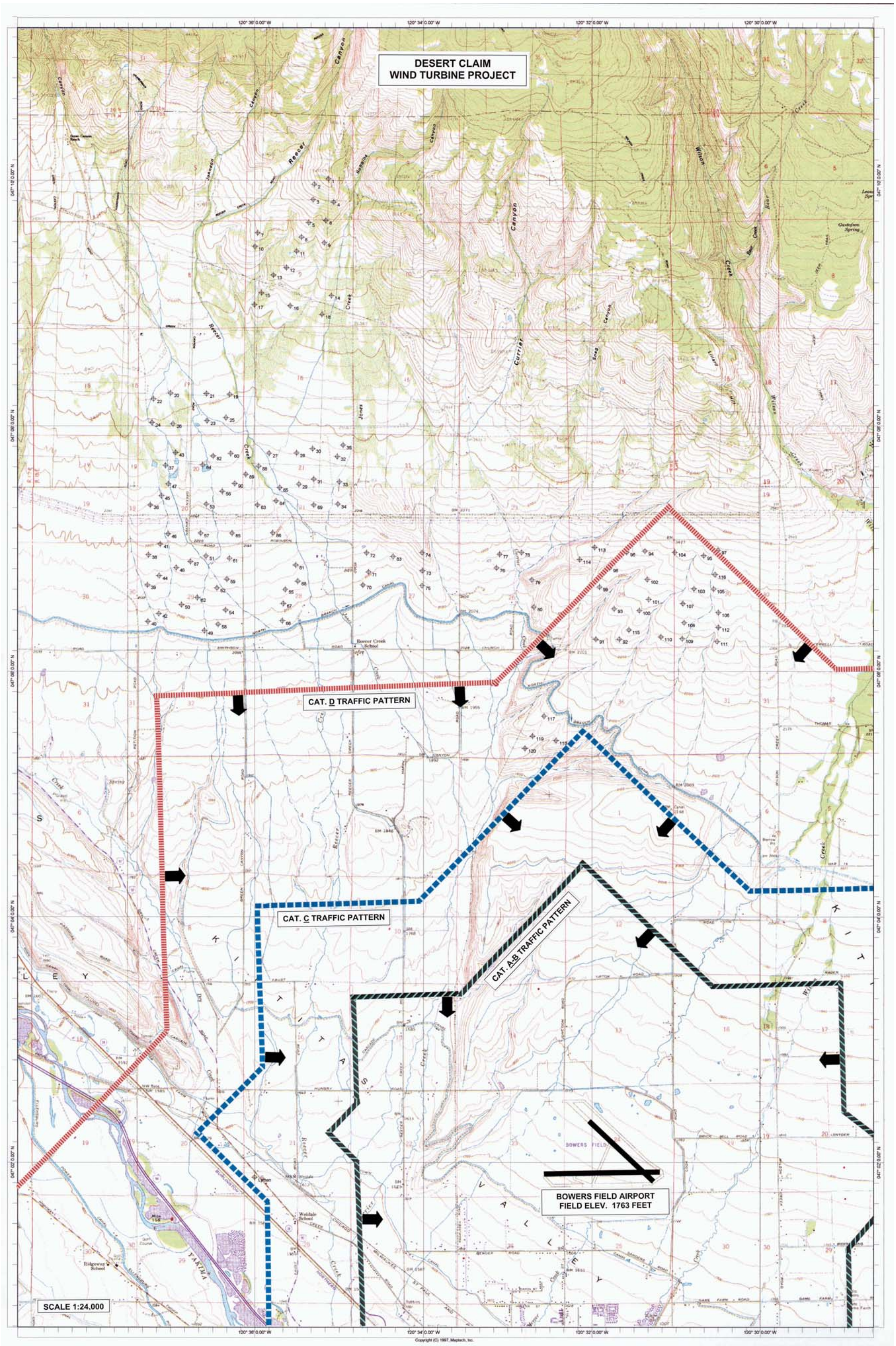
VFR Traffic Pattern

VFR operations at Bowers Field currently use standard left-hand traffic patterns for all runways, as discussed in **Section 3.13.1.2**. **Figure 3.13-2** shows the two-dimensional area around the airport that is within the VFR traffic pattern, based on the type of aircraft that might use Bowers Field. The protection of traffic pattern airspace out to 4 miles is based on the potential or occasional use of the airport by Category D aircraft, as indicated by the weight capacity of Runway 11-29 and the instrument approach procedure for Runway 25 that allows use by all four categories of aircraft. **Figure 3.13-2** also shows the lateral extent of the Category C and B traffic patterns, which stay within 2.25 NM and 1.5 NM of a given runway, respectively.

Proposed wind turbine locations in the southeastern portion of the Desert Claim project area are indicated in **Figure 3.13-2**. (The remainder of the project area is located to the north and west, and well beyond the range of the VFR airspace.) Twenty-eight (28) of the proposed turbine locations lie within the standard traffic pattern area for Runway 7 and/or Runway 11. The maximum allowable height for those turbines within the VFR traffic pattern is determined by their elevation and distance to the runway, according to FAA Order 7400.2E; this information is shown in **Table H1.** Based on the ground elevations for these locations and the height of the proposed turbines, 10 of the 28 turbines (Turbines 91, 92 109-111, 115, 117-120) would exceed the maximum allowable structure height relative to the VFR traffic pattern and would likely be considered hazards to air navigation. These 10 proposed turbines represent a conflict with protected VFR airspace and a potential adverse impact on air traffic operations (specifically, operations by large aircraft) in the Bowers Field traffic pattern. This condition is a change from the analysis documented in the Draft EIS, which indicated that 27 proposed turbines would exceed the maximum allowable structure height relative to the VFR traffic pattern. The change reflects the modified project configuration, which shifted a number of proposed turbines from the southeastern portion of the project area, and the selection of a turbine model with a total height of 340 feet, which is 53 feet less than the maximum turbine envelope addressed in the Draft EIS.

The significance of this conflict and potential impact must be evaluated in the context of actual and expected use of Bowers Field by various categories of aircraft, and their use patterns with respect to the four runways. As indicated in **Section 3.13.1.2**, over 85 percent of the aircraft based at Bowers Field are small, single-engine craft that fall into Category A (exemplified by Beech Bonanza and Cessna 172 models), and the remainder are likely to be in Category B. Category B generally encompasses light, twin-engine aircraft (such as Beech Baron and Kingair and Cessna 400-Series models) used for general aviation. Category C includes a variety of business jet aircraft in the mix, as well as commercial jets up to the size and speed of smaller Boeing 737 models. Aircraft in Category D are normally large jet aircraft; this includes commercial jets such as the Boeing 747 and 777, some military jet aircraft, and larger, faster business jets like the Gulfstream.

Category-A aircraft likely account for around 85 to 90 percent of the total aircraft based at Bowers Field, and for approximately 93 percent of current annual aircraft operations (Bucher, Willis and Ratliff, 2003). Category-B aircraft account for almost of the remainder, estimated at about 7 percent of total annual operations. Category-C aircraft currently account for about 0.1 percent of all operations at Bowers Field (53 operations per year, out of 55,000 total). As noted previously, the majority of aircraft operations within the VFR pattern actually stay within about 1 mile of the active runway on their downwind leg, because the aircraft are primarily within Category A or B. Use of Bowers Field by aircraft in Category D is likely to be extremely rare, and is reported at 6 operations per year in the most recent edition of the airport master plan; likewise, operations by these aircraft are expected at the current level in the forecast aircraft mix for the airport (Bucher, Willis and Ratliff, 2004).



Source: Aviation Systems, Inc.

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power Project EIS

Figure 3.13-2

Protected Airspace with Existing VFR Traffic Pattern

The traffic pattern area that includes the southeastern portion of the Desert Claim project area applies to VFR operations using Runways 7 and 11; the left-hand traffic pattern airspace for Runway 29 extends to the southwest of the airfield, while the traffic pattern airspace for Runway 25 extends to the south. Runway 11 receives the least use of the four Bowers Field runways, primarily due to its orientation relative to the typical wind directions. Runway 7 is used only when winds are light and variable, which primarily occurs in the summer months, and only in daylight hours. The combined activity on Runways 7 and 11 appears to account for as little as about 5 percent and no more than 15 to 20 percent of total operations at Bowers Field. Means to resolve the potential conflict with VFR traffic pattern airspace are discussed in **Section 3.13.5.1**.

Other Air Traffic Issues

Review comments on the Draft EIS expressed concerns over other aspects of air traffic that the comments maintained were not adequately addressed in the document. Comments specifically mentioned insufficient consideration given to aircraft operating for purposes other than arriving or departing Bowers Field, aircraft used in agricultural practices, helicopter operations, the CWU flight-training program, and activity at facilities such as the Flying Rock Ranch airstrip.

As discussed in **Section 3.13.1**, the EIS analysis for air transportation reasonably focuses on project consistency with air traffic regulations, and specifically with such regulations that create protected airspace. Because regulations for the air transportation system are developed to ensure aviation safety, actions that are consistent with those regulations can reasonably be presumed to be sufficiently safe.

While the EIS analysis focuses on protected airspace associated with Bowers Field, it does not ignore other pertinent air transportation activity. Flights conducted outside the airspace protected for Bowers Field flight procedures require aircraft operation that is consistent with safe and legal flight procedures, as established by the FAA. Among other provisions, the federal aviation regulations require that aircraft outside of other controls (such as instrument arrival or departure procedures or VFR procedures) must at all times maintain a safe minimum flying altitude. This requirement applies to flight training, agricultural operations, helicopter flights, and general overflight activity. The Desert Claim project would be located on private land and the owners of structures on private land are afforded the protection of the federal aviation regulations, as long as the structures are built and maintained consistent with the regulations. The regulations acknowledge that human activity will result in the construction of tall objects that could be obstacles for aviation, which is a primary reason for the FAA safety lighting requirements. Development of the Desert Claim project would result in no aviation safety issue as long as aircraft fly in accordance with the legal requirements of the federal aviation regulations, and the project is built and operated in accordance with the safety lighting requirements.

3.13.2.2 Marking and Lighting Issues

The current standards for marking and lighting structures in the National Airspace System are contained in FAA Advisory Circular (AC) 70/7460-1K, which became effective August 1, 2000. AC 70/7460-1K includes specific marking and lighting standards for wind turbine structures.

Although the AC is clear as to the lighting standards for an individual structure, the number of structures to be lit within a multi-turbine wind energy project is left to the discretion of the FAA Region charged with making hazard determinations for structures exceeding the notification requirement height. After the FAA is formally notified that Desert Claim LLC proposes to build 120 turbines that exceed the 200-foot notification limit, the agency will request the applicant to furnish a proposed lighting configuration for the project. The FAA will review the proposed lighting configuration relative to the obstruction standards and allowable height limits. If the proposed lighting configuration is found acceptable, the FAA would issue a “No Hazard Determination” for the project with the proposed lighting.

The various FAA regional offices follow a generally similar methodology to determine which structures in a wind power project are to be lit. For instance, the distance between lit structures should normally be no more than 3,000 feet in a straight line. Also, lighting on the perimeter of a large project should not leave large gaps or individual wind turbines that are outside the lit perimeter and unshielded. To a considerable degree, however, determination of the lighting needed to ensure adequate conspicuity of the structures involves professional judgment of the FAA staff reviewing the proposed lighting plan.

Marking and lighting project structures, consistent with the FAA regulations, is a required mitigation measure for wind energy projects. Consequently, the preliminary lighting configuration proposed for the Desert Claim project is described in **Section 3.13.5**.

3.13.3 Impacts of the Alternatives

3.13.3.1 Alternative 1: Wild Horse Site

Zilkha filed a notice with the FAA explaining the pertinent characteristics of the proposed Wild Horse project (including structure heights, locations and proposed marking plans) and requested a determination as to whether any of the turbines would be considered hazards to air navigation. As of October 2003, the company had not received a response from the FAA (personal communication, C. Taylor, Zilkha Renewable Energy, Portland, Oregon, October 21, 2003). Based on the distance between the site and Bowers Field, Zilkha anticipated that the Wild Horse turbines would not be considered obstructions. The EFSEC (2004) Draft EIS on the Wild Horse Power Project does not address potential airspace conflicts and does not provide updated information.

As a private, unregulated facility, there is no protected airspace associated with the JKD Farms airfield. Consequently, it is unlikely that Alternative 1 would result in adverse impacts to air traffic operations.

The FAA standards for marking and lighting tall structures, as discussed in **Section 3.13.2.2**, would also apply to a wind energy facility constructed at the Wild Horse site. Zilkha has submitted a proposed plan for marking and lighting Wild Horse project facilities to the FAA for review; see **Section 3.13.5** for additional discussion.

3.13.3.2 Alternative 2: Springwood Ranch Site

Given the circumstances applicable to a hypothetical wind energy project on the Springwood Ranch site, no notice of potential structure heights and locations has been filed with the FAA and a detailed, site-specific evaluation of potential airspace conflicts (comparable to what has been conducted for the Desert Claim project area) has not been undertaken. Based on the distances from the Springwood Ranch site to both Bowers Field and the Cle Elum Municipal Airport, and the discussion of potential airspace issues provided in **Section 3.13.2**, it does not appear that a wind energy project at the Springwood Ranch site would interfere with protected airspace or air traffic operations associated with either facility.

The FAA standards for marking and lighting tall structures, as discussed in **Section 3.13.2.2**, would also apply to a wind energy facility constructed at the Springwood Ranch site. Lighting plans for Alternative 2 would be similar to those discussed in **Section 3.13.5.2**, although considerably fewer towers would be lit.

3.13.3.3 No Action Alternative

Under the no-action alternative the Desert Claim Wind Power Project would not be developed and no wind turbines would be constructed in the project area. Under this alternative there would be no changes to current air traffic operations based on conditions in the project area (although relevant conditions elsewhere in Kittitas County could change), and no conflicts that are foreseeable at this time. No obstructions associated with the proposed project would be introduced and no mitigation measures associated with corresponding airspace issues would be required. Existing uses in the project vicinity, and any hazards to air navigation that might be associated with them, would be expected to continue generally as at present.

3.13.4 <u>Cumulative Impacts</u>

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.13.5 <u>Mitigation Measures</u>

The location and physical characteristics of the Desert Claim Wind Power Project raise issues relating to potential impact on one air traffic condition at Bowers Field. This involves the visual flight rule (VFR) traffic pattern, as discussed in **Section 3.13.2.1**. Available measures to mitigate this potential impact are discussed below. Mitigation measures are also necessary to comply with FAA structure marking and lighting requirements.

3.13.5.1 VFR Traffic Pattern

As discussed in **Section 3.13.2.1**, some of the proposed Desert Claim wind turbines in the modified project layout would conflict with the current use of standard left-hand traffic patterns for VFR traffic at Bowers Field; the number of conflicting turbines has been reduced as compared to the layout analyzed in the Draft EIS. Specifically, 10 of the proposed wind turbines would exceed the VFR traffic pattern maximum allowable obstruction height and would represent potential hazards to Category D VFR traffic near Bowers Field (see **Figure 3.13-2**). There are two general options to resolve this conflict. One would be to further modify the proposed project in such a manner that no turbines would exceed the maximum allowable height in relation to VFR traffic. The other would be to consider modifications to the VFR traffic pattern that would direct the traffic away from the portion of the project at issue.

<u>Project Modifications</u>

Possible measures to eliminate the VFR traffic conflict by modifying the physical characteristics of the proposed project include the following:

1. remove the 10 turbine locations at issue from the proposed project layout, reducing the scope of the project to approximately 110 turbines and the project capacity to approximately 165 MW;

2. shift some or all of the 10 proposed turbine locations to other locations that would not be in conflict with the VFR traffic pattern; or
3. revise the capacity and height of the turbines to be installed at some or all of the 10 turbine locations, to result in structure elevations that did not exceed the VFR traffic pattern allowable height limits.

To a degree, the modified project configuration that is evaluated in the Final EIS reflects implementation of items 2 and 3 above. A number of turbine locations that were originally proposed for the southeastern part of the project area were shifted to other areas within the project boundary, reducing the potential for conflict with the VFR traffic pattern. The applicant also selected a turbine model with a lower total height of 340 feet (rather than the 393 feet analyzed in the Draft EIS). Both of these actions reduced the number of turbines exceeding the maximum allowable structure height from 27 (per the layout evaluated in the Draft EIS) to 10 in the modified layout.

The modified project layout optimizes the generation potential of the land area included within the proposed project (based upon computer modeling using updated meteorological data), and retains the total capacity of the project at 180 MW, which is a project objective. With respect to the first option listed above, it is possible that elimination of the 10 turbine locations potentially conflicting with the VFR traffic pattern would also make some of the other proposed locations (such as Turbine 93) non-viable, and result in fewer than 110 total turbines in the project layout. It is unlikely that many (if any) of the 10 subject turbine locations could be shifted to other sites within the existing project-area boundary based upon the computer modeling. Consequently, implementing the second option (to a greater degree than reflected in the modified layout) would likely require the applicant to obtain development access to additional lands in the vicinity, but not currently within the proposed project area.

The 10 proposed turbine heights and locations exceed the maximum allowable heights by a range of 5 feet to 95 feet; the maximum allowable heights above ground level at these locations range from 245 feet to 335 feet. Based on the market availability of smaller generating units, it would be physically possible for the applicant to install smaller-capacity turbines at the subject locations that did not exceed the VFR traffic pattern allowable height limits. It is not known whether the equipment purchase, construction and operational consequences of installing multiple turbine types and sizes within the same project would have an effect on the viability of this option, but doing so would likely not achieve one of the applicant's project objectives of developing a project with at least 180 MW capacity.

Traffic Pattern Modification

An alternative approach to resolving the potential conflict between the 10 wind turbine locations and the existing VFR traffic pattern would be to modify the traffic pattern. As discussed in **Section 3.13.2.1**, a left-hand traffic pattern is now used for VFR traffic operating from all four Bowers Field runways. This results in the protected airspace for the VFR traffic patterns extending up to 4 miles north from Bowers Field and overlapping with the southeastern portion of the Desert Claim project area.

As discussed in the Draft EIS, by prescribing right-hand traffic patterns for both Runways 7 and Runway 11, effectively all visual traffic using these runways would operate to the south and/or west of Bowers Field. The protected airspace under this pattern would therefore remain at least 1 mile from the nearest wind turbine location. With such a revision, none of the proposed turbine locations would conflict with the VFR traffic pattern. Modifying traffic patterns in this manner is frequently proposed as a way of avoiding precipitous terrain and obstructions present near airports. However, comments on the Draft EIS maintained that a change to a right traffic pattern would have an unnecessary impact on the overwhelming majority of small aircraft that operate to and from Bowers Field.

In response to this concern, Kittitas County and the EIS team investigated other options for procedural modifications that would resolve the potential project conflict with the VFR traffic pattern. This investigation indicated that existing procedures specified the same traffic pattern altitude (TPA), approximately 2,600 feet AMSL or 840 feet above the elevation of the airport, for all categories of aircraft in the Bowers Field VFR traffic pattern. This condition is contrary to typical practice used in many airports across the nation, in which one TPA is specified for small (piston-driven) aircraft and a higher-level TPA is established for turbojet and large aircraft. Consequently, raising the Bowers Field traffic pattern altitude for large/jet-powered aircraft would take into account the higher terrain north of the airport, would be consistent with standard practice at other airports and would improve safe operating conditions for large/jet-powered aircraft using Bowers Field (i.e., it would reduce noise impacts from such craft by raising their approach elevation), and would be a more logical solution to the VFR traffic pattern conflict.

In conjunction with adoption of its updated airport master plan, Kittitas County requested the FAA to raise the Traffic Pattern Altitude for large/jet-powered aircraft using Bowers Field to 3,300 feet AMSL (1,540 feet above the airport elevation), while retaining the TPA of 2,600 feet for smaller aircraft. Kittitas County did this for health and safety reasons (i.e., to provide a safer approach for jet-powered aircraft and to reduce the noise impacts from such aircraft). One benefit of this change, however, is that it places the few large/jet aircraft that might utilize a Category D VFR traffic pattern well above the obstructions created by the 10 wind turbines in question, thereby resolving this issue. This revised Traffic Pattern Altitude proposal is also consistent with current aviation safety practices nationwide.

3.13.5.2 Marking and Lighting

Marking and/or lighting of the proposed wind turbines would be required to meet FAA safety requirements, as mitigation for the potential safety hazards represented by tall obstructions. Proposed measures to meet these requirements are incorporated into the project description, as indicated in **Section 2.2.2**, and are discussed in more detail below.

Daytime conspicuity can be achieved through painting the structures in accordance with AC 70/7460-1K. Wind energy project developers typically do not prefer this daytime conspicuity method, however, because it has higher initial (construction) and maintenance costs than other methods. Rather, white medium-intensity flashing lights (the L-865 lights specified in AC 70/7460-1K) are normally preferred to meet the daytime conspicuity requirements.

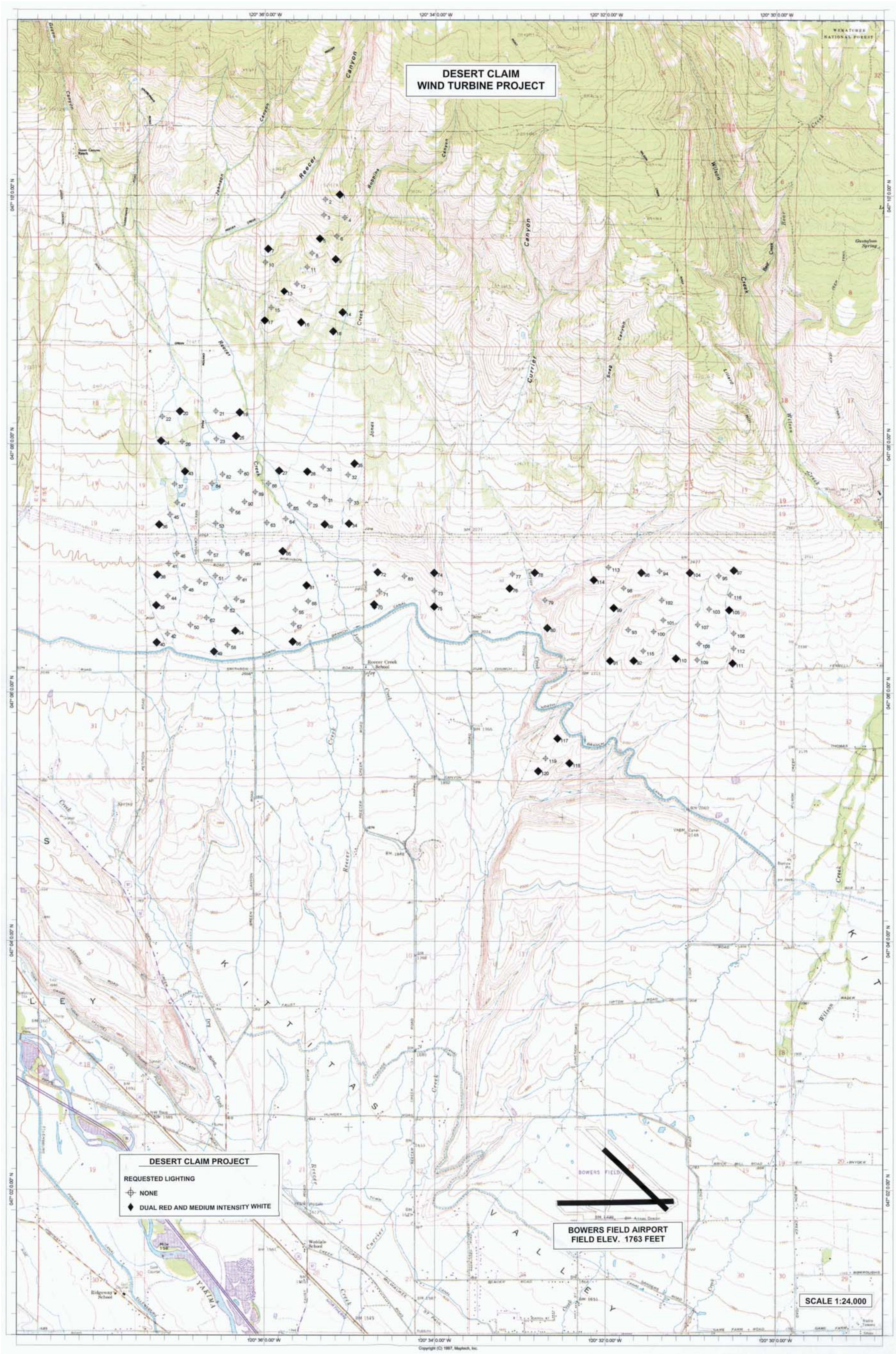
Chapter 8 of AC 70/7460-1K describes the preferred lighting system for wind turbine structures. This is a dual lighting system with red flashing lights (L-864) for nighttime use and medium-intensity flashing white lights (L-865) for daytime and twilight use. This dual system, purchased as a single unit, is the most cost-effective and reliable lighting system providing both day and night conspicuity. Two of these systems are to be mounted on top of the generator housing to flash simultaneously. The entire wind-turbine development project may also have a synchronized lighting system designed so all lights on all turbines flash at the same instant.

Figure 3.13-3 shows the proposed lighting configuration for the Desert Claim project. The wind turbine structures indicated by the large, solid symbols are proposed for lighting with flashing, white medium-intensity lights for use during daylight hours and flashing red lights for evening/night hours. Under this plan 48 of the total 120 wind turbines, or 40 percent, would be equipped with dual lights. Experience with FAA reviews of prior lighting plans indicates this configuration should meet the FAA requirements and provide safe lighting for both daytime and nighttime use.

If the FAA determines the proposed lighting plan to be acceptable, the agency would issue a no-hazard determination on that basis. In that event, the project lighting configuration would be consistent with FAA safety requirements and would not have an adverse impact on air navigation. The safety lighting on the turbines could affect other resources, however, as discussed in **Section 3.10.**

3.13.6 Significant Unavoidable Adverse Impacts

Some of the proposed turbine locations within the Desert Claim project area would conflict with the protected airspace currently associated with the existing VFR traffic pattern. Specifically, 10 of the proposed turbines would exceed the maximum allowable height for structures within the traffic pattern airspace, and represent a potential adverse impact on those air traffic operations. The significance of the potential impact is unclear, because in practical terms the conflict involves operation by a category of aircraft that rarely use Bowers Field and which are not included in the critical family of aircraft identified in the County's current Airport Master Plan. The airspace conflict could be resolved and the potential operations impact could be avoided through several possible means. Those include further modifying the project plan to remove or relocate the remaining 10 turbines and/or to install smaller turbines in selected locations. Changes of this type are already reflected to a degree in the modified project configuration evaluated in the Final EIS, which relocated 17 of the 27 turbines that were identified in the Draft EIS as creating a conflict, and by selecting a smaller turbine as compared to the maximum turbine envelope. Another option for resolving the remaining conflict would be to raise the VFR Traffic Pattern Altitude (TPA) for large/jet-powered aircraft. The available mitigation measures are discussed in detail in **Section 3.13.5**. Because either set of mitigation measures would result in insignificant impacts, there are no significant unavoidable adverse impacts to air transportation associated with the project. Independent of this project, Kittitas County airport management has taken action to raise the TPA for large/jet-powered aircraft. Upon acceptance by the FAA, this action would result in satisfactory resolution of the potential penetration of the 10 wind turbines into the currently-defined Category D VFR traffic pattern, with no adverse effects on aircraft operations or the community.



Source: Aviation Systems, Inc.

Huckell/Weinman Associates, Inc. HWA

Kittitas County Desert Claim Wind Power Project EIS

Figure 3.13-3

Proposed Desert Claim Lighting Plan

3.14 PUBLIC SERVICES AND UTILITIES

3.14.1 Affected Environment

Existing conditions with respect to public services and utilities for the Desert Claim project area are described in **Sections 3.14.1.1** through **3.14.1.7** below, with separate discussions for each major type of service or utility. Summary discussions of baseline service and utility conditions for the Wild Horse and Springwood Ranch sites are provided in **Sections 3.14.1.8** and **3.14.1.9**, respectively.

3.14.1.1 Fire and Emergency Medical Services

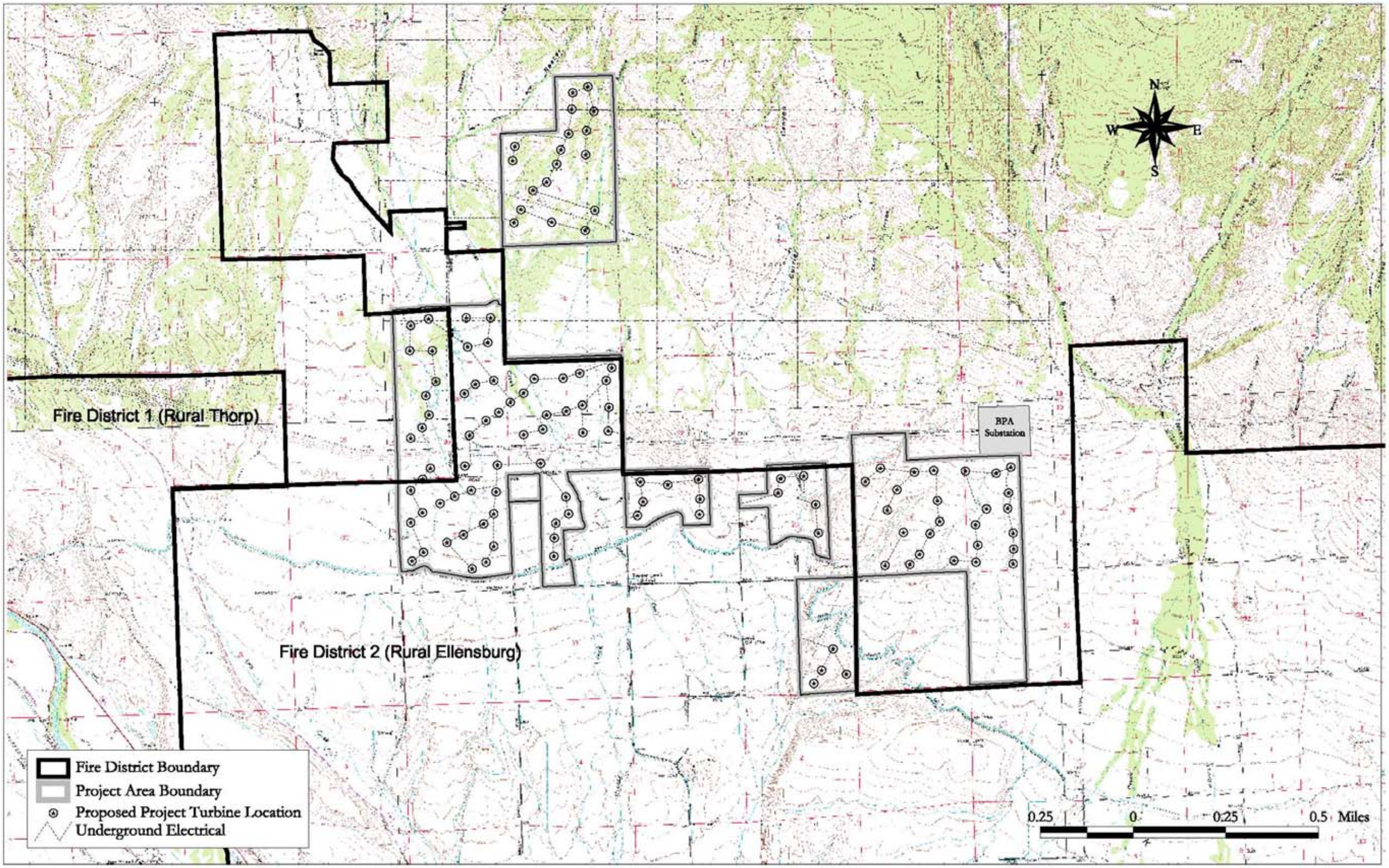
Approximately one-half of the project area receives fire suppression services from Kittitas County Fire District No. 2 (see **Figure 3.14-1)**. This area is located in the west half of the site and generally includes the majority of the central and southwest area of the project site. Roughly 70 of the 120 wind turbines would be located within this area. The remaining half of the project area (containing approximately 50 wind turbine locations) is located on private land and is outside of the Fire District's service boundary. This area is currently not served by a fire management entity. The Washington Department of Natural Resources (WDNR) provides wildland fire protection and suppression services to forest and range lands, primarily north of the project site.

Fire District No. 2 serves roughly 10,000 citizens and covers approximately 250 square miles northwest of Ellensburg. The District provides service from 9 stations. The stations closest to the project area include Central Headquarters (east of Ellensburg), Reecer Creek (approximately 2 miles south of the project area), and Fairview (southeast of project area on Fairview Road). Including the Fairview satellite station, four of the Fire District No. 2 stations are within approximately 8 miles of the perimeter of the project area. The location of each station is provided in **Table 3.14-1**. **Figure 3.14-2** shows the distribution of public service providers throughout Kittitas County, including fire, police, and medical services.

Table 3.14-1
Kittitas County Fire District No. 2 Station Locations

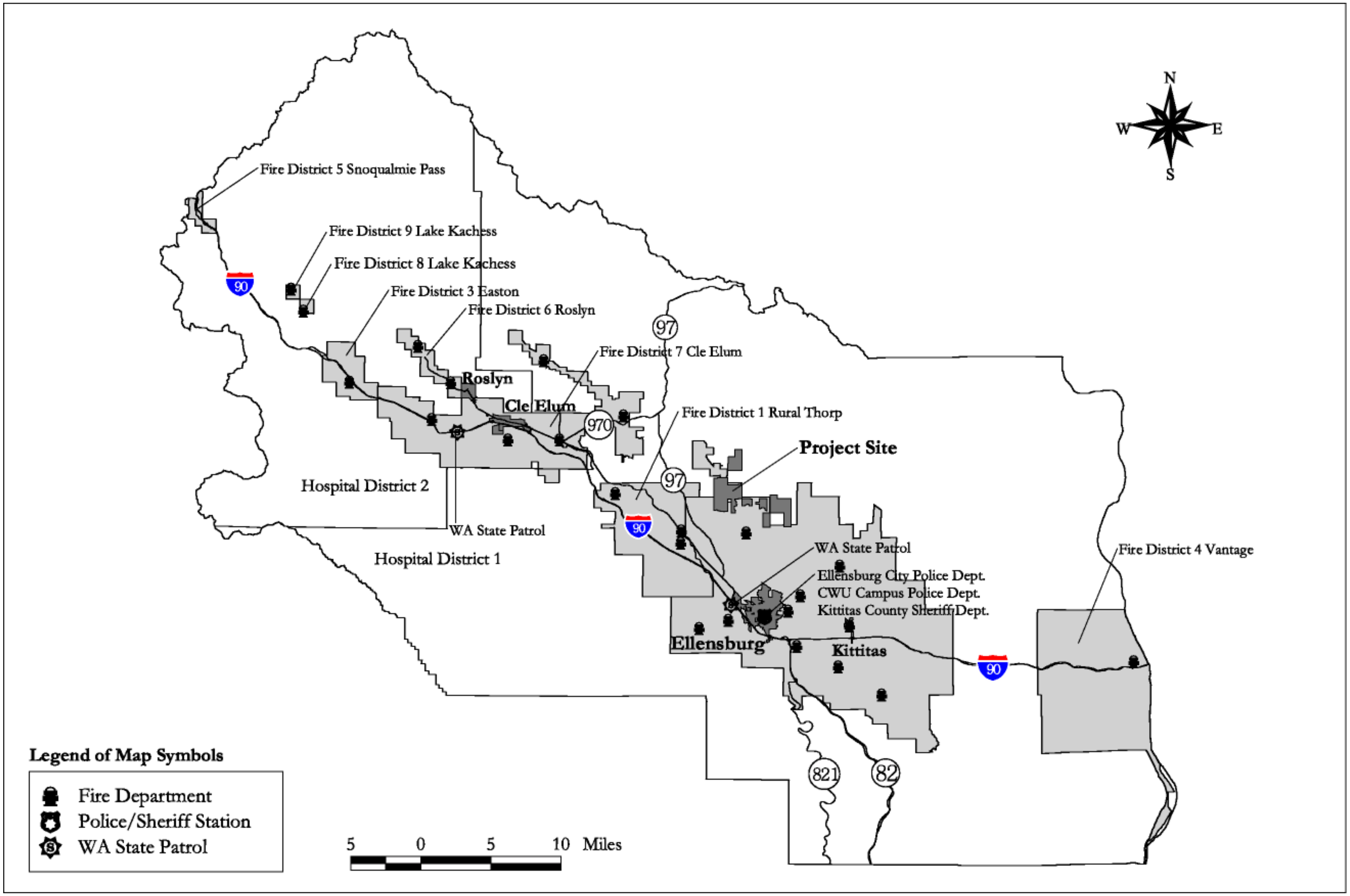
Station	Location
Central Headquarters	2020 Vantage Highway
Badger Pocket	4481 Fourth Parallel Road
Broadview	2671 Tjossem Road
Fairview	6651 Brick Mill Road
Fairview (satellite station)	2380 Game Farm Road
Eastside	207 Main Street (Kittitas)
Reecer Creek	8800 Reecer Creek Road
Westside	5640 Cove Road
Westside (satellite)	51 Barnes Road

Source: Kittitas County Fire District No. 2, 2003.



Source: Huckell/Weinman Associates, Inc.

Huckell/Weinman Associates, Inc. HWA	Kittitas County Desert Claim Wind Power Project EIS	Figure 3.14-1 Fire District No. 2 Service Area



Source: Huckell/Weinman Associates, Inc.

Huckell/Weinman Associates, Inc. HWA

Kittitas County
Desert Claim Wind Power
Project EIS

Figure 3.14-2

Kittitas County
Provider Service Areas

Current staffing within District No. 2 consists of 1 full-time equivalent (FTE) firefighter and 90 volunteer firefighters, including 19 EMT-trained personnel, 5 first-responders and 2 paramedics. The full-time firefighter works on a 24-hour shift schedule. The headquarters station includes 6 resident firefighters. Two firefighters are on duty from 5pm to 8am, Monday through Friday. Weekends and holidays are scheduled for 24-hour shifts. The Fire Chief is scheduled from 8am to 5pm, Monday through Friday. The District typically allocates 15 to 20 firefighters per station. Current staffing levels are considered appropriate for meeting fire service demand (personal communication, S. Baker, Chief, KCFD2, Ellensburg, WA, August 14, 2003).

The District's nine stations contain the following fire apparatuses: 3 water tenders (3,100 gallon capacity each); 11 pumpers (1,000 gallon capacity each); and 5 brush trucks (various capacities). The headquarters station houses the majority of the equipment, including 1 tender, 2 pumpers, and 5 brush trucks. Each of the other stations is equipped with a pumper; 2 of the stations have tenders. One pumper is housed at the Kittitas County Fire District No. 1 station (personal communication, S. Baker, Chief, KCFD2, Ellensburg, WA, August 14, 2003).

Capital facilities improvements are funded through property taxes only. The District does not receive revenues from other sources, resulting in constraints on its ability to hire paid firefighters, purchase equipment, and fund facilities. This funding enables the District to purchase one new fire engine every 3 years; the next engine is currently on order. The oldest trucks in the fleet were built in 1978. Facilities construction is ongoing—one new rural station was built 3 years ago; another, proposed for the west area of the District is pending County approval.

In the event of a fire emergency within the project area, Central Headquarters would provide first response. Response times would range from 15 to 20 minutes from Central Headquarters to the project area, but could be less (5 to 10 minutes), depending on the location of the fire and availability of volunteer firefighters. Other stations would provide backup support.

Mutual response agreements have been established with other County fire jurisdictions. In all, 12 fire districts serve the County and participate in the agreements. The nearest responding jurisdictions include Kittitas County Fire District No. 1 and City of Ellensburg Fire Department; these fire agencies surround District No. 2. In addition, The Kittitas County Emergency Communications Center (KITTCOM) provides radio communications and emergency dispatch services to participating emergency responders throughout the County, including law enforcement, fire districts, and ambulance services.

District No. 2 provides fire suppression services through contracts with several area landowners, including WDNR, Washington State Parks, the Bonneville Power Administration and the County landfill. In addition, the U.S. Forest Service provides wildland and brush fire suppression services County-wide through an agreement with the WDNR.

The Kittitas County Department of Building and Fire Safety, Office of the Deputy Fire Marshall is located in Ellensburg and is responsible for comprehensive fire prevention, fire inspection, and emergency management coordination services throughout the County. District No. 2 routinely coordinates with this office. Many of the districts have bimonthly or monthly training meetings.

In the event of a medical emergency, the Ellensburg Fire Department would provide emergency medical response (EMS) service to the project area. These services include primary advanced life support (ALS) ambulance service and emergency transportation, as well as emergency room and related medical services. There is currently no private ambulance service in the County. Fire District No. 2 maintains full-time Basic Life Support (BLS) services and stations are equipped with emergency medical and extraction equipment. However, its three licensed BLS vehicles are not equipped to transport injured persons. Fire District No. 2 responds to auto accidents, providing backup support to medical and police personnel.

Hospital service is provided by the Kittitas Valley Community Hospital, located at 603 South Chestnut in Ellensburg. The hospital is equipped to serve up to Level Four trauma patients. Patients with severe injuries— such as head injuries, advanced burns, and trauma (greater than Level Four)—are transported to facilities supporting such injuries (i.e., Seattle's Harborview Medical Center).

3.14.1.2 Police Service

The Kittitas County Sheriff's Department provides primary law enforcement services to the majority of the unincorporated areas of Kittitas County (2,400 square miles), including the project area. The cities of Cle Elum, Roslyn, Kittitas, and Ellensburg provide their own police services, independent of the County Sheriff's Department. The Sheriff's Department is headquartered in Ellensburg and is organized into the following divisions: Patrol Services, Major Crimes, Civil Warrant, Special Operations, Traffic Enforcement, U.S. Forest Service Patrol, Corrections Services, Narcotics Abatement, Administration, and Records. Services within these divisions generally include traffic control, drug enforcement, search and rescue, domestic calls, K-9 unit, SWAT team, marine patrol, evacuation and emergency disaster management (personal communication, G. Dana, Sheriff, KCSO, Ellensburg, WA, August 15, 2003).

The Washington State Patrol (WSP) also serves the area by providing traffic law enforcement, collision investigation, and motorist assistance along the state and interstate highways. In the general vicinity of the project area, these highways include SR-97, SR-970, SR-10, I-90, and I-82. The WSP detachment office is located in Ellensburg; the headquarter office is located in Wenatchee and provides service to a five-county area (referred to as District 6). In addition to highway patrol, the WSP provides drug enforcement, hazardous materials oversight, incident response, truck inspections, and aviation patrol (WSP, 2003). Hazardous materials response is also available through the Washington State Department of Ecology's Yakima office and/or private contractors, depending on the severity of the incident (personal communication, G. Dana, Sheriff, KCSO, Ellensburg, WA, August 15, 2003).

The Sheriff's Department serves as first responder to incidents occurring in the project vicinity. The Department currently employs 26 commissioned officers, 12 non-commissioned officers, 19 corrections officers, and 100 volunteers (mostly for search and rescue operations). One officer is assigned to the U.S. Forest Service land in order to patrol the area for potential unlawful activities (e.g., arson, property damage). A specific level of service standard does not exist, as the population served often fluctuates significantly between the weekdays to weekends. Recreational activities in the area generally draw visitors from outside of the County on weekends, increasing the area population (personal communication, G. Dana, Sheriff, KCSO, Ellensburg, WA, August 15, 2003).

The Department schedules overlapping shifts in order to allow for 24-hour, County-wide patrol coverage. Doing so enables the Department to provide service to the fluctuating population with the current officer count. Typically, there is a minimum of 3 to 4 officers on duty at any time; weekend staffing often consists of 6 officers. Response times to the project area are estimated at 20 minutes (personal communication, G. Dana, Sheriff, KCSO, Ellensburg, WA, August 15, 2003).

Mutual aid agreements have been established between the Sheriff's Department, other law enforcement agencies, fire departments, and emergency medical personnel. In the event of an emergency requiring additional police support, units would be available from the following law enforcement authorities: WSP, Roslyn Police Department, Cle Elum Police Department, and the Yakima County Sheriff's Office. Under existing practices, these agencies provide immediate support for one another (personal communication, G. Dana, Sheriff, KCSO, Ellensburg, WA, August 15, 2003).

The Sheriff's Department currently has limited capital facilities and personnel resources. Office headquarters are overcrowded. Development of a new jail (currently in the design phase) will enable the Department to modify the existing jail and provide additional office area. Officer resources are also constrained and additional staffing is not estimated for another 2 to 3 years. The current vehicle fleet is sufficient for providing service (personal communication, G. Dana, Sheriff, KCSO, Ellensburg, WA, August 15, 2003).

3.14.1.3 Schools

Kittitas County contains a total of six school districts. Ellensburg School District 401 serves the general vicinity of the project area and has a K-12 enrollment of 2,833 students (EOI, 2003). Surrounding school districts include Kittitas School District 403 and Thorpe School District 400.

3.14.1.4 Water Supply, Stormwater, and Sewer

Water supply, stormwater, and community sewer systems are not located in the project area. Residential and agricultural users in the project vicinity obtain water and sewer service through private wells and on-site sewage disposal systems.

The Kittitas Reclamation District (KRD), a local irrigation district, owns and operates the North Branch Canal, a gravity fed water supply facility that traverses the area south of the project area. The canal supplies water primarily for agricultural activities (i.e., irrigation, livestock watering) to areas south of the canal. Domestic wells provide irrigation to areas north of the canal.

3.14.1.5 Solid Waste

Waste Management of Ellensburg is contracted to provide solid waste collection services throughout the County. Solid waste is disposed of through two transfer stations, located in the upper County (50-#5 Mine Road, Cle Elum) and the other in the lower County (1001, Industrial Way, Ellensburg). Kittitas County Solid Waste Division owns and operates both stations. The stations accept waste from commercial haulers and self-haulers. Hazardous wastes or mixed paper recycling are not generally accepted. However, Kittitas County accepts household hazardous wastes (such as paints, solvents, and pesticides) one day each year through a grant-funded program. Drop-boxes are provided for recycling of glass, aluminum, plastic and other paper products. Demolition waste is also accepted.

Construction-related wastes are also accepted at the Ryegrass Construction and Demolition Site, located approximately 18 miles east of Ellensburg. No dirt, yard waste, or field grasses are allowed. Contractors and/or haulers with pre-existing accounts may use this facility. Wastes are transported from the transfer stations and the Ryegrass Construction and Demolition Site to the Greater Wenatchee Landfill in Douglas County, Washington.

Last year, the population of Kittitas County generated approximately 26,000 tons of waste (roughly 1,529 pounds per person). Sufficient capacity is estimated at both the Greater Wenatchee Landfill and the Ryegrass Site through 2013, at which time expansion of the facilities will likely occur.

3.14.1.6 Energy

The project area and local surrounding vicinity are served by the Kittitas County PUD No. 1, which owns and operates the local electrical distribution system via a combination of overhead and underground electrical lines. Puget Sound Energy also provides electricity and natural gas service to the County.

3.14.1.7 Communications

Ellensburg Telephone Company provides telephone service to the project area and vicinity.

3.14.1.8 Wild Horse Site (Alternative 1) Services and Utilities

Baseline conditions with respect to public utilities and services for the Wild Horse site are similar to those described previously for the Desert Claim project area. The site is not located within the existing boundaries of any of the rural fire districts serving Kittitas County. The U.S. Forest Service and the Washington Department of Natural Resources provide wildland and brush fire suppression services on a county-wide basis and are the primary providers of fire services within the vicinity of the Wild Horse site. The Ellensburg Fire Department provides emergency medical service to the eastern part of the County, while the Kittitas Valley Community Hospital provides hospital service; see **Section 3.14.1.1** for discussion of service capabilities and resources.

The Kittitas County Sheriff's Department is the primary source of law enforcement services for the Wild Horse site and other unincorporated areas in the County; **Section 3.14.1.2** provides detailed discussion of law enforcement services and resources that is also applicable to the Alternative 1 site.

The Wild Horse site is within the service boundaries of the Kittitas School District 403. District 403 has a current enrollment reported at 516 students (Dwyer and Dwyer, 2003).

There are no public water supply, stormwater or sewer systems serving the Wild Horse site or adjacent areas. Residential and agricultural users in the project vicinity obtain water and sewer service from individual wells and on-site sewage disposal systems. Waste Management of Ellensburg provides contracted solid waste collection services to residents living near the Wild Horse site, and Kittitas County PUD provides electrical service. The Wild Horse site is within the service territory of the Ellensburg Telephone Company.

3.14.1.9 Springwood Ranch Site (Alternative 2) Services and Utilities

The Springwood Ranch is located within the service territory of Kittitas County Fire District 1, which has facilities located in the unincorporated communities of Thorp and the Sunlight Waters development. Fire District 1 has an all-volunteer force that operates a total of five fire trucks. Fire District 2 in Ellensburg provides additional response capabilities for larger fires, under agreement between the two districts, while District 1 also participates in the County-wide mutual aid agreement. The U.S. Forest Service and WDNR provide County-wide wildland and brush/grass fire response service.

Kittitas Valley Community Hospital District 1, which is located in Ellensburg, provides hospital and emergency room service to the eastern section of the County (including the Springwood Ranch site), as well as hospital services County-wide.

Law enforcement service conditions for the Springwood Ranch area are essentially the same as described for the Desert Claim project area.

The Springwood Ranch site is located within the Thorp School District No. 400, which serves the central portion of Kittitas County between the District 404 and 401 (Ellensburg) service territories. District 400 serves grades K through 12 from facilities located in the unincorporated community of Thorp. Enrollment for 1997-1998 was reported at 189 students (Public Sector Information, Inc., 1998).

Utility systems and services (water supply, stormwater, sewer, solid waste, energy and communications) for the Springwood Ranch area are generally the same as described for the Desert Claim project area.

3.14.2 Impacts of the Proposed Action

3.14.2.1 Fire and Emergency Medical Services

Construction

Calls for fire and emergency medical services to the project area could increase during construction. Site clearing, road building, and construction of the wind turbines and transmission system could significantly increase the risk of a medical emergency or accidental fire on a temporary basis. The number of vehicles, employees and heavy equipment active on the site would contribute to this potential. Activities that would increase the potential for fire include electrical installation, sparks from machinery and vehicle use. Any fires that might occur during project construction would be typical of those applicable to any major construction project, and would not involve unusual materials or fire-control circumstances. The most likely fire incident scenario would be a brush fire sparked by construction machinery or vehicle operation.

On-site personnel would act to extinguish or control any construction-related fires, within the limits of their equipment and training. Assistance from public fire service providers would be requested for all but very minor incidents. Because a portion of the project is located within the service territory for Kittitas County Fire District No. 2, fire emergency calls during construction presumably would be referred to District 2 for response. Firefighters and equipment would likely be dispatched from one or more of the four District 2 stations that are close to the project area (Central Headquarters, Fairview, Fairview satellite and Reecer Creek). All four stations are located within approximately 8 miles of the project area, and the Reecer Creek and Fairview stations are located within 5 miles and 2 miles, respectively, of portions of the project area. Based on their proximity, the first response to a call from the project area would likely originate from the Reecer Creek and/or Fairview stations. Response times from District 2 stations to locations within the project area would be typical of response times for most areas of Kittitas County that are served by rural fire districts.

Depending on the number of increased calls during the construction phase (if any), there could be an impact on the Fire District 2 service demand. Any such increase would be temporary, for the expected 9 to 12 month duration of project construction, and would not likely be of sufficient magnitude to result in a need for additional fire personnel or response capability.

As noted above, portions of the project area are not currently located within the service area of a fire protection district. In the event of a fire emergency, response times and/or service quality could be compromised if confusion occurred regarding fire jurisdiction areas. This situation could be avoided through a mutual-aid agreement or a contract with District 2 for specific service to the entire project site.

The Ellensburg Fire Department would presumably respond to any medical emergencies occurring at the site during the construction period, possibly with assistance from Fire District 2. Accident or illness victims would be transported to Kittitas Valley Community Hospital in Ellensburg as warranted, or to a higher-level trauma center if necessary. Project demands for emergency medical service during the construction period are not expected to be significant, and would be within the current service capability of the respective providers.

New and/or improved project access roads could facilitate access by emergency vehicles and improve response times in the local area. Access road construction would occur relatively early in the construction process (see **Section 2.2.3**), so that improved access to lands within the project area would exist for most of the construction period. As part of the modified project layout, the applicant is proposing to construct a project access road from the eastern terminus of Smithson Road to the eastern-most project area boundary. This road would be made available for emergency vehicle access after its construction and during ongoing operation of the project. This new project access road would greatly reduce emergency vehicle response time to the project area and the project area vicinity by providing a direct route between Smithson Road/Robins Road and Wilson Creek Road.

It is possible the applicant could elect to schedule project construction in multiple phases (such as 3 phases of 40 turbines each, for example). If phased construction occurred, each phase of construction activity would likely be up to about 9 months long and the total duration of construction activity could be more than 2 years (although there would likely be intervals of at least several months between phases). The effect of phased construction would be to extend the total duration of the temporary period of potential increased fire demand, but to reduce the level of on-site fire risk for any one phase. Construction-related fire service impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant in a phased-construction scenario.

<u>Operation</u>

Section 3.8, Health and Safety discusses potential fire hazards associated with operation of the proposed wind power project. The following discussion addresses the public service aspects of responding to those hazards, as well as potential emergency medical needs.

During project operation, impacts to fire and emergency medical services would occur to a lesser extent than those described for the construction period. Once the wind power project is constructed, there would be significantly less activity at the site. Many fewer workers, much less machinery and substantially reduced traffic would be contributing factors to this lower level of risk and lesser impact on emergency services.

Certain possible incidents during operation could result in the need for fire protection services, including electromechanical failures, oil combustion (e.g., in a nacelle), and maintenance activities at the ground level near brush or grasses. As indicated in Sections 2.2.2 and 2.2.4, the project facilities would include various safety and control systems, and *enXco, Inc.*, has developed and implemented corporate-wide standard safety plans such as a fire safety program and an emergency tower rescue program that would be applied to this project. In addition, regular patrolling and monitoring of the project area would increase the likelihood that a fire or other emergency incident would be noticed and reported soon after occurrence, promoting a rapid response. These features of project operation would serve to reduce the risk of incidents and limit the consequences of incidents that might occur. The project access road system would also facilitate emergency response access throughout the project area and in the project vicinity.

As was indicated for the construction period, on-site operations personnel would act to extinguish or control any project-area fires, within the limits of their equipment and training, and would request assistance from Fire District No. 2 as needed. Fire District 2 has indicated that current fire department resources would be generally sufficient to provide fire suppression services to the portion of the project area that is currently beyond the District 2 service boundary, and that a fire protection service contract between Fire District No. 2 and Desert Claim would be required to ensure service (personal communication, Chief S. Baker, KCFD2, Ellensburg, WA, August 14, 2003). The long-term demands for fire service during project operation are not expected to place a significant burden on Fire District 2, and the costs of that service would be covered under the fire protection service contract.

Fire District No. 2 has noted that none of the rural fire districts in the local area have received specialized training for a fire that might occur in the nacelle of a wind turbine. The District also does not currently maintain rescue equipment effective for addressing a fire or rescue emergency at the height of a nacelle (over 200 feet above the ground).

The Ellensburg Fire Department would presumably respond to medical emergencies occurring at the site during the operation period, possibly with assistance from Fire District 2. Accident or illness victims would be transported to Kittitas Valley Community Hospital in Ellensburg as warranted, or to a higher-level trauma center if necessary. Demands for emergency medical service during project operation are not expected to be significant and would be well within the current service capability of the respective providers.

3.13.2.2 Police Service

Construction

Vandalism, theft and/or trespass could occur during construction. Construction traffic could result in an increase in need for police services from the Kittitas County Sheriff's Department, and possibly reduce the Department's ability to respond to incidents elsewhere. Project construction plans would include measures to maintain security of the site and the equipment and materials in use on the site. Based on the duration of the construction period, the planned security measures and the level of activity that would be occurring, the potential demand for law enforcement services is not likely to be sufficient to require additional personnel or have a significant adverse impact on the existing service providers.

Operation

During project operation impacts to police services would occur to a lesser extent than those described for the construction period. Once the wind power project is constructed, there would be significantly less activity at the site. Fewer vehicles and people would be contributing factors to this lesser impact. Vandalism and trespassing could contribute to increased calls for service to the project area, although project operation plans include provision of security to the site and regular patrolling. Access within the site would be improved as a result of the new and improved project access roads, although these would be posted and maintained as private roads with locked gates—with one road being used to provide improved emergency services access. All turbine towers would be locked and the project substation would be fenced and locked to prevent unauthorized entry. Based on the on-site security measures and the project location away from concentrated population or traffic, significant long-term impacts to law enforcement services would not occur.

3.14.2.3 Schools

Construction

No significant impacts on local schools are anticipated. Up to approximately 150 people would likely be employed at the project site at some time during the construction period (assuming the entire project were built in a single construction period); the peak work force at any given time would not likely exceed 80 to 100 workers. Based on expected labor market conditions, the project construction work force would likely result in a negligible increase to area school enrollment. Refer to **Section 3.15** for additional discussion of this topic. If the project were constructed in phases, the labor requirements for any given phase would likely be somewhat smaller than indicated above and the phases would not likely be consecutive. Therefore, phased construction would not result in greater impacts to school enrollment.

Operation

Based on the minimal size of the project operations work force, no long-term impacts to school services are anticipated.

3.14.2.4 Water Supply, Stormwater, and Sewer

Impacts to public water supply, stormwater, and sewer services are not anticipated, as none of these utilities are or would be available on-site. During construction, water would be discharged to unpaved roadways for the purpose of controlling fugitive dust. The specific source of this water has not been determined, although optional supply sources have been identified. See **Sections 2.2** and **3.3** regarding water use.

An on-site domestic well might be used to serve the operations and maintenance facility during operations. (Alternatively, the needed domestic water would be purchased from the host landowner.) Water use from such a well would be no more than 5,000 gallons per day and no permit for withdrawal or use of water would be required under the Washington Water Code. No significant impacts are anticipated from the addition of such a well.

Given the absence of sanitary and stormwater systems in the project area, no impacts to those systems are anticipated. Stormwater management during project construction would be accomplished through typical construction practices and the terms of the project construction stormwater permit. Sewage needs during project construction and operation would be served through self-contained systems.

3.14.2.5 Solid Waste, Energy, Communications

Construction

Electricity, refuse, and telephone service are the only utility services proposed for the project. These utilities are currently available at the site. Utility needs associated with the proposed project are anticipated to be minimal during construction; no significant or adverse impacts are likely to occur.

Impacts to solid waste facilities are not anticipated to be significant. Refuse could include construction waste, such as cable, metal, building materials, and materials used for packing and shipping wind turbine components. Refuse would be collected and transported to one of the two transfer stations or the Ryegrass Construction and Demolition Site, depending on the quantity and hauler (contractor or a disposal service).

The project electrical and communication lines are anticipated to run both above and below ground. Where lines are run above ground and parallel with existing power lines, the potential for impacts on existing underground lines would be reduced. Power collection lines would run underground between the wind turbines to the substation and then into the electrical transmission system.

Operation

Utility use associated with the proposed project (electricity, refuse, and telephone) is anticipated to be minimal during the operations phase; no significant or adverse impacts are likely to occur. Solid waste would be generated by general office and maintenance activities, although on-site activities are not expected to contribute a significant amount to the waste stream. The disposal of solid waste could be contracted with Waste Management or hauled off-site by employees of the project.

Tall structures, such as wind turbines, and facilities that involve electrical energy have the potential to create interference with communications signals. This issue is addressed in **Section 3.8.2**.

3.14.3 Impacts of the Alternatives

3.14.3.1 Alternative 1: Wild Horse Site

The impacts of Alternative 1 on public services and utilities would be similar to those described in **Section 3.14.2** for the proposed action. Calls for fire and emergency medical service to the Wild Horse project area could increase during construction. Potential needs for fire service during construction and operation would likely result in the execution of a service contract with a rural fire district (either Fire District 2, based in Ellensburg, or Fire District 4 in Vantage), as Zilkha Renewable Energy has planned for the Wild Horse proposal (personal communication, C. Taylor, Zilkha Renewable Energy, Portland, Oregon, September 18, 2003).

Project-related demands for police, education, solid waste, energy and communications services would be limited or minimal, and no significant adverse impacts on existing service systems would be expected for Alternative 1. Needs for water supply, stormwater management and sewer service would be addressed internally through project construction and operation plans, and would not result in impacts on existing delivery systems for those utility services.

3.14.3.2 Alternative 2: Springwood Ranch Site

The impacts of Alternative 2 on public services and utilities would be very similar to those described in for the proposed action and Alternative 1. Potential service demands during construction might be somewhat less for Alternative 2 because this alternative involves fewer turbines and a smaller project footprint, although the duration of construction and the number of construction workers would be nearly the same. Potential needs for fire service during construction and operation would likely result in the execution of a service contract with Fire District 1, based in Thorp.

Project-related demands for police, education, solid waste, energy and communications services would be limited or minimal, and no significant adverse impacts on existing service systems would be expected for Alternative 2. Needs for water supply, stormwater management and sewer service would be addressed internally through project construction and operation plans, and would not result in impacts on existing delivery systems for those utility services.

3.14.3.3 No Action Alternative

Under the No Action Alternative, the proposed project would not be built, and the level of public services and utilities in the project vicinity would not likely change significantly in the foreseeable future. No new impacts to public services and utilities are anticipated under this alternative.

3.14.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.14.5 Mitigation Measures

Available mitigation measures to address potential public services and utility impacts of the project are summarized below, by service category.

3.14.5.1 Fire Protection

In order to provide fire service coverage to the entire project area, the developer would contract with Kittitas County Fire District No. 2 or another jurisdiction to provide service to the area not currently served by a fire service entity. The Kittitas County Fire Marshal has indicated that this service contract should be executed prior to the start of construction. Water supplies for firefighting would be established at designated locations within the project area, the planning for which would occur in conjunction with Fire District No. 2.

During construction of the project, power equipment would be equipped with safety features that would reduce the potential for fire hazards, including spark arrestors and/or approved mufflers, fire extinguishers and shovels. Equipment shutdowns would be required during periods of general industrial fire precautions in the local area, and limitations regarding "hot" work with electrical equipment and facilities would be observed. In order to prevent fires caused by catalytic converters on vehicles, designated parking areas would be created for workers' vehicles. These areas would be free of combustibles. Designated worker smoking areas would also be established to reduce the potential for fire. In addition, development of a worker-oriented fire prevention program would provide additional knowledge of wildfire prevention and control practices to workers.

Any secured areas (i.e., buildings or gates) should require provision of a "knox box," a fire service access box containing master keys, which would facilitate access to the site by fire and emergency medical crews. In addition, the developer would provide fire, emergency medical, police agencies, and KITTCOM with emergency response information relating to:

- the design of the project, including the detailed maps of project access roads, on-site facilities, and wind turbines, and an addressing plan;
- emergency contact information; and
- procedures for rescue operations should an incident occur inside a turbine or nacelle (including available on-site emergency rescue equipment).

The Kittitas County Fire Marshal has also suggested that the applicant prepare a long-term plan to provide for fire risk reduction on the project site, to be approved by the Fire Marshal and the affected fire departments.

The applicant should execute an agreement with the Ellensburg Fire Department addressing training and equipment related to potential high-angle rescue needs at the project site, unless those needs are provided internally through project resources.

During both construction and operation of the project, refuse containers would be located in areas that would reduce the potential for on-site debris. With the exception of natural vegetation, no burning of debris would be allowed without written permits from issuing agencies (WDNR and WDOE). All flammable liquids would be stored according to 1997 Uniform Fire Code and inspected by the responsible agency.

3.14.5.2 Law Enforcement

The applicant would employ methods for on-site security (including private security patrols). This would meet the applicant's needs for operational security at the site, and would also reduce the potential for calls to local law enforcement services.

3.14.5.3 Other Services and Utilities

Mitigation measures for schools, water supply, sewer and stormwater, solid waste, energy and communications services are not necessary, given the insignificant impacts identified for these services and utilities.

3.13.6 Significant Unavoidable Adverse Impacts

Construction and operation of the Desert Claim project would result in negligible impacts for most types of public services and facilities. Some concerns with respect to the need for fire protection services were identified, as were mitigation measures that would resolve these concerns. Therefore, with mitigation, no significant unavoidable adverse impacts to public services and utilities would be expected.

3.15 POPULATION, HOUSING AND EMPLOYMENT

3.15.1 Affected Environment

The following description of baseline conditions applies to the Desert Claim project area and to the Wild Horse and Springwood Ranch sites that have been defined as the project areas for Alternatives 1 and 2.

3.15.1.1 Population

The proposed Desert Claim Wind Power Project lies in the northern section of Kittitas County, approximately 8 miles north of the City of Ellensburg. Kittitas County is in the center of Washington State and stretches from the crest of the Cascade Mountains to the Columbia River. It is bounded to the north by Chelan County, to the south by Yakima County, and to the west by King County. The County comprises an area of 2,297 square miles, which makes it the eighth largest county in the state by area.

Kittitas County includes five incorporated cities: Ellensburg, Cle Elum, Roslyn, Kittitas, and South Cle Elum. According to the Washington Office of Financial Management, the county's 2003 population is approximately 35,200, of which 42 percent live in unincorporated areas and 58 percent live in the incorporated areas. Since 1990, the population in unincorporated areas grew by 41.9 percent, while that of the incorporated cities increased 25.2 percent (U.S. Census 2000; WOFM 2003). **Table 3.15-1** shows the population for all cities and unincorporated areas in Kittitas County for 1990, 2000, and 2003.

Table 3.15-1
Kittitas County Population Data 1990 – 2003

City/region name	1990*	2000*	2003**	Percent change (90'-03')
Kittitas	26,725	34,000	35,200	31.7%
Unincorporated	10,418	14,120	14,785	41.9%
Incorporated	16,307	19,880	20,415	25.2%
Cle Elum	1,778	1,755	1,775	-0.2%
Ellensburg	12,360	15,460	15,940	29.0%
Kittitas	843	1,105	1,120	32.9%
Roslyn	869	1,017	1,020	17.4%
South Cle Elum	457	543	560	22.5%

*U.S. Census Bureau, 2000

**WOFM 2003

The project area lies within unincorporated Kittitas County. As stated above, the unincorporated areas of the county have, in the past decade, had fewer residents than the cities and towns, but have been growing at a much faster rate. The smallest subdivision available from the U.S. Census (2000) that includes the project vicinity is Census Tract 9753. This census tract contains rural lands extending from State Route 97 to the eastern border of the county. Population in the census tract was approximately 3,038 when counted during the 2000 census. The Desert Claim project and the surrounding area account for a relatively small fraction of the geographic area and population of Census Tract 9753. The distribution of the population in the immediate vicinity of the project is generally very low-density residential properties.

According to the WOFM, population density in the county is 15.3 people per square mile (compared to 2,290 people per square mile for the City of Ellensburg). Most of the population in the direct vicinity of the project area lives in a farming, ranching or scattered rural residential configuration.

3.15.1.2 Housing

According to the U.S. Census (2000), Kittitas County had 16,475 housing units in 2000. Of those, 81.2 percent were occupied and 18.8 percent were vacant (10.9 percent were vacant due to seasonal use). There were 13,215 housing units in 1990 (U.S. Census 1990), reflecting a 10-year increase of 24.7 percent. The most recent census also revealed that of the occupied housing, 58.3 percent was owner occupied and 41.7 percent was renter occupied. Rental vacancy in the county was 6.8 percent, which was higher that the statewide vacancy rate of 5.9 percent. The most recent housing data published by the Washington Office of Financial Management (WOFM 2003) updated the 2000 census figures for the County. The most current housing estimates are shown in **Table 3.15-2** below.

Table 3.15-2
Housing Units by Structure Type, 1990 and 2003

Housing Type	Incorporated Kittitas County (units)		Unincorporated Kittitas County (units)	
	1990	2003	1990	2003
Single Family	4,049	4,883	4,476	6,082
Multi-family	2,517	3,701	217	352
Mobile Home or Trailer	519	580	1,436	1,787
Total	**7,085**	**9,164**	**6,129**	**8,221**

Source: WOFM April 2003

The county's largest city, Ellensburg, is approximately 8 miles south of the Desert Claim site. According to the U.S. Census (2000), the city had 6,732 total housing units, of which 92.8 percent were occupied and only 0.5 percent were vacant for seasonal, recreational, or occasional use. Total housing units increased by 34.2 percent from 5,015 in 1990 (U.S. Census 1990). Of the current housing stock, 34.6 percent is owner occupied and 65.4 is renter occupied. The rental vacancy rate in Ellensburg is 6.6 percent, slightly lower than the county rate.

There are also numerous short-term housing possibilities in Kittitas County. They include motels, hotels, bed and breakfast inns, guest ranches and cabins, and campgrounds and RV parks. Cabin rentals and other camping areas exist in the county; there are 33 campgrounds in western Kittitas County (Kittitas County 1999) Both the Ellensburg and Cle Elum/Roslyn areas have hotels and motels with 50 rooms or more. **Table 3.15-3** lists the number of lodging facilities in the Ellensburg area and the Cle Elum / Roslyn area.

Table 3.15-3
Lodging Establishments in Ellensburg and Cle Elum / Roslyn

Lodging Type	Ellensburg	Cle Elum/Roslyn
Motels/Hotels	11	9
Bed and Breakfast	10	2
Resorts	1	1
Guest Ranches and Cabins	4	2
Campgrounds and RV parks	3	4
Total	**29**	**18**

Source: Ellensburg and Cle Elum / Roslyn Chambers of Commerce, 2003.

3.15.1.3 Employment and Local Economy

In 2001 the total Kittitas County labor force was estimated at 17,420 (USBEA 2003). According to the 2000 U.S. Census, 1,556 people were unemployed representing an unemployment rate of 5.7 percent.

Median household income in the county was $32,546 and the per capita income was $18,928. Eight hundred-nineteen (819) families and 6,122 individuals were counted as living within poverty status; they represented 10.5 of the families and 19.6 percent of the population in the county (U.S. Census 2000).

Of the 17,420 total employees in Kittitas County, 75 percent (13,102) are wage and salaried employees and the remaining 25 percent (4,318) are self-employed or members of a partnership. Eight percent (1,439) of all employees in the county are in farm related positions and the remaining 92 percent (15,981) are in non-farm positions. Of all non-farming employees, 74 percent (11,778) are in private sector occupations and 26 percent (4,203) are in government and government enterprises. Ninety-three percent (3,900) of government employees are employed by state and local agencies. The military provides jobs for 3 percent (133) and the federal government employs the remaining 4 percent (170) (USBEA 2003). **Table 3.15-4** shows the number of employees, personal income, and total wages per industry.

Nearly half (45 percent) of all private sector employees fall into one of three employment categories: transportation and warehousing, which employs 19 percent (2,257) of private sector workers; 15 percent (1,801) are employed in accommodation and food services; and 11 percent (1,281) are employed in health care and social assistance. Both construction and other services employ 8 percent (918 and 919 respectively). All other employment categories employ 5 percent or less (USBEA 2003). According to the Kittitas County profile produced by the Washington Employment Security Department (2002), the agriculture/forestry/fishing sector is also significant in Kittitas County.

Construction was on the upswing through the 1990s and continues through this decade. Residential construction was particularly active during this time. The demand for housing has been strong in the recent past and continues to be so. From 1970 through 2000 Kittitas County's construction employment grew at an annual average of 2.0 percent. Total full-time and part-time employment in construction as of 2001 was approximately 918 (USBEA 2003).

Table 3.15-4
Average Monthly Employment and Total Wages in Covered Employment (2001)

Industry	Average No. of Employees	Percent of Total	Wages Paid ($)	Percent of Total
Agriculture, Forestry, and Fishing	813	6.87	12,942,368	4.87
Mining	*	*	*	*
Construction	430	3.63	10,462,352	3.94
Manufacturing	685	5.79	18,721,781	7.04
Transportation, Communication, Utilities	432	3.65	17,016,072	6.40
Wholesale Trade	421	3.56	12,463,633	4.69
Retail Trade	2867	24.22	37,972,796	14.28
Finance, insurance, Real Estate	*	*	*	*
Services	2198	18.57	33,496,836	12.60
Government	3717	31.40	116,413,161	43.79
Other	275	2.32	6,384,318	2.40
Total	**11,838**	**100.00**	**265,873,317**	**100.00**

Source: WOFM, 2003.

3.15.2 Environmental Impacts of the Proposed Action

In general, most of the potential population, housing and employment impacts attributed to the proposal would result from the construction phase of the project. Because the work force required for construction and operation of the project would be relatively small (in the context of total countywide economic activity), the project is not expected to significantly impact population, housing, or employment throughout the county. Any impacts would be localized and temporary. In most cases the impacts would generally be considered beneficial as well.

The modified proposal described in Section 2.2 of the Final EIS would result in the same type and level of population, housing and employment impacts as the original proposal identified in the Draft EIS. Potential impacts for this element of the environment are determined by factors such as the size of the capital investment represented by the project and the work force requirements for construction and operation. The subtle shifts in the locations of project facilities, relative to the project plans described in the Draft EIS, would not cause corresponding changes in project costs or labor requirements. Similarly, construction of the project in phases, if it occurred, would not significantly change the types of impacts; while each phase of construction could involve somewhat smaller numbers of employees, the longer construction period would likely result in similar levels of employment overall.

3.15.2.1 Population

The proposed project would not have a noticeable impact on population in Kittitas County or the City of Ellensburg. Typically, population changes associated with a development action are the result of changes in the local labor market, specifically in-migration to fill new jobs. The impacts on population from a project such as Desert Claim would depend on the level of worker relocation and in-migration needed to meet the project's labor demands. The proposed project would employ an estimated 150 workers during construction (approximately one-half are assumed to be existing residents and part of the local labor market) and 10 during operations. Desert Claim has indicated that, where possible, local workers would be hired for construction and operation positions. Both of these factors would limit worker in-migration to the project area. Therefore, employment opportunities would not be sufficient to increase the population significantly. The discussion of labor sources and potential employment impacts in **Section 3.15.2.3** provides the basis for this conclusion.

3.15.2.2 Housing

Potential impacts to housing from the proposed project could either be direct or indirect. Direct impacts would include any loss of or displacement from housing by families or individuals. The proposed project would be built completely on private land at least 1,000 feet from any existing homes. No housing units would be destroyed or displaced by the project and, therefore, there would be no direct impacts on housing.

Indirect impacts on housing could result from changes to housing units, availability or cost caused by the project. These changes are typically the result of changes to employment and population in a region. A large, long-term construction project could cause a change in housing availability and cost if significant numbers of workers moved into the region and occupied available housing units. This could result in lower vacancy rates and some upward pressure on housing costs.

The proposed project's estimated employment demand and opportunities would be modest and would not attract significant numbers of new residents to the local area or cause these types of effects to the local housing market (see **Section 3.15.2.3** for additional discussion). The expected 9-12 month construction schedule is also relatively short compared to other projects of a similar capital investment size. It is likely that some construction workers (not currently living in the area) would stay in local hotels or motels, and others would commute from other population centers such as Yakima or the greater Seattle area. Therefore, the proposed project is not expected to have a significant indirect impact on housing in Kittitas County. Based on available information, there is currently adequate housing, both permanent and temporary, for the estimated number of non-resident workers.

3.15.2.3 Employment and Economic Issues

Economic issues associated with wind energy development focus on the effects on employment, income, and taxes, and the provision of public services. Economic impacts can be grouped under the construction and operation phases of wind project development. These phases are generally distinct; effects associated with construction are transitory, while operation-related effects are more permanent. There could be an amalgamation of these effects during construction and operation phases if other wind energy developments concurrently come online within the vicinity at the same time.

According to the SEPA Rules (WAC 197-11-448), the economic effects of proposals are not "environmental impacts." This information about economic impacts is provided for information purposes only and is not technically part of the EIS for purposes of SEPA compliance. More detailed, additional information about the economic development impacts of wind power projects is available in a recent report prepared for the National Wind Coordinating Committee (Northwest Economic Associates, 2003).

Economic Links and the Local Economy

To understand how the local economy is affected by some external change, such as a wind power project, it is useful to develop an overall snapshot of the local economy at a particular point in time. Such a snapshot would show that some parts or sectors of the local economy are linked to each other. Using production agriculture as an example, a farmer buys seeds and fertilizer from the seed grower industry and agricultural chemicals industry, plants with a tractor and equipment purchased from a farm implement dealer, which buys its tractors and farm equipment from the farm machinery manufacturing sector. These sectors are referred to as *backward linkages*. Typically, a farmer will sell his production to a processor, such as grain into flour milling, vegetables into frozen or canned products, or apples into juice or sauce. These further processing steps are generally called *forward linkages*.

Most economic sectors need to make purchases of goods and services for needed production outside the local area. Purchases made outside the local economy are called "imports." Money spent on imports represents a "leakage" from the local economy. Likewise, farmers and other businesses do not sell all of their production to other businesses and consumers within the local area. Products sold to businesses and consumers outside the local area are called "exports." Money received for these exports are called "new money" and increases the size of the local economy through a multiplier effect.

The extent to which exports are able to expand the local economy depends to a great extent on how much of the money received from exports remains within the local economy. As money is received for exports, the local supplier in turn spends that money. To the extent that there are other local businesses on which this local supplier depends, less of this money leaves the local economy to buy imports. If there only a few local businesses from which needed purchases can be made, then much of the money will be "leaked" from the local economy.

As other local businesses receive a portion of the money from the first supplier, they also spend the money either within or outside the local economy. The more money that is circulated within the local economy, the larger the local impact from the initial payment received for the export. This round-by-round spending pattern associated with local export production is called the *multiplier process*. The size of this multiplier effect depends on how local businesses are linked with each other as well as how much leakage there is to outside regions for purchasing imports. If the local economy has numerous linked sectors, then multipliers tend to be higher.

Multipliers break this initial external change of wind power project within the local economy into three components: *direct*, *indirect*, and *induced effects*. The *direct effect* refers to those changes—via business purchases of goods and services—in output, employment, and/or income that represent the construction and operation of the wind power project. *Indirect effects* refer to the purchases of materials, supplies, and services of those firms that provide direct services to the wind power project. The *induced effects* refer to the additional impact from consumption spending of employees from the wind power project (construction and operation) and indirect-related sectors. Within the local economy, these secondary effects—indirect and induced—result from these subsequent rounds of spending and re-spending with the local economy.

Construction Impacts

In order to measure the effect that the construction of a wind power project has on the local economy, one has to first identify the mix of things (inputs) necessary to construct a wind power project. This recipe of ingredients—measured in dollars—relates to what is generally used in constructing the project. These items include turbines, towers, rotor assembly, wiring, and concrete, as well as the labor and management skills required for site preparation and installation of the equipment. Prior studies have estimated that about 80 percent of the construction costs of wind energy projects are for the equipment (e.g., rotor assembly, tower, generator, etc) and its installation. Most (if not all) of these equipment items and the specialized skills needed for their installation are generally imported from outside the rural host area. The remaining 20 percent or the "balance of station" is for site preparation and installation of equipment. This involves the construction of roads, pouring the concrete foundations for towers and operations buildings, and so forth. In contrast to wind energy project installation and equipment, these activities provide the greatest opportunities for local input suppliers and workers.

Depending upon the size of the proposed project, the construction phase can affect the job base and personal income within the host region. Additional jobs stemming from project construction are likely to be limited and brief in duration. Other areas with wind power projects have found that most of the construction workers came from within the region. In the case of Desert Claim, it is estimated that approximately one-half of the needed construction workers would come from within a reasonable commuting distance of the project area (i.e., from Kittitas and Yakima Counties) with the balance from surrounding labor markets (primarily the Tri-Cities and/or the Seattle metropolitan area). Local trade and service sectors might be indirectly and positively affected due to purchases by construction workers; some manufacturing business (i.e., concrete) could also be affected. Likewise, the construction phase would generate local personal income that would positively affect the trade and services sectors of the economy.

Wind power projects are also a source of supplemental revenues for local landowners. Wind power companies typically lease rather than purchase land from landowners. Although each developer's lease contract has unique features, there are many common aspects. Each megawatt (MW) of turbine capacity generally requires 25 to 50 acres total area, with the landowner losing the use of about two to four percent (i.e., 0.5 to 2 acres per turbine) of this area. Because the wind turbine occupies a small amount of the overall project area, farming and ranching operations are not greatly affected. Payments to landowners are often calculated as a percentage of the gross revenues of the wind project, generally one to three percent. Typical annual royalty payments to landowners range from $2,500 to $4,000 per turbine (or approximately $50 to $160 per acre). At that rate, total royalty payments for the Desert Claim proposal would be approximately $450,000 per year.

Direct effects of the Desert Claim project would relate to site preparation and installation of a maximum 120 wind turbines. The input parameters for the construction phase include between approximately 150 total and 75 local construction jobs. Using an input-output modeling[1] framework, the total economic effects of construction of the Desert Claim Wind Power Project are illustrated in **Table 3.15-5**.

[1] In order to estimate the economic impacts resulting from the Desert Claim Wind Power Project, an input-output model was employed. This economic model is utilized to measure the indirect effects of project development—both construction and operation—on the local economy, in terms of additional industry output, employment, and income. The model here is based on IMPLAN ("IMpact analysis for PLANning"), a system of software and data used to perform economic impact analyses.

Table 3.15-5.
Desert Claim Construction-Phase Economic Impacts

Impact Type	Jobs	Labor Income	Other Value Added	Total Value Added
Direct	75	$2,883,000	$772,000	$3,655,000
Indirect	16	$433,000	$285,000	$718,000
Induced	24	$502,000	$489,000	$991,000
Total	**115**	**$3,818,000**	**$1,546,000**	**$5,364,000**

Construction costs for Desert Claim were estimated to total approximately $180 million, or $1 million per MW of installed capacity. Of this total, roughly $144 million represents expenditures for major equipment (turbines, blades, and towers). The remaining $36 million represents outlays for activities such as structural construction (foundations, pads, and roads), project engineering, project/contractor management and related activities.

As shown in **Table 3.15-5**, the construction phase is estimated to directly employ a local workforce of 75. Spending on labor and materials would indirectly result in an additional 40 full and part-time jobs during the construction phase. Labor income (wages and salaries and proprietor income) would be over $3.8 million due to local hiring of construction workers and the increases in services needed to support the work.

The amount of other value added—composed of corporate profits, property rents, and net interest -- is estimated at over $1.5 million. The landowner royalty payments of $450,000[2] is included under property rents but is expected to have limited multiplier effects. These lease payments represent an addition to household income for a select number of households within the area. It would be largely speculative to project how much of this additional income would be re-circulated within the local economy, saved or invested. In a larger context, the additional household income from lease payments represents less than 1 percent of 2002 total personal income of $730 million in Kittitas County.

Operation Impacts

Once the wind power project becomes operational, economic effects would primarily derive from household income received by resident workers and leaseholders, along with additional local expenditures for fuel and some supplies needed for maintenance. The estimated level of operation and maintenance workers (approximately 10 positions) would have a "ripple effect" throughout the local economy that would primarily affect the trade and services sectors.

As shown in **Table 3.15-6**, the operational phase of the project would annually support, directly and indirectly, a total of 22 full and part-time jobs. Collectively, these jobs would have an annual payroll of nearly $900,000. Other value added—corporate profits, property rents, and net interest -- is estimated at nearly $2 million annually.

[2] Royalty payments to the landowner begin during the construction phase and would continue annually during the operation phase.

Table 3.15-6
Desert Claim Operation Phase Economic Impacts

Impact Type	Jobs	Labor Income	Other Value Added	Total Value Added
Direct	10	$591,000	$1,794,000	$2,385,000
Indirect	4	$124,000	$41,000	$165,000
Induced	8	$168,000	$154,000	$322,000
Total	**22**	**$883,000**	**$1,989,000**	**$2,872,000**

In general, the Desert Claim project would not provide a large number of ongoing new jobs, nor would it effect a major change in the local population. Given its small size relative to the local economy, a wind energy project would not have a substantial impact on other economic development issues within rural regions, such as consumer spending leakage, workforce availability, and youth flight.

Potential Tourism Development

Tourism is an increasingly important component of the Washington State economy. Washington State is recognized domestically and internationally as a destination for travelers. Kittitas County, among others, has a growing tourism-related sector in the local economies. Annual visitor and traveler spending in Kittitas County (in 2001) was estimated at $75 million (Dean Runyan Associates, 2002) and supports about 1,330 jobs, or 11 percent of total non-farm employment.

Current research and surveys have generally found that wind farms have either no effect on tourism numbers or a positive effect (Australian Wind Energy Association, 2003). Some studies indicate that a wind farm can be an asset to the local tourism base, particularly if the wind energy company provides an interpretive center. There may be some limited effects from associated increased tourism during the first few years of the wind farm operating due to "novelty" value. An interpretive center could potentially increase visitors to the local area and could indirectly increase tourism spending. This potential effect has not been quantified. Additional discussion of potential tourism interest is provided in **Sections 3.11.2 and 3.12.2**.

3.15.3 Impacts of the Alternatives

3.15.3.1 Alternative 1: Wild Horse Site

The construction and operation of the Wild Horse project would result in an influx of temporary and full-time workers that could impact the availability of local housing and the construction labor force. The evaluation of potential impacts to population and employment is based on a recent study prepared for the Phoenix Economic Development Group by ECONorthwest (2002). That report addresses two prospective wind energy projects in Kittitas County; thus, the results from that study were adjusted to apply to Alternative 1 only.

The construction impacts are expected to occur over approximately a 1-year period. The total number of full and part-time jobs created by the project is estimated to be from 150 to 180 jobs. Of the total jobs created during construction, approximately half (about 75 to 80) are expected to be direct construction jobs within the local labor market. Relative to the current size of the local economy, this temporary increase would not be a significant change.

Temporary housing would be needed for those workers who would relocate during construction of the project. As noted in **Section 3.15.2.2**, the local area appears to have an adequate supply of temporary housing to accommodate workers from outside the area. Thus, the impact to the local housing market is not expected to be significant.

3.15.3.2 Alternative 2: Springwood Ranch Site

Impacts from construction and operation of Alternative 2 on population, housing and employment would be similar in nature to those described for the proposed action and Alternative 1. The primary difference in this case would involve the magnitude of the potential impacts, however, because Alternative 2 involves a considerably smaller wind energy project with less capital investment. The number of construction workers and the duration of the construction period would be about the same as for the proposed action. The total labor income and local expenditures during the construction period would be considerably smaller, as would lease payments to landowners during project operation; based on the relative numbers of turbines (40 to 45 for Alternative 2, compared to 120 for the proposed action), the total economic impact of Alternative 2 would likely be 35 to 40 percent of the level indicated for the proposed action.

3.15.3.3 No Action Alternative

Under the No Action Alternative the proposed project would not be built. No wind turbines would be installed in the Desert Claim project area, no land lease payments would be made, and no additional construction or operation jobs associated with this proposal would be available. Countywide population, housing and employment trends would generally be expected to continue as in recent years, pending other significant actions not associated with the Desert Claim proposal. Two other wind farms unrelated to the Desert Claim project are proposed for other sites in Kittitas County. One or both of these other projects could conceivably proceed to development under the no action alternative.

3.15.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.15.5 Mitigation Measures

The Desert Claim Wind Power Project is not expected to create any adverse impacts on population, housing, or employment. Population and housing supply and cost typically follow changes in employment levels. According to this analysis, employment increases would be minimal in the context of the local labor market, and would not result in significant changes in either population or housing, Accordingly, no mitigation measure are necessary to offset impacts to employment, population, or housing.

3.15.6 Significant Unavoidable Adverse Impacts

The population, housing and employment impacts of the Desert Claim Wind Power Project are not expected to be significant, and would not likely be viewed as adverse.

3.16 FISCAL CONDITIONS

3.16.1 Affected Environment

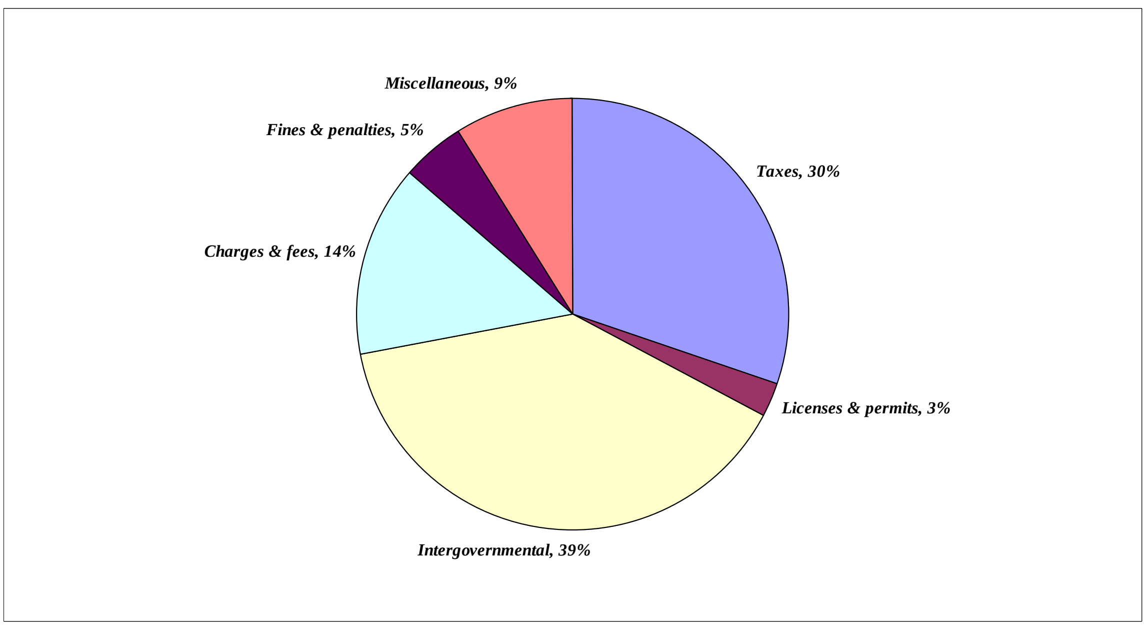
The following description of baseline fiscal conditions applies to the Desert Claim project area and to the Wild Horse and Springwood Ranch sites that have been defined as the project areas for Alternatives 1 and 2, respectively.

3.16.1.1 Kittitas County Revenues

County governments in Washington State collect a variety of taxes, licenses and permit fees, charges and fines, and intergovernmental transfers. Washington State governments rely heavily on consumer taxes, the most significant of which is the retail sales tax, which applies to most items (one of the major exceptions is food) purchased by consumers. Sales taxes on construction materials are paid at the place of purchase. Washington State has no personal income tax. Utility taxes are levied by the State, but not by counties.

In Kittitas County, operating revenues are received from a variety of funding sources. For the current 2003 budget year, operating revenues totaling $32.2 million are received primarily from intergovernmental transfers, taxes, and charges and fines (**Figure 3.16-1**).

Figure 3.16-1
2003 Operating Revenues, Kittitas County



Source: Kittitas County Auditor, 2003.

Each county collects property taxes for local jurisdictions within the county that have taxing authority. Property subject to taxation includes all privately owned real property (e.g., land, buildings, fixed machinery and equipment) and personal property used in a business.

Various jurisdictions have authority to levy property taxes. Properties in the Desert Claim project area (and other sites in Kittitas County) are classified into one code for property tax assessment purposes and subject to taxes from 6 different taxing authorities as shown in **Table 3.16-1**. Each jurisdiction receives property tax revenue according to the mill levy rate assigned to the respective code.

Table 3.16-1
Property Tax Rates in Kittitas County, 2003

Category	Mill Rate	Percent of Total levy
State	2.8847	24.4%
County	1.3406	11.3%
Fire District	1.4455	12.2%
Road District	1.6310	13.8%
School District	4.0930	34.6%
Hospital District	0.4449	3.8%
Total	11.8397	100.0%

Mill rate = $ per $1,000 property valuation
Source: Kittitas County Assessor's Office, 2003.

According to the Kittitas County Assessor's Office (2003), the total assessed valuation for real and personal property in the county was approximately $2.53 billion in FY2002-03. The total tax levied in the county for FY2002-03 was approximately $26.3 million.

3.16.2 <u>Impacts of the Proposed Action</u>

3.16.2.1 County Revenues

<u>Construction</u>

Washington State categorizes most wind power structures, such as towers, pads, and turbines, as both real and personal property. The wind turbine pad is considered real property, whereas the attached (i.e., to the pad) tower and turbine are considered personal property (personal communication, I. Rominger, Kittitas County Assessor, Ellensburg, Washington, August 27, 2003). Any equipment and supplies used within an office setting would be subject to personal property assessment. All project-related wind power facilities would be placed on property leased from current landowners. Consequently, the assessed value of affected properties would increase when project facilities are added (with corresponding increases in tax revenue, for which the project proponent – not the owners of underlying property – will be responsible). This is essentially the only tax revenue source affected by the construction and operation of a wind power project in Washington State.

The purchase and installation of machinery and equipment for wind generation facilities are exempt from sales tax under the Washington Administrative Rules (¶68-663 WAC 458-20-263). Therefore, no new sales taxes in Kittitas County would be generated from the construction value of the turbine components for the proposed Desert Claim Wind Power Project. Local purchases of goods and services during the long-term operation of the project would generate minor amounts of local sales tax revenues.

In **Section 3.15.2**, it was noted that project construction would have a beneficial impact on local employment. During the construction period, needed materials and supplies (fuel, gravel, cement) would be purchased from local vendors. Overall, this projected modest increase in economic activity from construction of the Desert Claim Wind Power Project would likely increase tax revenues for Kittitas County. The project is expected to have a positive financial impact on the local economy through the purchases of goods and services, resulting in increased sales tax revenues on those purchases.

Operation

As stated earlier, the primary increase in tax revenues would be from property taxes on the wind turbines themselves. For this calculation, each of the proposed 120 turbines is valued at approximately $765,000, for a total assessed valuation of $91.8 million. The property tax rate used for the calculation of potential property tax revenues is 1.18 percent (the actual rate applied in 2003). Given the proposed total of 120 turbines for this project, the potential property tax revenues from the project are estimated at a maximum of $1,086,884 for the first year of operation.

It is possible that the effect of the added tax base (an initial total of $91.8 million) would largely be to reduce the tax rate, in which case the increase in tax revenues would be less than reported above. According to the recent passage of Initiative 747, property tax revenue increases are limited to 1 percent per year. The installation of 120 wind turbines would increase the assessed property value by $91.8 million, which is a 3.6 percent increase in the total assessed value of all real and personal property in Kittitas County. To comply with I-747, the County Assessor takes the total prior year assessed value for all real property in the County and can add up to 1 percent. After this, the Assessor adds in the value of newly constructed real property. Then, the Assessor applies the mill rate to calculate real property tax revenues. For personal property, the Assessor includes new additions to the prior year assessment, applies the mill rate, and then calculates personal property tax revenues. Because the project would generate significant tax revenues (both real and personal), it is possible that Kittitas County could receive additional revenue from the project, local tax rates could decline to maintain tax revenues within the I-747 limit, or some combination thereof could occur.

The likely distribution of potential new tax revenues for the first year of operation is reported in **Table 3.16-2**. Based on current local government spending patterns, local schools would receive the largest share of the project-generated property tax revenues at over $375,000 (if the assessed valuation of the project were taxed at the 2003 mill rate of 1.18 percent). The state share of the property tax revenue (which is used to fund basic education) would be the next largest share, at nearly $265,000. The County road district would receive nearly $150,000, followed by smaller amounts to the fire district, general County government, and finally, the hospital district.

Table 3.16-2a
Allocation of Estimated Potential Property Tax Revenues from Desert Claim Project, First Year of Operation

Category	Amount
School District	$375,737
State Schools	$264,815
Road District	$149,726
Fire District	$132,697
County	$123,067
Hospital District	$40,842
Total	$1,086,884

Source: Huckell/Weinman Associates, 2003.

The additional employment directly associated with the operation phase of the project would result in some increased economic activity within Kittitas County through project-related purchases from local vendors and consumer expenditures by project workers. The increased economic activity would have positive financial implications through a modest increase in sales tax revenue collections. It is also expected that the project would produce a positive though modest increase in personal income and economic activity in the local area. However, the amount of these additional tax revenues—based on increased property values and increased consumer expenditures—has not been estimated.

In review comments on the Draft EIS, the Economic Development Group (EDG) of Kittitas County (formerly the Phoenix Group) submitted additional information related to the property tax base and potential revenue aspects of the project (see letter 8 in **Appendix I**). The EDG noted that the value of new construction is exempt from the 1 percent limit under I-747, and estimated that the new construction value of the project would generate an additional approximate $189,000 of new local tax revenue in the first year (Strand, Debbie. The Phoenix Group Economic Development, Ellensburg, WA Personal communication and review, January 30, 2004). It is unresolved, however, whether some portion of the project would be valued as new construction.

Tax revenues attributed to the Desert Claim project over the life of the project would be based on the depreciated value of the wind turbines. This issue of depreciation was raised in comments received on the Draft EIS. A depreciation schedule for the attached tower and turbine has not yet been determined, so the assessed value and potential revenue in future years cannot be identified precisely. Despite these uncertainties, however, one could devise a possible scheme and develop an estimate based on a straight line depreciation schedule over a 30 year period with an end-of-period salvage value of 10 percent for each turbine. This scenario was based on information from the Washington State Department of Revenue (Chuck Boise, personal communication August 2, 2004). Under such a taxing scheme, tax revenues would decrease as the turbines aged and depreciated in value. Tax revenues would be somewhat lower than those shown in Table 3.16-2a. A distribution of potential new tax revenues for selected years of operation, accounting for depreciation, are reported in Table 3.16-2b.

Table 3.16-2b. Allocation of Potential Property Tax Revenues from Desert Claim Project Using Straight Line Depreciation Schedule For Selected Years of Operation

Taxing District	First Year Operation	Fifth Year Operation	Tenth Year Operation	Fifteen Year Operation	Twentieth Year Operation	Thirtieth Year Operation
State	$230,389	$198,612	$158,889	$119,167	$79,445	$0
County	$107,068	$92,300	$73,840	$55,380	$36,920	$0
Fire District	$115,446	$99,523	$79,618	$59,714	$39,809	$0
Road District	$130,261	$112,294	$89,835	$67,377	$44,918	$0
School District	$326,892	$281,803	$225,442	$169,082	$112,721	$0
Hospital District	$35,532	$30,631	$24,505	$18,379	$12,253	$0
Total	$945,589	$815,163	$652,131	$489,098	$326,065	$0

3.16.2.2 County Expenditures

Anticipated effects of the Desert Claim Wind Power Project on existing public services and utilities are discussed in **Section 3.14**. During construction, it is anticipated that there could be some increased expenditures related to surface road damage and fire protection services, for which potential mitigation measures have been identified. During the operation phase, there could be increased fire protection costs, although these would likely be covered through a service contract with Fire District 2. Other potential public services impacts—on schools, police services, and utilities—are expected to be minimal for both construction and operation.

For both the construction and operation phases of the project, the net fiscal position of Kittitas County is expected to be positive. In other words, expected tax revenues from the project are projected to be significantly higher than expected service costs attributable to the project. This would be the case even taking into account the depreciation schedule that would apply to the portion of the project that would be taxed as personal property as compared to real property. While local tax revenues would decline over time because of this depreciation of the personal-property component of the project, tax revenues would still be positive over the long term because of the added tax-base from the project and the relatively low service costs to the County from the project. Service costs attributable to the project would be minimal throughout the operating period; tax revenues would exceed costs even during the latter years of the operating period, and would be far in excess of costs during the initial years.

3.16.3 <u>Impacts of the Alternatives</u>

3.16.3.1 Alternative 1: Wild Horse Site

The fiscal impacts associated with the construction and long-term operation of Alternative 1 would be very similar to those described for the proposed action, as these two alternatives are nearly identical in their size characteristics and would have similar capital values. Alternative 1 would result in a substantial increase in total property tax assessed valuation for Kittitas County, similar to the $91.8 million figure identified for the Desert Claim proposal. The Wild Horse site is located in the Kittitas School District

403, which has a relatively small enrollment and existing assessed valuation. The capital value of Alternative 1 would have a substantial proportionate impact on the tax base of the school district.

As discussed previously, with the increase in assessed valuation it is likely that property tax levy rates in the County would decrease to comply with the property tax collection limits of Initiative 747. Even with the tax increase limitations, the County could expect to collect a sizeable amount of additional revenue when compared to 2002 collections because of the project. Analyses prepared by Zilkha Renewable Energy for the company's proposed Wild Horse project indicated that property tax revenues could increase by up to $1.3 million in the first year of operation; see **Section 3.16.4** for additional discussion. On balance, it is likely that the revenue and service cost impacts of Alternative 1 would be very similar to those identified for the proposed action.

3.16.3.2 Alternative 2: Springwood Ranch Site

The fiscal impacts associated with the construction and operation of Alternative 2 would be parallel to those described for the proposed action, but would involve considerably smaller dollar values. Alternative 2 would result in the construction of 40 to 45 wind turbines on the Springwood Ranch site. Based on the unit value figures cited previously, this would result in a total assessed valuation for the project of up to about $34.4 million. This amount is approximately 37 percent of the value calculated for the Desert Claim project, and is equivalent to approximately 1.3 percent of total assessed valuation in Kittitas County. The combination of additional property tax revenues and/or decreased levy rates associated with this change in total assessed value would be proportionately less than for the proposed action or Alternative 1. Similar to the case for Alternative 1, Alternative 2 would result in a large relative increase in the tax base for the Thorp School District 400. Expected local government revenues associated with Alternative 2 are likely to be significantly higher than expected service costs for the project.

3.16.3.3 No Action Alternative

Under this alternative, the Desert Claim project would not be developed and the Kittitas County tax base would not be increased by the real property and personal property value represented by the project facilities. No significant additional county revenues and expenditures relative to the proposed project area are anticipated under the No Action Alternative. Kittitas County tax revenue and service cost trends would likely continue to be similar to those of past years, at least with respect to the project area.

3.16.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are discussed in **Chapter 4**.

3.16.5 Mitigation Measures

No adverse fiscal impacts associated with the proposed project have been identified, and no mitigation measures are necessary.

3.16.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are expected. Anticipated local government revenues associated with the project are likely to be significantly higher than expected service costs.

APPENDIX A
EARTH RESOURCES

This appendix contains detailed technical information on earth resources that supports the content of **Section 3.1, Earth Resources**, in Volume 1 of the EIS. The appendix content includes more detailed description of regional and project-area geology (**Section 1** of the appendix), soils (**Section 2**) and seismic hazards (**Section 3**). Five graphics, identified as **Figures A-1** through **A-5**, are provided at the back of the appendix.

1. GEOLOGY

1.1 Regional Geology

Eroded metamorphic and igneous rocks form the basement rock on the eastern side of the Cascade Range. Tertiary sedimentary rocks derived from uplift and erosion of the basement rock and Tertiary volcanic rocks overlie most basement rock in the region. During Miocene time, the Columbia River Basalt Group (CRBG) was emplaced from eruption vents in southeast Washington, parts of Oregon, and Idaho. The basalt flowed generally westward and lapped onto the eastern margin of the Cascade Range covering over 164,000 km^2 of Washington, Oregon, and Idaho. Basalt flows crossed the Miocene-age equivalent of the Cascade Range along the Columbia Trans-Arc Lowland now occupied by the Columbia Gorge. The Grande Ronde Basalt was the largest of the Columbia River Basalt flows and underlies Kittitas Valley, terminating approximately 15 miles northeast of the project area. It was emplaced from approximately 15.5 to 16.5 million years ago (Tolan et al. 1989). Erosion and eruption of the Cascade Range during Miocene time generated sediment that was interfingered with the basalt flows to form the volcaniclastic and sedimentary sandstones, siltstones, and conglomerates of the Ellensburg Formation.

Regional deformation continued during the emplacement of the CRBG. North-south compression and east-west extension acted on the region contemporaneously with subsidence of the Columbia Plateau, due to emplacement of the basalt flows, and tectonic uplift of the Cascade Range. The stress regime led to the formation of folds and faults in the Columbia Plateau, creating southeast-trending ridges and valleys of the Yakima Fold Belt. The Yakima Fold Belt is characterized by a series of continuous, narrow, faulted, anticlinal ridges (outward dipping folds) that are separated by broad synclinal valleys such as the Kittitas Valley and the Wenatchee Mountains. Uplift of the Cascade Range tilted the Grande Ronde Basalt eastward. The stress regime creating the Yakima Fold Belt is likely still active today (Reidel and Tolan 1994)

The Kittitas Valley in the vicinity of the Desert Claim project is filled with Pliocene-age to Recent-age alluvial material derived from the surrounding basalt mountains and glacial deposits. Glacial geology indicates that Pleistocene-age glaciers of the upper Yakima River Basin were some of the largest alpine glaciers in the Cascade Range. Individual valley glaciers merged during some glacial advances in Pleistocene time to form extensive ice streams extending from Snoqualmie Pass to near Thorp, a few miles upstream of the project area. Porter (1976) identified three such glacial advances and argued that the outwash of the two older and larger advances extends to the central Kittitas Valley. Those glacial outwash deposits were named the Thorp Drift and the Kittitas Drift. Waitt (1979) concluded that the Thorp deposits are of Pliocene age and may not be of glacial origin. He designated these deposits as Thorp Gravel.

1.2 Project Area Geology

Geologic conditions of the project area were evaluated using data obtained from field explorations by Associated Earth Sciences, Inc. (AESI) and AESI's review of regional geologic maps and publications. Exploration logs are available for review on request from Kittitas County. **Figure A-1** presents a surficial geologic map of the project area. One cross section summarizing surface and subsurface geology relative to the project area topography is presented as **Figure A-2**. The location of the cross section is shown on **Figure A-1**. **Figure A-3** shows the locations of AESI's field explorations.

The surficial project-area geology consists of Pliocene-age sidestream alluvium, Pleistocene-age sidestream glacial outwash, and Recent-age postglacial alluvium. These surficial sediments overlie Miocene-age Grande Ronde Basalt that crops out on the northernmost property of the project and other isolated locations. A small outcrop of Miocene-age volcaniclastic Ellensburg Formation was located on the northeastern portion of the project area. The geologic units present in the project area are described below in order from oldest to youngest. Field observations of the units are also described.

Grande Ronde Basalt

The Miocene-age Grande Ronde Basalt is the oldest rock identified in the project area. The Grande Ronde consists of fine- to medium-grained basalt flows. Locally it may include thin sedimentary deposits of the Ellensburg Formation. The Grande Ronde Basalt consists of many flows which are complexly jointed and display typical basalt jointing patterns of a basal colonnade, central entablature, and in some flows, upper colonnade. Jointing patterns in much of the area are considerably affected by interaction of flows with water and sediment. (Tabor et al. 1982). Well logs, discussed in **Section 3.3.1.2** of the EIS, report many fracture zones in the basalt flow.

Surface exposures of the Grande Ronde Basalt are confined to a few small portions of the project area as mapped by Tabor et al. (1982): 1) in the south half of Section 22 (Township 19 North, Range 18 East) and 2) in adjoining portions of Sections 3, 4, 9, and 10 (Township 19 North, Range 18 East). A small outcrop of basalt was encountered during field exploration in a stream drainage incised into the Thorp Gravel terrace in the center of the northern half of Section 25 (Township 19 North, Range 18 East) (see **Figure A-1**).

One exploration pit was excavated on the northern portion of the property in Section 22 and encountered basalt bedrock at 1.5 feet below ground surface at about 2,280 feet elevation. The bedrock was fine-grained and vesicular. Broken angular gravel was observed at the surface with orange staining indicating moderate weathering. The basalt outcrop encountered in the Thorp Gravel terrace drainage was also fine-grained, vesicular, and displayed complex jointing. The exposure continued from the channel bottom (2,250 feet elevation) to approximately 10 feet above the channel bottom.

Ellensburg Formation

The Miocene-age Ellensburg Formation consists of volcaniclastic sedimentary rocks derived from volcanoes in the Cascade Range. The rocks are primarily sandstone and siltstone but include conglomerate, laharic deposits, and very minor amounts of micaceous, feldspathic siltstone. The formation rocks are weakly lithified. The volcanic sediment is mostly andesitic and dacitic and clasts are commonly pumiceous. The Ellensburg Formation is observed interbedded with and overlying the Grande Ronde Basalt (Tabor et al. 1982).

Within the Kittitas Valley, surface exposures of the Ellensburg Formation are not common. However, Waitt (1979) describes the Ellensburg Formation encountered at the base of Thorp Gravel terraces in the northwestern Kittitas Valley**.** During field exploration, AESI encountered a thin layer of white, volcanic rock at the base of the eastern Thorp Gravel terrace in the northwest quarter of the southwest quarter of Section 24 (Township 19 North, Range 18 East) at approximately 2,300 feet elevation. This is interpreted to be the Ellensburg Formation. The exposure was encountered at the base of the terrace that was eroded by a small drainage (**Figure A-1**). The deposit is weakly lithified and includes pumice clasts and crystal fragments indicating the material was erupted from volcanoes in the ancestral Cascade Range, not eroded from older volcanic rocks (Tabor et al. 1982).

Thorp Gravel

Thorp Gravel is a thick gravel deposit that forms a conspicuous high-level terrace in the Kittitas Valley. Thorp Gravel located in the project area was deposited by Yakima River tributaries as sidestream deposits during a period of aggradation of the river, as suggested by Waitt (1979). Sidestream alluvium refers to deposits of tributary streams to the mainstream (here, the Yakima River), that grade to mainstream deposits (Waitt, personal communication 2003). The sidestream facies is composed of subangular clasts of Grande Ronde Basalt derived from the northern side of the Kittitas Valley. Both the sidestream and mainstream deposits are incised as much as 30 meters by small streams, are deeply weathered and are weakly cemented up to 10 meters with montmorillonite and hematite (Tabor et al. 1982). Waitt (1979) documents zircon fission track dating of the Thorp Gravel that gives Pliocene ages of approximately 3.6 to 3.7 million years ago, and suggests that aggradation of the river may have been caused by uplift of anticlines that cross the river to the south within the structural zone of the Olympic-Wallowa Lineament (OWL) (Tabor et al. 1982).

AESI's field exploration documented Thorp Gravel terraces as forming high, distinct terraces with slopes of 25 to 35 degrees. The terraces are approximately 100 to 200 feet above the surrounding topography. The tops of the terraces are covered up to 80 percent with grass and shrubs while vegetation cover on the slopes is approximately 40 percent. Slumping was not observed at the base of terrace slopes however colluvium composed of broken basalt gravel was observed to cover about half of the lower half of slopes. Subsurface exploration showed a thin soil layer as described in **Section 2, Soils** below. Beneath the soil, a partially cemented zone was encountered that consisted of brown to orange-brown, subrounded to subangular gravel in a sand matrix. Few cobbles and boulders were encountered. The material was heavily oxidized and weathering rinds were observed on clasts, demonstrating deep weathering. Gravels were partially cemented; iron staining and chert development were observed during site-specific field explorations.

Kittitas Drift

Kittitas glacial deposits in the project area are comprised of sidestream outwash of the Swauk Prairie phase. Sidestream deposition is defined above under Thorp Gravel. The maximum glacial ice advance in the upper Yakima River Valley is marked by moraines approximately 7 km upvalley of the project area and Kittitas mainstream (Yakima River) outwash can be traced about 15 km southeast of moraines, along the southern side of the valley. Terraces of basaltic sidestream gravel in the northern Kittitas Valley are correlated with the mainstream terrace on the basis of elevation. Pleistocene ages of 135,000 to 145,000 years old have been proposed for the Kittitas Drift (Porter 1976 and Waitt 1979).

AESI's field exploration documented Kittitas Drift terraces as forming distinct terraces of moderate height (15 to 30 feet) and gentle slopes. Thin to moderate soil development was observed and discussed in **Section 2, Soils** below. The terrace sediment encountered was yellow-brown to orange sandy silt with subangular to subrounded gravel. The deposits are weakly cemented and brittle; containing some mica and chert.

Recent-Age Alluvium - Postglacial Deposits

Most of the Recent-age, postglacial deposits in the project area are alluvial fan or other modern stream deposits accumulating from streams that originate in the basalt mountains to the north and flow southward to the Yakima River. Erosion by these younger, postglacial streams has carved distinct terraces in the older Kittitas Drift and Thorp Gravel deposits. The alluvium is comprised of either reworked older deposits or material derived from the northern basalt mountains. Porter (1976) suggested that the postglacial alluvial deposits are probably relatively thin. Field exploration in modern stream channels encountered sediment that was generally loose to medium dense and dark brown to brown. The material was composed primarily of sand and silt with lesser amounts of gravel. Clay was encountered as the primary constituent in some excavations.

Other postglacial deposits in the project area include landslide and colluvial deposits located at the base of steep slopes and in drainages. One exploration pit was excavated in the landslide mapped in Section 9 (**Figure A-1**). The sediment encountered was loose and contained clay, silt, and sand with some gravel. Colluvium of broken basalt gravel was observed at the base of Thorp Gravel terraces.

2. SOILS

2.1 Overview

Physical and chemical weathering of surficial glacial deposits, nonglacial deposits, and bedrock has resulted in the formation of various types of surface soils on the project site. Surface soils data were obtained from the Natural Resource Conservation Service (NRCS) located in Spokane, Washington. The NRCS soil survey of Kittitas County has not been completed as of the date of this report. Draft versions of soil maps and descriptions were available for the project site (NRCS 2003a). Individual soil units have been mapped by the NRCS on recent orthophotoquads of the site vicinity. **Figure A-4 (a, b, and c)** presents a surface soils map for the project site based on the orthophotoquads obtained from the NRCS and modified as determined from site-specific subsurface investigations.

Comprehensive descriptions for map units shown in **Figure A-4** are not currently available. However, draft engineering and selected physical properties of each soil unit were obtained from the NRCS and are summarized in **Table A-1** (NRCS 2003a). Also, soil profiles for most on-site soils are available from the NRCS database via the Internet (NRCS 2003a). Based on this information, descriptions of each unit are presented below.

2.2 Soil Unit Taxonomy

All soil units on the project site share certain characteristics, which are represented in various levels of the soil taxonomy hierarchy. A summary of the hierarchy follows:

- Order **-** differentiated by horizons and features that reflect the formation of the soils
- Suborder **-** differentiated by the most important variable of soil formation within the order
- Great Group - differentiated by assemblage of horizons and most significant properties of the soils
- Subgroup - differentiated by subordinate features or processes that influence soil development
- Family - differentiated by physical and chemical properties
- Series **-** differentiated by a narrower range for one or more properties

The soils on the project site belong to the order Mollisols. These soils are present in mid-latitudes on prairie regions. They are usually part of a grassland ecosystem. Mollisols typically have a thick, dark surface horizon (mollic epipedon). Soils on the project site are classified in the Xerolls suborder. They are typical to areas that have moist, cold winters and dry, warm summers. Sometimes, as in this case, these soils are present in semiarid regions. These soils form in late-Pleistocene loess, tertiary lake sediments, older crystalline rocks, and alluvium (NRCS 2003b).

Table A-1
Summary of Surface Soils

Soil Name	Texture	Percent Slope	Runoff Rate*	Erosion Hazard*
Sapkin-Rubble	cobbly/very stony loam	30 to 75	slow to rapid	slight to severe
Stemilt	ashy loam	25 to 45	very slow to rapid	very slight to severe
Pits, Mine				
Mippon	very cobbly loam	0 to 5	very slow or slow	very slight to slight
Argabak	very cobbly loam	15 to 30	slow to very rapid	slight to very severe
Tanksel-Camaspatch	very gravelly/cobbly clay loam	15 to 30	slow to very rapid	slight to very severe
Argixerolls-Durixerolls		steep south		
Pachneum	ashy loam	2 to 5	slow to rapid	slight to severe
Argixerolls-Durixerolls		steep north		
Varodale	clay	2 to 5	slow	slight
Vanderbilt	ashy loam	0 to 2	slow	slight
Argixerolls		moderately steep		
Camaspatch-Whiskeydick	very gravelly/extremely cobbly clay loam	15 to 30	slow to very rapid	slight to very severe
Whiskeydick-Tronsen-Camaspatch	very gravelly/cobbly clay loam	30 to 70	slow to very rapid	slight to very severe
Laufer-Theissen	very cobbly/clay loam	30 to 45	medium to rapid	moderate to severe
Argabak-Whiskeydick	very cobbly loam/clay	3 to 15	slow to very rapid	slight to very severe
Argabak-Mozen	very cobbly loam to silt/clay loam	3 to 15	slow to very rapid	slight to very severe
Reeser-Lablue	ashy clay/gravelly loam	3 to 15	slow to medium	slight to moderate
Reeser-Lablue-Sketter	ashy/very gravelly clay loam	3 to 10	slow to medium	slight to moderate
Modsel	ashy loam/extremely gravelly sandy clay	0 to 5	slow	slight
Reeser-Reelow-Sketter	ashy/extremely gravelly sandy loam	2 to 5	slow	slight
Reelow-Reeser-Sketter	ashy/extremely gravelly sandy clay loam	2 to 10	slow	slight
Metmill	ashy/very gravelly sandy clay loam	0 to 5	slow	slight

Soil Name	Texture	Percent Slope	Runoff Rate*	Erosion Hazard*
Modsel-Metser	clay loam/very gravelly sandy clay	0 to	slow	slight
Reelow-Reeser	ashy clay/gravelly sandy loam	5 to 10	slow	slight
Reelow-Skeeter-Lablue	very gravelly ashy/sandy loam	2 to 10	slow to medium	slight to moderate
Sketter-Reelow-Reeser	very gravelly/gravelly ashy/sandy loam	2 to 5	slow	slight
Reelow	very cobbly ashy loam	3 to 15	slow	slight
Reelow-Lablue	gravelly clay/sandy loam	3 to 10	slow to medium	slight to moderate
Weirman	gravelly sandy loam	0 to 5	very slow to slow	very slight to slight
Sketter-Millhouse-Lablue	gravelly ashy loam/extremely gravelly sand	0 to 5	slow to medium	slight to moderate
Reeser-Skeeter-Weirman	ashy clay loam/very gravelly sandy loam	3 to 15	very slow to slow	very slight to slight
Maxhill	gravelly ashy loam/extremely gravelly loamy sand	0 to 5	slow	slight
Patron	gravelly silty clay loam	15 to 45	medium to very rapid	moderate to very severe
Weirman-Kayak	very gravelly loamy sand/gravelly ashy sandy loam	0 to 5	very slow to slow	very slight to slight
Maxhill	very cobbly ashy loam	0 to 5	slow	slight
Vantage-Palerf-Rubble	very gravelly/cobbly clay loam/clay	30 to 75	slow to very rapid	slight to very severe

* Range in Runoff Rate and Erosion Hazard is due to their relationship to slope. Since many soils are encountered with a wide range of slopes, the associated runoff and erosion hazard will also vary.

Agrixerolls and Durixerolls

Some soil units are characterized in their Great Group instead of Series due to their wide ranges in key properties. The Agrixerolls and Durixerolls are Great Groups of soils that belong to the suborder Xerolls. Durixerolls have a duripan, a silica-cement layer of sediment that is slowly permeable. On-site, this duripan is cemented basalt gravel with iron and manganese staining. Agrixerolls have an argillic horizon which is a layer that has a higher percentage of phyllosilicate clay than the overlying soil material (NRCS 2003b). Soils defined by these Great Groups are located on recent alluvium overlying Thorp Gravel on the easternmost properties (**Figure A-4c**). These soils have moderately steep to steep slopes.

Characteristics of the following soil units are listed in **Table A-1** and the map units are located in **Figure A-4 (a, b and c)**. Information for the descriptions below was provided by NRCS (2003a and 2003b).

Stemilt Ashy Loam

The Stemilt soils are composed of very deep and deep, well-drained soils. These soils are characterized by dark-grayish-brown, brown and pale-brown, ashy loam developed over a substratum of material that has weathered from basalt. There is some influence from volcanic ash and loess. Stemilt soils are found on mountains at elevations of 3,200 to 3,500 feet with slopes of 25 to 75 percent. Permeability is moderately slow and runoff varies from very slow to rapid with slope. Stemilt soils cover a small area on the northernmost property (**Figure A-4a**).

Mippon Very Cobbly Loam

The Mippon soils are composed of very deep, moderately well-drained soils. These soils are characterized by dark-grayish-brown and brown, very cobbly loam developed over a substratum of material that has weathered from recent alluvium. On-site Mippon soils are present on stream terraces on the northernmost properties, at elevations of 2,300 to 3,500 feet, with slopes of 0 to 5 percent (**Figure A-4a**). Permeability is moderate to very rapid and runoff varies from very slow to slow with slope.

Patron Landslide Complex

The Patron soils are composed of very deep, well-drained soils. These soils are characterized by dark-grayish-brown, brown and yellowish-brown, gravelly silt loam developed over a substratum of landslide material. On-site Patron soils are located on the northwest ¼ of Section 9 (**Figure A-4a**). These soils are at elevations of 2,700 to 3,300 feet, with slopes of 15 to 45 percent. Permeability is slow and runoff varies from medium to very rapid with increasing slope.

Kayak and Weirman Complexes

The Kayak and Weirman soils are composed of very deep soils. Kayak soils are characterized by grayish-brown and brown, gravelly, ashy loam. Weirman soils are characterized by grayish-brown and brown, fine sandy loam. These soils are developed over a substratum of material that has weathered from recent alluvium and are found in floodplains. On-site, Weirman and Kayak soils are present in the floodplain of Green Canyon Creek in Sections 17 and 20 (**Figure A-4b**). The elevation range of Kayak soils is 2,100 to 2,500 feet with slopes of 0 to 5 percent. The Weirman soils are also located on low terraces and in stream channels and floodplains overlying Thorp Gravel (**Figure A-4c**). Weirman soils are present at elevations from 1,900 to 2,500 feet, with the slopes ranging from 0 to 15 percent. Permeability is moderate for Kayak soils and rapid for Weirman soils. Runoff varies from very slow to slow with slope.

Lablue, Reelow, Reeser, and Sketter Complexes

The Lablue, Reelow, Reeser, and Sketter soils are composed of very shallow and moderately deep, well-drained soils. They are present in old uplifted fan remnants, old terraces, and old till plains. Lablue soils are characterized by yellowish-brown, brown and pale-brown, very gravelly ashy loam. Reelow soils are characterized by dark-brown to very-pale-brown and light-yellowish brown, very gravelly, ashy loam. Reeser soils are characterized by grayish-brown, brown, yellowish-brown, and very-pale to pale-brown, ashy loam. Sketter soils are characterized by very-dark-grayish-brown, dark-yellowish-brown to light-yellowish-brown, and very-pale-brown, gravelly loam. On-site, these soils are developed over a substratum of material that has weathered from the Thorp Gravel and the Kittitas Drift. Lablue, Reelow, Reeser, and Sketter soils are located at elevations of 1,900 to 3,100 feet with slopes of 0 to 15 percent. Permeability is slow to moderately slow and runoff is medium to slow depending on slope. Lablue, Reelow, Reeser, and Sketter soils are located throughout the project area and cover most of the easternmost properties (**Figure A-4a, b, and c**)

Palerf, Sapkin, and Vantage Complexes

The Palerf, Sapkin, and Vantage soils are composed of shallow and moderately deep, well-drained soils. Palerf soils are characterized by brown, gravelly loam. Vantage soils are characterized by dark-brown, brown, and dark-yellowish-brown, very cobbly loam. Sapkin soils are characterized by brown and yellowish-brown, very stony loam. On-site, these soils are developed over a substratum of residuum and colluvium composed of Grande Ronde Basalt and some loess. Palerf and Sapkin also have an influence of volcanic ash. Palerf and Vantage soils are found on hillslopes of the northeast ¼ of Section 21 (**Figure A-4c**). Sapkin soils are located on ridgetops and mountainside slopes of the northernmost property (**Figure A-4a**). Palerf soils are located at elevations of 1,900 to 2,500 feet, Sapkin soils are found at elevations of 2,100 to 3,000 feet, and Vantage soils are found at elevations of 2,400 to 5,600 feet. These soils have slopes of 30 to 75 percent. Permeability is slow for Palerf and Vantage soils and moderate for Sapkin soils. Runoff is slow to rapid depending on slope.

Metmill and Modsel Complexes and Varodale Clay

The Metmill, Modsel, and Varodale soils are composed of very deep soils. Metmill soils are somewhat poorly drained, and Modsel and Varodale soils are moderately well drained. Metmill soils are characterized by dark-grayish-brown, ashy loam. Modsel soils are characterized by dark-grayish-brown, brown and yellowish-brown, ashy loam. Varodale soils are characterized by dark-grayish-brown, grayish-brown, and light-brownish-gray clay. These soils are developed over a substratum of recent alluvium with volcanic ash, including alluvial fans. Metmill soils are also present on inset fans. Modsel soils cover large areas of the western properties (**Figure A-4b**). Metmill and Varodale are also located throughout the western properties, covering a smaller area (**Figure A-4c**). Varodale soils are also developed over Kittitas Drift on Section 26 (**Figure A-4c**). Metmill and Modsel soils are located at elevations of 2,060 to 2,500 feet, and Varodale soils are located at elevations of 1,900 to 2,400 feet. These soils have slopes of 0 to 5 percent. Permeability is slow for Modsel and Varodale soils and moderately slow for Metmill soils. Runoff off from these soils is slow.

Maxhill, Millhouse, and Metser Complexes and Vanderbilt Ashy Loam

The Maxhill, Millhouse, Metser, and Vanderbilt soils are composed of very deep, moderately well-drained and well-drained soils. Maxhill soils are characterized by dark-grayish-brown, dark brown and brown, ashy loam. Millhouse soils are characterized by dark-grayish-brown and brown, gravelly ashy loam. Metser soils are characterized by dark-grayish-brown and grayish-brown, clay loam. Vanderbilt soils are characterized by dark-grayish-brown, brown and grayish-brown loam. These soils are developed over a substratum of recent alluvium or glacial outwash and overlie Kittitas Drift. They are present on the western properties and portions of the eastern properties (**Figure A-4b and c**). Maxhill and Millhouse soils are located at elevations of 2,060 to 3,100 feet. Metser and Vanderbilt soils are located at elevations of 2,060 to 2,500 feet. These soils have slopes of 0 to 5 percent. Permeability is slow to moderate, and runoff is slow.

Argabak, Pachneum, and Tanksel Complexes

The Argabak, Pachneum, and Tanksel soils are composed of well-drained soils. Argabak soils are very shallow, Tanksel soils are moderately deep, and Pachneum soils are very deep. Argabak soils are characterized by yellowish-brown and dark brown, very cobbly loam. Pachneum and Tanksel soils are characterized by dark-grayish-brown, grayish-brown, yellowish-brown and brown loam. These soils are developed over a substratum of loess with volcanic ash, residuum, colluvium, and alluvium composed of Grande Ronde Basalt. Argabak, Pachneum, and Tanksel soils overlie the Kittitas Drift. They are present on slopes and benches on Section 26 (**Figure A-4c**). Argabak and Pachneum soils are located at elevations of 2,060 to 3,500 feet. Tanksel soils are located at elevations of 2,500 to 3,500 feet. Argabak soils have slopes of 3 to 30 percent, Pachneum soils have slopes of 2 to 5 percent, and Tanksel soils have slopes of 15 to 30 percent. Permeability is slow to moderately slow, and runoff varies with slope.

Camaspatch, Laufer, Mozen, Thiessen, Tronsen, and Whiskeydick Complexes

The Camaspatch, Laufer, Mozen, Thiessen, Tronsen, and Whiskeydick soils are composed of well-drained soils. Camaspatch and Laufer soils are shallow, Mozen, Thiessen, and Whiskeydick soils are moderately deep, and Tronsen soils are very deep. Laufer and Thiessen soils are characterized by brown, very stony silt/clay loam. Camaspatch and Mozen soils are characterized by dark-gray, dark-grayish-brown, brown, and pale brown, silt loam and very cobbly silt loam. Tronsen soils are characterized by dark-grayish-brown, brown, yellowish-brown, and pale-brown, stony ashy silt loam. Whiskeydick soils are characterized by dark-brown and yellowish-brown, very cobbly loam. These soils are developed over a substratum of residuum, colluvium, and slope alluvium composed of Grande Ronde Basalt with some loess and volcanic ash. These soils overlie the Kittitas Drift. They are present on slopes, mountainsides, and benches over large areas of the northern properties (**Figure A-4a**). Camaspatch, Laufer, Mozen, Thiessen, Tronsen, and Whiskeydick soils are located at elevations of 2,500 to 3,200 feet. These soils have slopes that vary from 3 to 70 percent. Permeability is slow to moderate in these soils, and runoff varies with slope.

3. SEISMIC HAZARDS

3.1 Historical Seismic Activity

The Desert Claim wind power project location is in an area of low to moderate historical seismicity. **Table A-2** summarizes historical and recorded seismic events greater than magnitude (M) 3.0 in the vicinity of the site as obtained from the University of Washington's Pacific Northwest Seismograph Network (PNSN). The historic record of earthquakes in the Pacific Northwest dates from about 1840. Much of the early record was provided by newspaper reports of structural damage or human perception of shaking. Seismograph networks did not start providing locations and magnitudes of earthquakes in the Pacific Northwest until about 1960 and the PNSN began operation in 1970. Magnitudes, locations, and depths before this time are less precise. **Figure A-5** shows the locations and magnitudes for earthquakes listed in **Table A-2**. Nearly 200 seismic events between M 2.0 and M 2.9 have been recorded in the project vicinity since 1970. Earthquakes of magnitude less than 3.0 pose little to no hazard, however, they provide information about regional structure and faulting.

Two earthquakes within an area of approximately 1degree latitude by 1degree longitude surrounding the project area had a measured magnitude of 5.0 or greater (M 5.0 and M 6.8). The M 5.0 event occurred in 1943 and is located just north of Table Mountain in the Wenatchee Mountains of the Cascade Range, about 14 to 17 miles north of the project area. The M 6.8 event occurred in 1872 and is located approximately 55 miles northwest of the project area. All other earthquakes are M 4.3 or less. Both the M 5.0 and the M 6.8 earthquakes occurred prior to the operation of the PNSN. Two M 4.3 earthquakes located about 27 miles southwest and 34 miles northeast of the project area are the largest seismic events recorded in the site vicinity since the installation of the PNSN. One earthquake (M 3.0) is located in the project area (**Figure A-5**) and is discussed under **Surficial Fault Zones** below.

Stresses that cause earthquakes in western and central Washington are due, in part, to the interaction of tectonic plates that meet near the western edge of Washington State. The Juan de Fuca oceanic plate, which forms the floor of the northeastern Pacific Ocean, moves northeastward with respect to the North American continental plate at an average rate of about 4 centimeters per year. Differences in density of the two plates cause the Juan de Fuca plate to sink or subduct beneath the North American plate. The interaction of the plates forms the Cascade volcanoes and potentially large earthquakes.

Recent tectonic research reveals regional tectonic stresses, in addition to the stresses created by the subduction of the Juan de Fuca plate, that affect western and central Washington, including the Yakima Fold Belt. Studies using the Global Positioning System (GPS) show that a small tectonic block of North America that includes part of Oregon is experiencing rotation and general northward movement relative to Washington State. Regionally this motion may be driven by a combination of extension in the Basin and Range region to the southeast, northward push from the Eastern California shear zone, and from drag created by resistance of the subduction zone to northward movement (McCaffrey et al. 2000, 2003; Savage et al. 2000). GPS studies have confirmed that northward motion of approximately 1 centimeter per year (cm/year) is occurring along the Cascadia margin (McCaffrey et al. 2000, 2003; Savage et al. 2000). McCaffrey et al. (2000) suggests the rotating Oregon block appears to converge with North America in Washington State along the OWL and across Puget Sound. The deformation is accommodated by north to south shortening in Washington State and Canada, including the Yakima Fold Belt and Puget Sound.

Table A-2
Historical Seismicity in the Project Vicinity (M>3.0)

Date	Latitude (°N)	Longitude (°W)	Depth (km)	Magnitude
12/15/1872*	47.75	119.87	NA	6.8
04/24/1943*	47.29	120.59	NA	5.0
09/11/1970	46.65	120.40	18.1	3.5
12/09/1970	46.92	120.91	13.1	3.5
07/13/1977	47.09	120.98	3.3	3.9
06/27/1978	46.87	120.97	12.4	3.6
04/07/1979	46.97	120.45	16.9	3.0
07/28/1979	46.67	120.61	0.0	3.7
12/10/1979	46.66	120.60	7.5	3.1
02/18/1981	47.19	120.89	3.4	4.2
11/14/1983	46.65	120.59	7.9	3.8
12/05/1983	46.91	120.71	7.8	3.8
04/11/1984	47.53	120.18	8.0	4.3
01/09/1985	47.06	120.09	0.3	3.3
01/31/1985	47.05	120.08	0.3	3.3
04/19/1985	46.89	120.28	5.3	3.2
06/17/1985	47.05	120.07	0.3	3.0
10/01/1985	46.79	120.04	1.1	3.0
10/01/1985	46.78	120.04	1.7	3.0
06/11/1987	46.77	120.69	17.2	3.0
12/02/1987	46.67	120.68	18.2	4.1
12/02/1987	46.67	120.67	17.8	4.3
02/01/1991	46.81	120.55	6.6	3.4
02/22/1991	46.87	120.65	13.3	3.2
07/06/1991	46.93	120.33	4.1	3.4
07/07/1991	46.93	120.33	3.8	3.3
10/26/1992	46.84	120.71	0.0	3.5
03/09/1995	47.19	120.95	1.6	3.0
06/30/1995	47.10	120.52	11.2	3.0
12/17/1995	47.59	120.21	12.4	3.1
01/01/1997	46.77	120.45	19.0	3.7
01/15/2003	46.61	120.52	11.0	3.2

*Seismic event occurred prior to operation of the Pacific Northwest Seismograph Network.
Source: Pacific Northwest Seismograph Network (2002).

Three types of earthquakes occur in the Pacific Northwest that affect Washington. The Juan de Fuca plate must bend as it subducts beneath the North American plate causing deep intraplate earthquakes within the Juan de Fuca plate. Three such events have been recorded in western Washington: the recent Nisqually earthquake (2001 M=6.8), the 1965 earthquake (M~6.8), and the 1949 (M~7.1) earthquake.

Deep interplate (or subduction zone) ruptures occur between the Juan de Fuca plate and the North American plate. Records provided by buried soil layers, dead trees, and deep-sea deposits indicate that a subduction earthquake such as this occurred in the year 1700 with a magnitude of approximately 8.9. A documented tsunami occurred in Japan that has been correlated to this earthquake. A recurrence interval of 500 to 600 years is estimated for this type of earthquake (Satake et al. 1996, Atwater and Hemphill-Haley 1997).

The third type of event is a shallow, crustal earthquake occurring within the North American plate due to tectonic stress regimes. Crustal faults and structural lineaments are mapped in central Washington in the vicinity of the project area. Many document movement during Late Tertiary but not during Quaternary time. Ongoing studies suggest that east-west trending faults in the Yakima Fold Belt are actively accommodating north to south compression of Washington (McCaffrey et al. 2000, 2003).

The Kittitas County CAO (Section 17A.02.260) defines seismic hazard areas as, "*…geologically hazardous areas subject to risk of earthquake damage.*" Four types of potential geologic hazards are usually associated with large seismic events: ground rupture along a surficial fault zone; ground motion response; liquefaction; and seismically induced landslides.

3.2 <u>Surficial Fault Zones</u>

Geologic structures that relate to surficial fault zones near the project area are described in **Section 3.1.1.3**. The anticlines of the Yakima Fold Belt are underlain and often caused by thrust faults. Recent studies indicate that the Yakima Fold Belt is actively accommodating north-south shortening of central Washington (McCaffrey et al. 2000) as discussed in **Appendix A, Section 3.1**. Several generally east-west trending faults are mapped within the Yakima Fold Belt (Bakun et al. 2002, Tabor et al. 1982). However, evidence of Quaternary deformation has not been identified to date.

The 1872 earthquake (M 6.8) is important in quantifying the seismic hazard in central and eastern Washington because it is the largest historical earthquake in Washington east of the crest of the Cascade Range. Bakun et al. (2002) suggest that the earthquake was shallow, based on aftershock patterns, and the epicenter was located south of Lake Chelan (as shown on **Figure A-5**). The rupture plane of the 1872 earthquake has not been located and may represent a recent rupture within the Yakima Fold Belt or deeper Cascade Range crystalline rock that does not have surface expression. Bakun et al. (2002) suggest that events as large as M 6.8 can reasonably be expected over most of south to central Washington.

There are northwest-southeast trending faults that cross the project area as mapped by Tabor et al. (1982) (the inferred fault traces are shown on **Figure A-1**). Currier Creek drainage patterns appear to be influenced by this fault near the center of the project area in Section 22 (Township 19 North, Range 18 East). The fault is not visible under recent alluvial deposits but may be continuous from Section 22, trending northwest to cut diagonally across Section 9 (Township 19 North, Range 18 East). In Section 9, the fault trace crosses a landslide deposit mapped by Tabor et al. (1982). The landslide block was observed in the field and the mapped area on **Figure A-1** was adjusted as per field and aerial photography observations. The landslide material is part of the Kittitas Drift; therefore the material was deposited approximately 130,000 to 140,000 years before present. The landslide is fully vegetated and does not represent a recent disturbance. Landslide movement may have been due to seismicity along the fault at some time after deposition.

AESI identified northwest-trending lineaments on stereo pair aerial photographs on the eastern Thorp Gravel terrace (Section 25, Township 19 North, Range 18 East and Sections 30 and 31, Township 19 North, Range 19 East). However, these lineaments were not visible during field exploration. The 1995 M 3.0 earthquake that occurred in the project area is located on the eastern side of the property on the

Thorp Gravel terrace near a fault mapped by Tabor et al. (1982). Deformation along the fault affects the Pliocene-age Thorp Gravel terrace. More recent activity along the fault system is possible, however, offset has not been documented in post-Pliocene-age deposits.

3.3 Ground Motion Response

Ground motion from an earthquake results from shear, pressure, and surface waves propagating through the earth's crust from the earthquake's hypocenter. The ground motion caused by these waves is the seismic shaking felt during an earthquake. The intensity of the shaking felt at a given location during and immediately after an earthquake, is a result of several variables including: 1) the magnitude of the earthquake; 2) distance from the earthquake; 3) depth of the earthquake; 4) the type of rocks and unconsolidated sediments underlying a given site; and 5) attenuation of the seismic energy between the earthquake and a given site. Although the project site is located in an area of relatively low to moderate historical seismicity, as shown in **Table A-2,** there are several sources of large earthquakes in western Washington and possibly within central Washington as indicated by the 1872 event.

The Nisqually 2001 earthquake provided direct observation of ground motion during a large regional earthquake. The University of Washington's PNSN created a "shake map" of peak acceleration and velocity from wave forms collected during the earthquake. Peak acceleration is the maximum acceleration experienced by a particle at the earth's surface during the course of the earthquake motion. The event was located between Olympia and Tacoma, 33 miles deep, approximately 95 miles east of the project areas. The shake map shows light shaking within 20 miles of the project area (peak acceleration of 1 to 4 percent of the acceleration of gravity (g) [g = 9.8 meters per second]) (http://www.ess.washington.edu/shake/0102281854/intensity.html).

The United States Geological Survey (USGS) has created seismic hazard maps to predict the expected peak ground acceleration from earthquakes (Frankel et al. 2002). According to this work, in the next 50 years there is a 10 percent chance that ground motions will exceed 15 percent g in the vicinity of the project. This work contributed to the 1997 *Uniform Building Code* (UBC) determinations of seismic zones in the Pacific Northwest. The UBC's seismic zone classifications are used to determine the strengths of various components of a building or structure needed to resist earthquake damage caused by ground motion. Design guidelines for minimizing earthquake damage to structures based on anticipated ground motions for a specific region are included in the UBC. The seismic zones used by the UBC range from Seismic Zone 0 (area of low seismic risk) to Seismic Zone 4 (area of high seismic risk). The project is located within Seismic Zone 2B as defined by the 1997 UBC.

Unconsolidated young deposits may amplify ground motion. Ground motions in these areas will likely be more intense than predicted for hard rock sites.

3.4 Liquefaction

Liquefaction is the process in which soil loses strength or stiffness during vibratory shaking, such as that caused by earthquakes, and temporarily behaves as a liquid. Shaking during an earthquake can cause an increase in pore water pressure in the soil, and decrease the soil shear strength. Soils are considered to liquefy when nearly all of the weight of the soil is supported by the pore water pressure and becomes relatively unstable. The seismically induced loss of soil strength can result in failure of the ground surface and can be expressed as landslides or lateral spreads, surface cracks and settlement, and/or sand boils. Seismically induced liquefaction typically occurs in loose, saturated, non-cohesive sandy and silty soils commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill.

AESI's field exploration and review of area well logs indicate that much of the project area is underlain by unconsolidated sediments up to 300 feet thick. Some material is young stream deposits that are relatively loose and fine-grained and may be subject to liquefaction under strong seismic shaking, however these sediments are expected to be thin. The majority of the property is underlain by well-drained sand and gravel deposits which are not susceptible to liquefaction. Based on the results of our field exploration program, our experience with similar soil types, and our understanding of the regional seismicity, it is our opinion that the potential for liquefaction at the project area is low. However, unconsolidated soils underlying wetlands and stream corridors may be susceptible to liquefaction during larger seismic events, although most of the susceptible soil layers are likely relatively thin.

3.5 Seismically-Induced Landslides

Earthquake vibration may cause unstable material to fail by influencing existing planes of weakness within bedrock (such as bedding planes or fault planes) or within unconsolidated material. The USGS documented many earthquake-induced landslides throughout the Puget Lowland that occurred due to shaking from the 2001 Nisqually event and several researchers have correlated previous mass movements in Lake Washington to the A.D. 900 earthquake on the Seattle Fault (Jacoby et al. 1992; Karlin and Abella 1992, 1996). Although landslides were identified on the project area, it is unknown whether these landslides were induced by associated seismic events. The risk of seismically induced landslides occurring on the site is generally interpreted to be low due to the relatively moderate slope gradients and soil characteristics. Locally, along steep slopes, the risk of seismically induced landslides is considered moderate.

APPENDIX B

Water Resources

Contents

Stream and Wetland Delineation Report

Desert Claim Wind Power Project
Kittitas County, Washington

August 2004

Prepared for:

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Stream and Wetland Delineation Report

1.0 Executive Summary

This report presents results of a delineation of streams and wetlands, and water-associated habitats for a proposed Desert Claim Wind Power (Desert Claim) Project located approximately 5 miles north of the City of Ellensburg in Kittitas County, Washington. Desert Claim is proposing to construct and operate a wind energy facility with a maximum of 120 wind turbines, with associated towers, footings, and pad-mounted transformers, each capable of generating a minimum of 1.5 Megawatts (MW) of electricity. Other proposed project elements include power collection, substation and transmission facilities, project access roads, and a project operations and maintenance facility.

The wetland delineation results are based on the routine on-site determination methodology (Environmental Laboratory, 1987) performed by Ecology and Environment, Inc., (E & E). E & E was retained by Huckell Weinman Associates, Inc. to delineate wetlands and waters of the United States within Desert Claim's project area. The delineation covered the entire project area, including locations planned for wind turbines and other above ground facilities as well as the surrounding area of influence. The term *project area* refers to the specific lands where Desert Claim has the landowners' permission to permit and construct the Project.

Water features were identified in the survey area, including 5 perennial streams, 14 intermittent streams and creeks, ephemeral drainages or washes, the North Branch Irrigation Canal, and numerous irrigation ditches and stock ponds. All 5 perennial streams exhibited characteristics of a Type 3 stream and the remaining 14 streams exhibited characteristics of a Type 4 or 5 stream. Twenty (20) water features are crossed by access roads or located within the construction area for wind turbines or the substation. Table 6.1.1 names those jurisdictional water features identified within the project area. Table 6.1.2 provides a list of potential temporary and permanent impacts to water features as a result of the proposed project. All waters were classified using the Washington Department of Natural Resources (WDNR) stream typing maps.

A total of 76 wetlands containing all three wetland parameters (hydrology, vegetation, and soils) were identified within the project area. While some wetlands were connected to perennial streams and/or associated riparian corridors, the majority of the wetlands delineated within the project area were fed by artificial irrigation. Numerous irrigation ditches flow from the North Branch Irrigation Canal across the properties to supply water to agricultural fields and/or grazing areas. During the delineation, it was noted where artificial irrigation supplied the only hydrology for the wet areas. The majority of the wetlands exhibited features characteristic of Category III or IV or poor-quality wetlands, as classified by the Washington Department of Ecology (Ecology) for the eastern region of the state (site reference to ranking system). No wetlands could be classified as high quality Category I or II wetlands.

Of the 76 wetlands, 48 are crossed by access roads or within the operation or construction area for wind turbines. Table 6.2.1 provides a list of wetland features identified in the project area. Table 6.2.2 provides a list of potential temporary and permanent impacts to wetlands as a result of the proposed project. The total calculated acreage of delineated wetlands within the proposed construction area, which includes temporary extra workspace areas, is 17.1 acres.

Data sheets and photographs are on file with Kittitas County.

2.0 Project Description

Desert Claim is pursuing the opportunity to construct and operate a wind energy facility located approximately 5 miles north of the City of Ellensburg in Kittitas County, Washington and 8.5 miles from the city center (see **Figure 1**). The project area consists of 5,309 acres of agricultural land that is relatively flat and open. Land within the project area is zoned Agriculture 20 (Ag-20) and Forest and Range (FR) under the Kittitas County Zoning Code. Existing land use includes grazing, pasture, feed crop production, and rural residential development. In addition, the project area is within a major cross-state electrical transmission corridor. Eight high-voltage electrical transmission lines either directly cross or are located adjacent to the project area. The site was selected based on favorable conditions including: sufficient winds to support the project, existing roads, adjacent electrical power transmission lines, land owner concurrence, and the lack of major environmental limitations.

The facility would include a maximum of 120 wind turbines, with associated towers, footings, and pad-mounted transformers, each capable of generating a minimum of 1.5 Megawatts (MW) of electricity. Other proposed project elements include power collection, substation and transmission facilities, project access roads, and a project operations and maintenance facility. The project area is generally described in the following Townships/Ranges/ and Sections: T19N, R18E, Sections 4, 8, 9, 17, 20, 21, 24-29, and 35; and T19N, R19E, Sections 30 and 31, as shown on **Figure 1**.

Each turbine consists of an above ground component measuring 12 feet in diameter and 393 feet (120 m) in height, as well as an underground base measuring 42 to 17 feet in width and 8 feet in depth (Inverted T Type Foundation) or measuring 12 to 15 feet in width and 25 to 35 feet in depth (Pile Type Foundation). Transformer pads will also be located at the base of the turbines. There will also be a substation located in Township 19N Range 18E Section 21. The turbines and access roads are permanent features that will be utilized during long-term project operation.

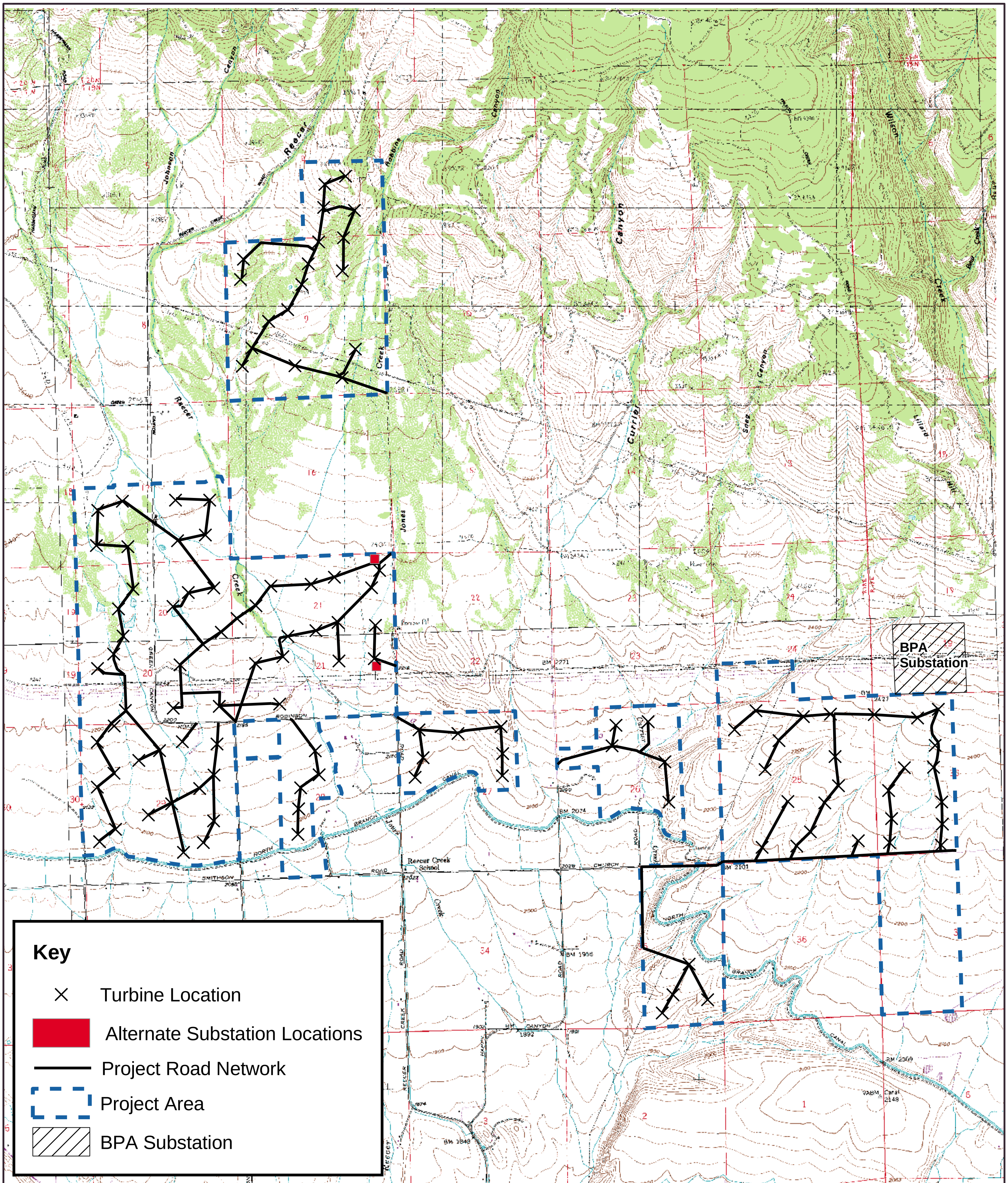

Figure 1

SITE MAP

Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Job Id: 001775.HW04.01	
Date: July 14, 2004	Developed by: AVH
Map Source Information: USGS Topo Quads N. Ellensburg, Reecer Creek, Swauk, and Thorp	

During construction, additional temporary extra workspace will also be required around each of the turbine locations. It is anticipated that construction crews will require an additional 130 square feet of extra workspace radiating around each of the turbine locations. As such, the delineation included the area required for facility operation, as well as the temporary extra workspace needed during construction.

The project area waters of the United States, including wetlands, were delineated to identify the locations and extent of areas regulated by the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), the Washington State Department of Ecology (Ecology), and Kittitas County. This wetland delineation report was prepared in order to facilitate the project's environmental permitting.
In order to minimize potential impacts to "Waters of the United States," Desert Claim will implement best management practices (BMPs) discussed in the Kittitas County Critical Area Ordinance.

3.0 Regulatory Environment

3.1 United States Army Corps of Engineers

The Federal CWA was enacted in 1972 and regulates discharges into "Waters of the United States." Section 404 of this Act regulates activities including fills placed in wetlands that are adjacent to navigable "Waters of the United States." In 1976, USACE and the United States Environmental Protection Agency adopted a regulatory definition of *wetlands*:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (33 Code of Federal Regulations 328.3)

The USACE *Wetland Delineation Manual* (Environmental Laboratory 1987) is used to delineate wetlands and other waters of the United States.

3.2 Washington State Department of Ecology

Ecology does not have general authority to regulate wetlands or other waters of the United States. However, Ecology does have authority to regulate uses of specific activities in wetlands. According to Section 401 of the Federal CWA, Ecology may require any permit issued by USACE to meet State Water Quality Standards. Conditions placed on the issuance of a Section 401 certification by the State of Washington become part of the Section 404 permit issued by USACE. Ecology has the regulatory authority to deny a Section 401 certification. A Section 404 permit cannot be issued by USACE if there is a denial of the Section 401 certification by the State of Washington.

3.3 Kittitas County Critical Areas Ordinance

Kittitas County Critical Areas Ordinance (KCCAOAO) establishes procedures to designate and classify ecologically sensitive and hazardous areas per requirements of the Kittitas County comprehensive plan and the Growth Management Act.

The KCCAOAO protects the designated critical areas in accordance with the Growth Management Act and the WAC 365-195-900 through 365-195-925. Additional protection by federal and state agencies is required, and addressed through agency coordination and permitting. Compliance with the KCCAO requires the submittal of a checklist containing the following information:

- Legal description of the land, and assessor's parcel number.
- Wetlands;
- Erosion hazard areas;
- Floodplains and floodways;
- Riparian habitat;
- Geologically hazardous areas;
- Landslide hazard areas;
- Mine hazard areas;
- Seismic hazard areas;
- Streams and rivers;
- Other information requested by Kittitas County for processing an application.

Wetlands in KCCAO are defined in Section 17A.02.310 and classified in four categories. The Department of Ecology wetland rating system in the Washington State Wetland Rating System documents (Western Washington, *Ecology Publication #93-74*, Eastern Washington, *Ecology Publication #91-58*) contains the rating definitions and methods.

a. **Category I.** Category I wetlands are those that meet the following criteria:

   i. Documented habitat for federal or state listed endangered or threatened fish, animal, or plant species;

   ii. High quality native wetland communities, including documented category I or II quality Natural Heritage wetland sites and sites which qualify as a category I or II quality Natural Heritage wetland (defined in the rating system documents);

   iii. High quality, regionally rare wetland communities with irreplaceable ecological functions, including sphagnum bogs and fens, estuarine, wetlands, or mature forested swamps (defined in the rating system documents); or

iv. Wetlands of exceptional local significance.

b. **Category II.** Category II wetlands are those not defined as Category I wetlands and that meet the following criteria:

   i. Documented habitats for state listed sensitive plant, fish or animal species;

   ii. Wetlands that contain plant, fish or animal species listed as priority species by the Department of Fish and Wildlife;

   iii. Wetland types with significant functions that may not be adequately replicated through creation or restoration;

   iv. Wetlands possessing significant habitat value based on a score of twenty-two (22) or more points in the habitat rating system; or

   v. Documented wetlands of local significance.

c. **Category III.** Category III wetlands are those that do not satisfy category I, II or IV criteria, and with a habitat value rating of twenty-one 21 points or less.

d. **Category IV.** Category IV wetlands are those that meet the following criteria:

   i. Hydrologically isolated wetlands that are less than or equal to one (1) acre in size, have only one wetland class, and are dominated (greater than eighty percent (80%) areal cover) by a single non-native plant species (monotypic vegetation); or

   ii. Hydrologically isolated wetlands that are less than or equal to two (2) acres in size, and have only one wetland class and greater than ninety percent (90%) areal cover of non-native plant species.

Wetland buffers also are protected through the KCCAO (Section 17A.04.020). The wetland buffer width establishes requirements to reflect the impact of certain intense land uses on wetland function and values (KCCAO 17A.02.322 High, Medium, and Low). Wetland buffers may be modified by averaging buffer widths only if a project applicant demonstrates:

- Necessary to avoid an extraordinary hardship caused by circumstances peculiar to the property;

- The wetland contains variations in sensitivity due to existing physical characteristics;

- The proposed use would be located adjacent to areas where buffer width is reduced, and that such land uses are low in impact;

- That width averaging will not adversely impact wetland function and values.

Kittitas County employs the USACE 1987 *Wetland Delineation Manual* to determine and delineate wetlands in its jurisdiction.

Waterbodies in KCCAO are defined in Section 17A.02.300. The term “Waters” includes all surface waters not otherwise owned pursuant to water rights established under state law, as defined in Section 17A.02.290. Kittitas County uses Washington State’s five-tier water typing system (WAC 222-16-030) to classify streams, lakes and ponds by their flow and habitat quality. Types 1, 2, 3, 4 and 5 waters are adopted and are classified according to the following system:

- Type 1 Waters: All waters, within their ordinary high water mark (OHWM), as inventoried as “shorelines of the state” under Chapter 90.58 RCW, but not including those waters’ associated wetlands as defined in Chapter 90.58 RCW;
- Type 2 Waters: Segments of natural waters not classified as Type 1 that have a high fish, wildlife, or human use;
- Type 3 Waters: Segments of natural waters which are not classified as Type 1 or 2 and have a moderate to slight fish, wildlife, or human use;
- Type 4 Waters: Segments of natural waters within Kittitas County which are not classified as Type 1, 2 or 3 and have a channel width of two feet or more between the ordinary high water marks.*
- Type 5 Waters: Segments of natural waters within Kittitas County which are not classified as Types 1, 2, 3 or 4 waters and have a channel width of two feet between the ordinary high water marks, including streams with or without well-defined channels.*

*Type 4 and 5 waters are not truly waters, but are waterways which are intermittent in nature and may be dry beds at any time of the year. (Ord. 96-14 (part), 1996; Ord. 95-15 (part), 1995; Ord 94-22 (part), 1994).

3.4 Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife (WDFW) requires a Hydraulic Project Approval (HPA) permit for construction activities in or near state waters (RCW [illegible]0.100-160). The state legislature has given WDFW the responsibility of preserving, protecting, and perpetuating all fish and shellfish resources of the state. The HPA permit would have permit conditions, such as timing and construction methods, to limit impacts on state fish resources.

4.0 General Site Conditions

4.1 Overview of Project Location and Topography

The project area is located within the relatively flat and open Kittitas Valley, with a gradual south-to-north rise in elevation totaling approximately 1,000 feet over approximately 5 miles. Gently sloping creeks dissect north to south across the project area, forming shallow depressions on the otherwise slightly sloping landscape.

Except for the northernmost portion, the project area lies below the foothills of the Wenatchee Mountains and Table Mountain. Elevation ranges from approximately 2,100 feet to 2,500 feet above sea level across most of the project area.

The highest elevations and steepest slopes in the project area are in the northernmost portion, in Township 19N, Range 18E, Sections 4, 8 and 9, where the project area includes a small hill coming off the foothills of the Wenatchee Mountains. Here, elevation rises from approximately 2,600 feet to approximately 3,100 feet above sea level.

In addition, on the western edge of the site, a long ridge rises up, approximately 400 feet in elevation, between the project area, U.S. Route 97, and the Yakima River, forming a natural sight barrier that would shield the Project from areas to the west and southwest.

4.2 Hydrogeographic Setting

<u>Geologic History</u>

The Kittitas Valley northwest toward Snoqualmie Pass in the Cascade Mountains is a broad U-shaped valley caused by receding glaciers during the last ice age (USGS 1982).

The project area lies in the northeast edge of the valley, where the low slopes slowly begin the steep climb from the valley into the Wenatchee Mountains. Streams drain from the steep, narrow canyons of the mountainous regions to the north into the wide, low-angle plains and plateaus of the Kittitas Valley in the south and spread into wide alluvial fans. The project area crosses these alluvial fans, as well as glacial outwash deposits (loess), and stream terraces (remnant flood plains). The alluvium present across the project area, is mainly composed of sediments from the Ellensburg Formation and the Columbia River Basalts (CRBs) Group (Economic and Engineering Services, Inc [EES] 2001).

The CRBs Group is a series of basalt lava flows, found locally both deep under the Kittitas Valley and at the surface along the ridgelines to the north of the project area (EES 2001). These basalts occur throughout the project area, sometimes at shallow depth, vary in permeability, and contain confined aquifers (EES 2001).

The Ellensburg Formation is comprised of volcanic materials (ash and pumice) and varies in permeability depending on the depositional thickness of ash and the level of fracturing of the formation (United States Geologic Survey [USGS] 1982; EES 2001), which overlie the Columbia River Basalts. The Ellensburg Formation is also known for non-uniform areas of perched and confined aquifers.

The Kittitas Valley is the trough of a down-fold (syncline), while the Wenatchee Mountains to the north are formed by an upfold (anticline) (USGS 1982, Alt, 1994). These geologic structures are another factor in the perched artesian aquifers along the valley side slopes of the project area (EES 2001; USGS 1982).

<u>Surface Water</u>

The project area is located within the Yakima River Basin. The Yakima River Basin lies in the "rain shadow" east of Washington State's Cascade Range, which receives little direct precipitation (EES, 2001).

Nineteen streams are located in the project area. Streams were identified during field surveys based on the presence of a defined bed and bank. Using the DNR Forest Practices stream-typing map, those streams were then classified as either perennial or intermittent. There are 5 perennial streams and 14 intermittent streams. In addition, the North Branch Canal traverses the project area. One of the identified streams was classified as intermittent above the North Branch Canal and perennial below the canal. There are also several irrigation ditches and stock ponds within the project area that are used for agricultural purposes.

<u>Groundwater</u>

Two principle Aquifers, the Columbia Plateau aquifer and the Pacific Northwest Basin-fill aquifer, underlie the project area (National Atlas, 2003).

The Columbia Plateau aquifer system is characterized by basalt and other volcanic rock, which is generally very permeable and capable of accepting large volumes of precipitation that recharge underlying aquifers. While the aquifer is well below ground surface, groundwater levels in the Columbia Plateau have risen due to irrigation practices. Water diverted from Canals and streams for irrigation have increased groundwater recharge and groundwater levels in the area. Conversely, in locations where groundwater has been the main water source for irrigation practices, groundwater levels have shown declines up to as much as 150 feet.

The Pacific Northwest Basin-Fill aquifer system is primarily composed of unconsolidated deposits up to 100 feet thick. The unconsolidated deposits are mainly alluvial deposits consisting of clays, silts, sands and gravel, but in some locations can be eolian, glacial, or volcanic deposits. Permeability of the unconsolidated deposits is variable (USGS, 1994). Local well logs indicate that the primary water-bearing zone is located approximately 110 feet below ground surface (Ecology, 2003).

Depth to first water can vary throughout the project area. This is partly due to irrigation and leakage from local canal channels, which can create a perched water table (EES, 2001). Areas identified as wetlands within this report may exhibit saturated soils and standing water as a result of canal leakage and the subsequent perched water table.

As a result of the irrigation and leakage mentioned above, low topography, and snowmelt-fed streams, there are numerous wetlands located in the project area. While some of these wetlands are connected to perennial streams such as Reecer Creek and/or associated riparian corridors, according to field observations, the majority of these wet areas are fed by leaks in the North Branch Irrigation Canal and/or by pasture irrigation. Wetlands identified in the National Wetland Inventory (NWI) that are also within the study area are shown in **Figure 2.** Further discussion of the Waters of the United States is provided in Section 6.0.

4.3 Vegetation

The existing upland vegetation in the project area is characteristic of cropland and grazing land. Dominant plants include pasture grasses such as brome (*Bromos mollis*), Poa grasses (*Poa sp.*), and Fescue grasses (*Festuca sp.*). Desert shrub species such as sagebrush (*Artemisia sp.*) and antelope bitterbrush (*Prushia tridentata*) also dominate the uplands. Existing croplands producing hay and other feed crops are located primarily in the western portion of the project area and south of the North Branch Irrigation Canal.

Shrub-steppe vegetation is present in various states of disturbance across small portions of the project area. The shrub-steppe environment occurs primarily in the eastern portion of the project area and north of the North Branch Irrigation Canal. The shrub-steppe also is interspersed with areas of grassland steppe and ephemeral snowmelt-fed streams. This vegetation has been disturbed by grazing. Sagebrush is the dominant species, with *Artemisia tridentata* found on deeper soils and *Artemisia rigida* found on shallow soils.

A review of federal plant species lists suggests that one species could occur in the project area based on the type of habitats present: the Ute ladies'-tresses (*Spiranthes diluvialis*), a federally listed threatened species that grows in wetlands and seeps. According to the Washington State Natural Heritage Database, there are only two records for state sensitive species in or adjacent to the project area. These is one historic record (1959) for Piper’s daisy in the western portion of the project area, which grows in dry, open places, often with sagebrush; and one current record (1991) for long-sepal globemallow adjacent to the eastern end of the project area, which grows in sagebrush foothills to Ponderosa Pine woodlands.

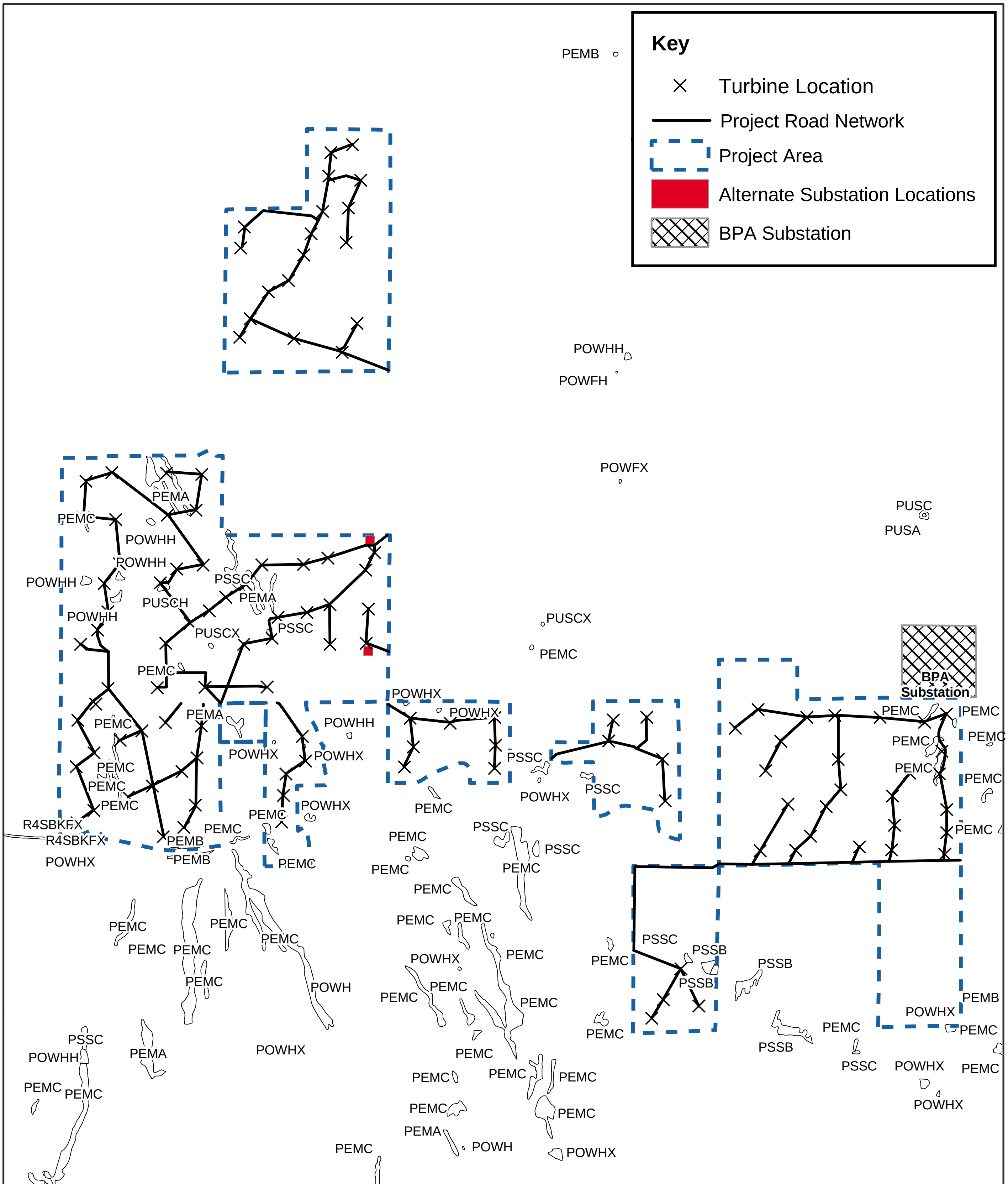

Figure 2

National Wetlands Inventory (NWI) Map
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.15 0.3 0.6 0.9 1.2 1.5
Miles

Job Id:
001775.HW04.01

Date:
July 14, 2004

Developed by:
AVH

Map Source Information:
National Wetlands Inventory

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

The vegetation in lower, wetter areas consists mainly of the following hydrophytic vegetation: Baltic Rush (*Juncus balticus*), Spike rush (*Eleocharis palustris*), Slough sedge (*Carex obnupta*), Red fescue (*Festuca rubra*), Monkey flower (*Mimulus guttatus*), and willows (*Salix lucida* and *Salix exigua*). Forget-me-nots (*Myosotis laxa*), White clover (*Trifolium repens*), and Iris (*Iris missouriensis*) were also dominant in lowlands.

4.4 Soils

The soils found across the project site were unusually dark and varied in color from dark brown to dark gray-brown and black and contained non-uniform concentrations of clay and ash. While such low chroma colors would normally be present in hydric conditions, these characteristics are likely a function of the parent alluvium, and not necessarily hydrology.

Soil series descriptions and associations found in the vicinity of the project area are taken from the *draft* Soil Survey for Kittitas County (USDA 2003). The United States Department of Agriculture (USDA) Soil Conservation service (SCS) is currently revising and updating the 1947 Soil Survey. **Table 4.4-1** provides the SCS draft soil descriptions. In addition, the locations of hydric soils have not yet been determined by the SCS. As a result, none of the soils crossed in the project area are described as hydric. Potential changes to the SCS soil descriptions are included in parenthesis. See **Figure 3** for a map of the *draft* Soil Survey for Kittitas County.

Table 4.4-1 Soils Present in the Desert Claim Wind Power Project Area	
Name	**Soil Description**
Maxhill Series	The Maxhill series is an ashy loam that is very deep and well drained. It is found on 0 to 5 percent slopes, is very dark brown (10YR4/2,10YR4/3), and increases in abundance of gravel from 10 inches. Formed on alluvial fans and terraces, and it is usually moist, but is dry for 90 to 100 consecutive days following the summer solstice.
Modsel Series	The Modsel series is a very deep ashy loam, moderately well drained soil found on 0 to 5 percent slopes. It is a dark greyish brown (10YR4/2, 10YR5/3, 10YR5/4) and increases in abundance of gravel from 10 inches. It is formed in alluvium mixed with volcanic ash at the surface, and is usually moist, but is dry for 60 to 75 consecutive days following the summer solstice. This soil has an irrigation-induced water table at 30 to 48 inches during the mid-May to mid-October growing season (USDA 2003).
Varodale Series	The Varodale series consists of clay, very deep, moderately well drained soil found on slopes of 0 to 5 percent. It is black for the first 22 inches before grading to a dark brown (10YR2/1, 10YR3/2, 10YR3/3, 10YR4/2), and forms in alluvium with an influence of volcanic ash. It is usually moist, but is dry for 60 to 75 consecutive days following the summer solstice, and has an irrigation-induced water table at 30 to 60 inches during the mid-May to mid-October growing season. (More investigation is expected for this soil to confirm the degree of andic properties.)
Weirman Series	The Weirman series consists of very deep, somewhat excessively drained fine sandy loams. The soil increases in abundance of gravel from 20 inches, is very dark greyish brown to dark greyish brown (10YR3/2, 10YR4/2), and is located on slopes from 0 to 5 percent. The Weirman Series is formed in the alluvium on flood plains and low terraces. As a result these soils, while typically dry, are subject to occasional long to brief periods of flooding. (More investigation is expected for this soil to determine if

Table 4.4-1 Soils Present in the Desert Claim Wind Power Project Area	
Name	**Soil Description**
	this series should include an Oxyaquic subclass.)
Pachneum Series	The Pachneum series is a very deep, well-drained loam. Formed on slopes of 2 to 30 percent on hillsides, footslope, dissected plateaus and piedmont slopes, this soil is very dark brown to very dark greyish brown (10YR2/2, 10YR3/2, 10YR3/3). It is usually moist, but is dry for 75 to 90 consecutive days following the summer solstice. (This draft represents a change from mixed, mesic Pachic Argixerolls to mixed, superactive, mesic Vitrandic Argixerolls.)
Brickmill Series	The Brickmill series consists of deep, moderately well drained very cobbly loam. Slopes vary from 0 to 5 percent, and soils form in old alluvium on piedmont slopes grading from mountain footslopes to basin floors. It increases in abundance of cobbles from the surface, and grades from very dark brown through to very dark greyish brown with a few distinct strong brown mottles starting at 8 inches to yellowish red mottles starting at 19 inches (10YR2/2, 10YR3/3, 10YR4/3, 2.5YR3/2; mottles 7.5YR 4/6, 5YR4/6). These soils are continuously saturated with water within one meter of the soil surface for 90 or more days in most years.
Lablue Series	The Lablue series is a very gravelly ashy loam that is very shallow and well drained. It forms slopes of 3 to 15 percent in alluvium and glacial drift over a duripan with an influence of loess and volcanic ash at the surface, on old uplifted fan remnants. It is yellowish brown to pale brown (10YR3/2, 10YR3/3, 7.5YR3/3, 10YR5/2), and increases in gravel from 8 inches. It is usually moist, but is dry for 90 to 100 consecutive days following the summer solstice. (This draft relects a change in classification from Palexerollic Durixerolls to Haplic Durixerolls.)
Reelow Series	The Reelow series consists of shallow, well-drained very gravelly ashy loam. It is formed in alluvium and glacial drift with an influence of loess and volcanic ash in the surface, on old uplifted fan remnants, old terraces, and old till plains with slopes of 2 to 15 percent. Color ranges from very dark brown to very pale brown at depth (10YR2/2, 7.5YR3/3, 7.5YR4/4, 10YR4/4, 10YR4/2), with gravel increasing in abundance from 6 inches. It is usually moist but is dry for 90 to 100 consecutive days following the summer solstice. (This draft reflects a change in classification from Palexerollic to Haplic Durixerolls.)
Reeser Series	The Reeser series is an ashy loam that is moderately deep and well drained. Slopes vary from 2 to 15 percent, and soils form in alluvium and glacial drift with an influence of loess and volcanic ash in the surface, on old uplifted fan remnants, old terraces, and old till plains. Color varies from greyish brown to yellow brown (10YR2/2, 7.5YR3/3, 7.5YR4/4, 10YR4/4, 7.5YR4/4, 10YR4/2), and increases in gravel from 22 inches. It is usually moist but is dry for 90 to 100 consecutive days following the summer solstice. (This draft represents a reclassification a new type location based on a thorough investigation and resulting revision of series concept.)
Sketter Series	The Sketter series is a moderately deep, well-drained gravelly loam. It is formed in slopes of 2 to 15 percent on old uplifted fan remnants, old terraces, and old till plains in alluvium and glacial drift with an influence of loess and volcanic ash in the surface. Gravels increase in abundance from the surface and the soil varies from very dark greyish brown to very pale brown at depth (10YR2/1, 10YR3/3, 10YR5/3, 10YR4/4, 10YR4/2). It is usually moist but is dry for 90 to 100 consecutive days following the summer solstice.
Kayak Series	The Kayak series is a very deep, somewhat poorly drained gravelly ashy loam. It is formed on flood plains in slopes of 0 to 2 percent in alluvium with an influence of volcanic ash at the surface. Gravels increase in abundance from the surface and the soil varies from very dark greyish brown to dark grey depth (10YR3/2, 5Y4/1).

Table 4.4-1 Soils Present in the Desert Claim Wind Power Project Area	
Name	**Soil Description**
	These soils are continuously saturated with water within one meter of the soil surface for 90 or more days in most years, if not artificially drained. This soil has an irrigation-induced water table at 18 to 42 inches during the mid-May to mid-October growing season.
Mippon Series	The Mippon series is a very cobbly loam that is very deep and moderately well drained. It forms in recent alluvium on stream terraces and slopes of 0 to 5 percent. It varies in color from very dark greyish brown to brown at depth (10YR2/2, 10YR3/2), and cobbles and gravel increase in abundance with depth from the surface. These soils are subject to brief periods of overflow. (The Meirmick series needs further investigation as to how it competes with the Mippon series. Correlation of Meirmick into Mippon should be considered if it cannot be adequately competed.)
Metser Series.	The Metser series consists of a very deep, moderately well drained clay loam. Formed in alluvium with an influence of volcanic ash on terraces and alluvial fans, the soils are found on slopes of 0 to 5 percent. Gravel starts at 30 inches at increases in abundance with depth; color goes from black to very dark grayish brown (10YR2/1, 10YR3/2, 10YR5/3, 10YR4/4, 10YR4/2). These soils are usually moist but are dry in all parts of the moisture control section for 60 to 75 consecutive days following the summer solstice. (More investigation is needed to confirm the degree of andic properties.)
Argabak Series	The Argabak series is a very cobbly loam that is very shallow, well-drained soil. Formed in loess and residuum from basalt on ridgetops, hillslopes, and benches on slopes of 0 to 65 percent. Cobbles and gravel increase to basalt bedrock at 6 inches, and the soil is very dark and dark brown (10YR3/3, 7.5YR3/2). These soils are dry more than half the time.

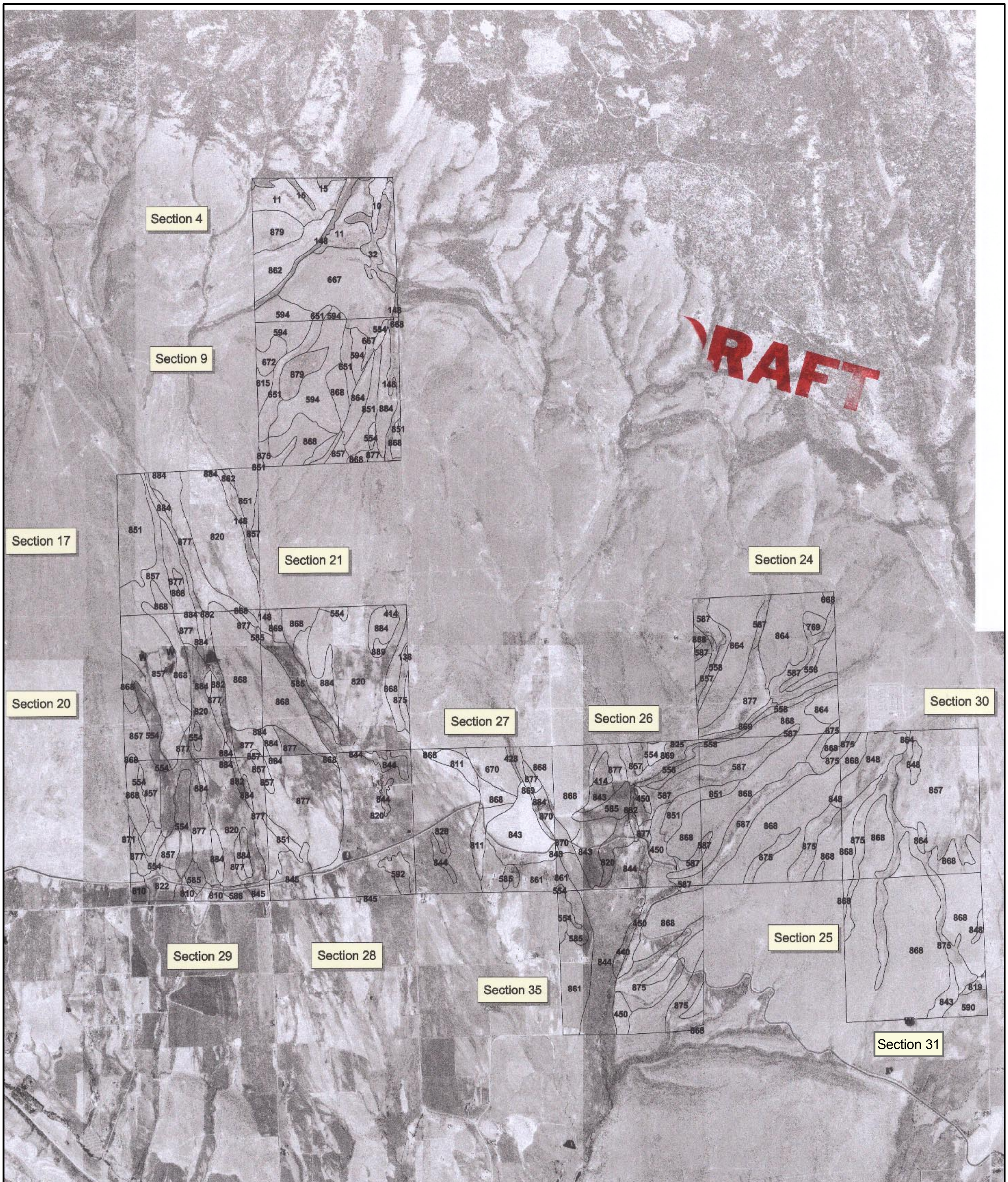

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Figure 3
NRCS SOIL MAP
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 1/2 1
Miles

Job Id:
001775.HW04.01

Date:
June 9, 2003

Developed by:
AVH

Map Source Information: Soil Survey Map
Kittitas County, Washington

ecology and environment, inc.
International Specialists in the Environment
Portland, Oregon

5.0 Delineation Methodology

5.1 General Methods

The delineation of waters of the United States and wetlands was conducted by E & E in June of 2003. E & E's technical support team included wetland ecologist and wildlife biologist Noreen Roster, geologist Jessica Spiegel, hydrologist Erin Murphy, and environmental scientist Ben Martich. Wetlands and other waters of the United States were identified using the routine on-site determination method outlined in the USACE *Wetland Delineation Manual* (Environmental Laboratory 1987).

E & E reviewed the following sources for information relevant to this delineation:

- United States Geological Survey (USGS) 7.5-minute topographic maps,
- NWI maps,
- Soil Survey data, and
- Standard biological references and field guides.

Soil, hydrology, and vegetation data were collected for streams and wetlands. The wetland boundaries were determined based on distinct changes in soils, hydrology, and vegetation.

Determination of hydric soil conditions was based on an assessment of soil characteristics at each sample location inspected to a depth of at least 12 inches, unless otherwise noted on the data sheet due to refusal. Each sample location was assessed for soil matrix color, soil texture, and presence of mottling or gleying. The soil hue, value, and chroma were determined using Munsell Soil Color Charts (1990 Edition). The wetland scientists used professional judgment to determine whether the soil criteria were met at each sample location.

Soils were also assessed using the *draft* Soil Survey for Kittitas County (USDA 2003). Kittitas County is currently in the process of revising the 1947 soil survey report and has not yet determined the locations of hydric soil. As such, hydric soils were based upon low chroma color and mottling.

Hydrophytic vegetation was identified by visual observation of dominant plant species (defined as plants that comprise 20% or more of the cover value observed at a site). An area was considered to have hydrophytic vegetation when more than 50% of the dominant species were Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC) (Environmental Laboratory 1987). At each sample location where there was no overstory, vegetation was analyzed within an approximately 5-foot radius of the sample location. In areas where there was an overstory (tall shrubs and/or trees), vegetation was analyzed within a radius up to 30 feet.

When plants could not be identified to species because of seasonal constraints or impacts caused by land use (e.g., grazing), only the genus or plant community was listed. The indicator of each species was confirmed using *National List of Plant Species that Occur in Wetlands* (Reed 1988). Plant nomenclature followed Hitchcock and Cronquist (1973).

Wetland hydrology was determined to be present if the sample location had one or more of the following characteristics:

- Landscape position and surface topography (e.g., position of the site relative to an upslope water source, a location within a distinct wetland drainage pattern, or concave surface topography);

- Inundation or saturation for a long duration (either inferred based on field indicators or observed during field surveys); and

- Residual evidence of ponding or flooding (e.g., scour marks, sediment deposits, algal matting, or drift lines).

Delineated wetlands and waters of the United States were mapped and alphanumerically identified on USGS 7.5-minute topographic maps, and cross-referenced to the corresponding data sheet for each sample location.

5.2 Wetland Methodology

The extent of wetlands is determined by examining the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. Under normal circumstances, all three of these parameters must be satisfied for an area to be considered a jurisdictional wetland under Section 404 of the CWA. Methods used to evaluate hydrophytic vegetation, hydric soils, and wetland hydrology are described below.

Hydrophytic vegetation is defined as:

> "The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. The vegetation occurring in a wetland may consist of more than one plant community (wetland plant communities may contain plant species that are Obligate [OBL], Facultative Wetland [FACW], Facultative [FAC], Facultative Upland [FACU], Upland [UPL], No Indicator [NI], and/or Not Listed [NL])" (Environmental Laboratory, 1987).

Hydric soils is defined as:

> "A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of its stratum." (Environmental Laboratory 1987)

Wetland hydrology is defined as:

> "All hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively." (Environmental Laboratory 1987)

6.0 Results

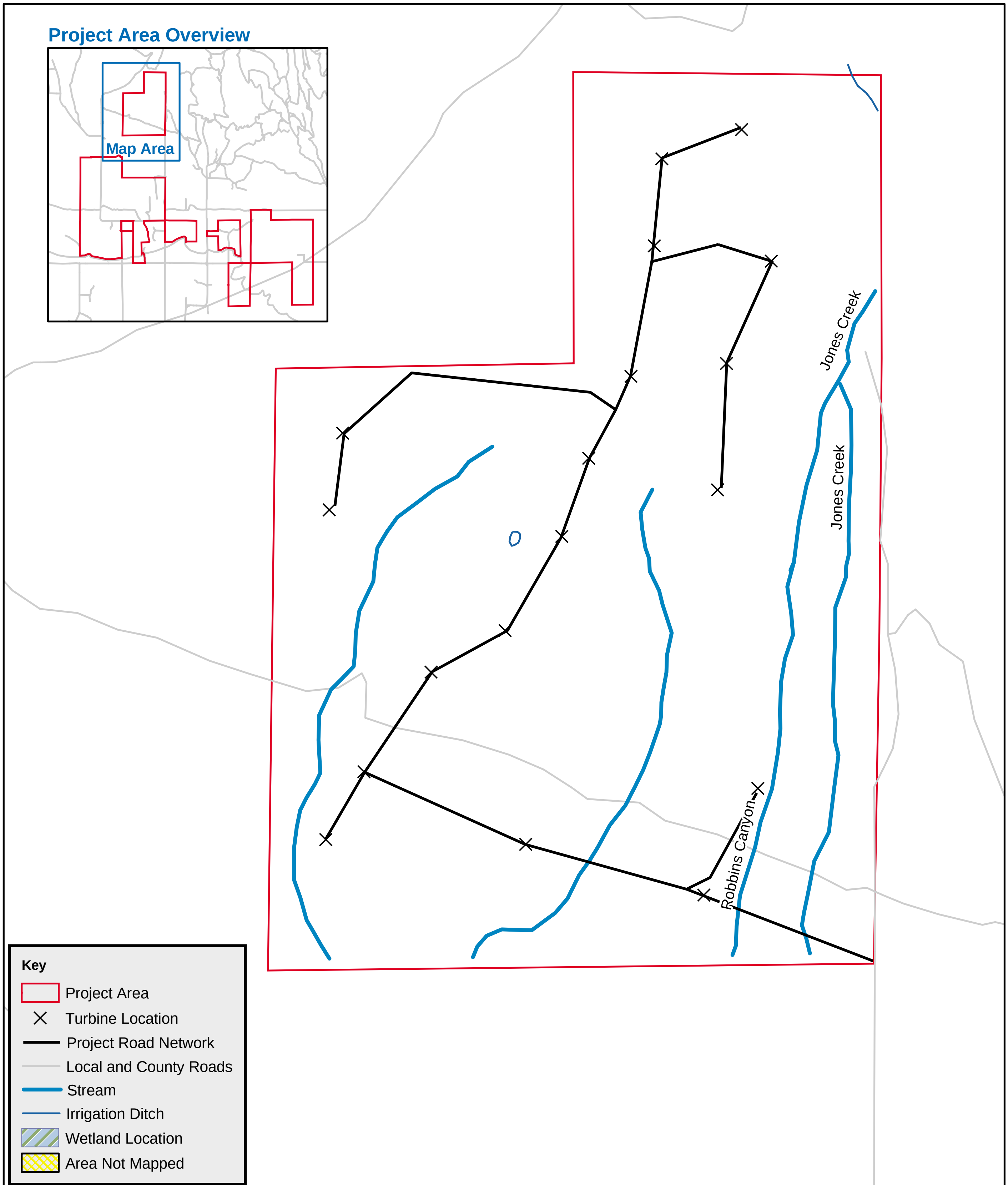
This section summarizes the results of field surveys to identify wetlands and waterbodies. Delineated waters of the United States are presented below. Refer to **Figure 4** for a map of the delineated features in the project area. **Table 6.1-1** and **6.1-2** list the streams in the proposed project area and an estimate of the potential short term and long term impacts resulting from construction and facility operation. Table 6.2-1 and 6.2-2 list the wetlands in the project area, information on whether the wetland criteria were met, and an estimate of the potential short term and long term impacts resulting from construction and facility operation. Data sheets and photographs are on file with Kittitas County.

6.1 Waters of the United States

<u>Affected Environment</u>
Perennial, intermittent, and ephemeral streams were delineated as waters of the United State in the project study area. Jurisdictional waters of the United States were defined using the following criteria:

- The feature must have a definite bed and bank (of any size); and
- The feature must be an area where water flows periodically (ranging from intermittent to ephemeral) to provide a bed and bank.

The KCCAO classifies perennial and intermittent streams according to WAC 222-16-030. Streams do not include irrigation ditches, waste ways, drains, outfalls, operational spillways, channels, storm water runoff facilities or other wholly artificial watercourses (KCCAO 17A.02.273).



N W E S

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Figure 4A

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

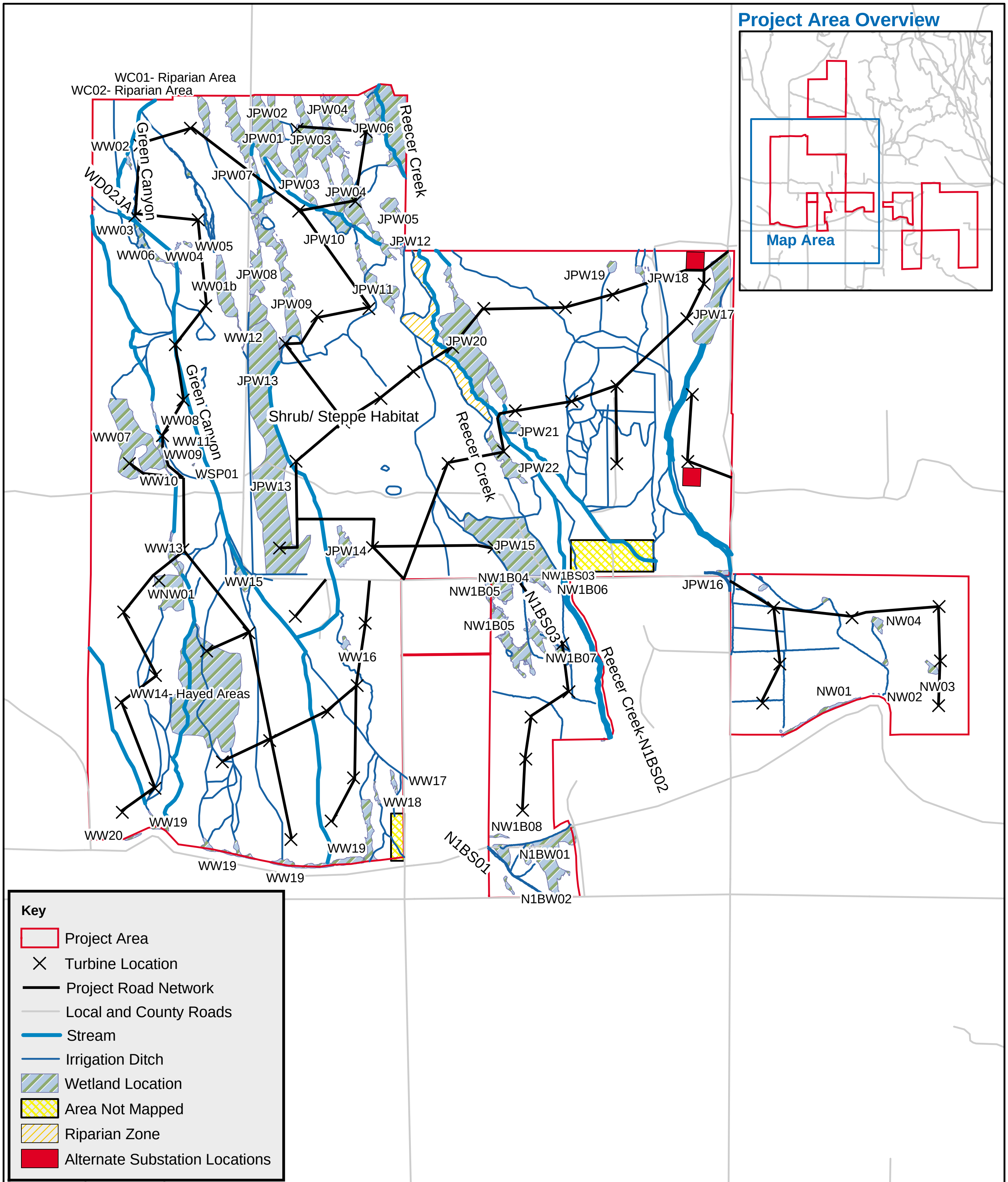
0 0.04 0.08 0.16 0.24 0.32 0.4
Miles

Job Id:
001775.HW04.02

Date:
July 15, 2004

Developed by:
avh

Map Source Information:



N
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ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Figure 4B

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.125 0.25 0.5 0.75
Miles

Job Id:
001775.HW04.02

Date:
July 15, 2004

Developed by:
avh

Map Source Information:

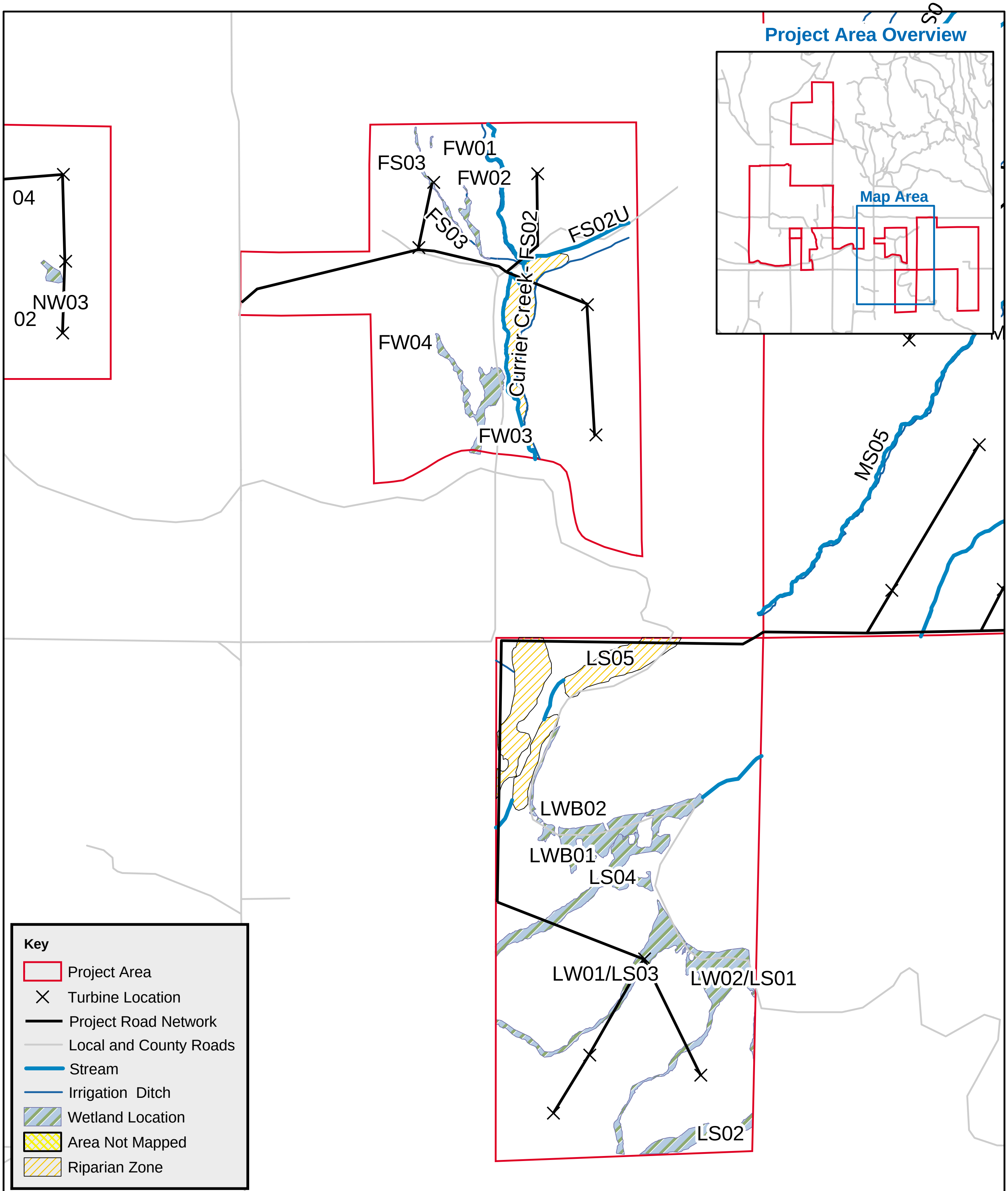


Figure 4C

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

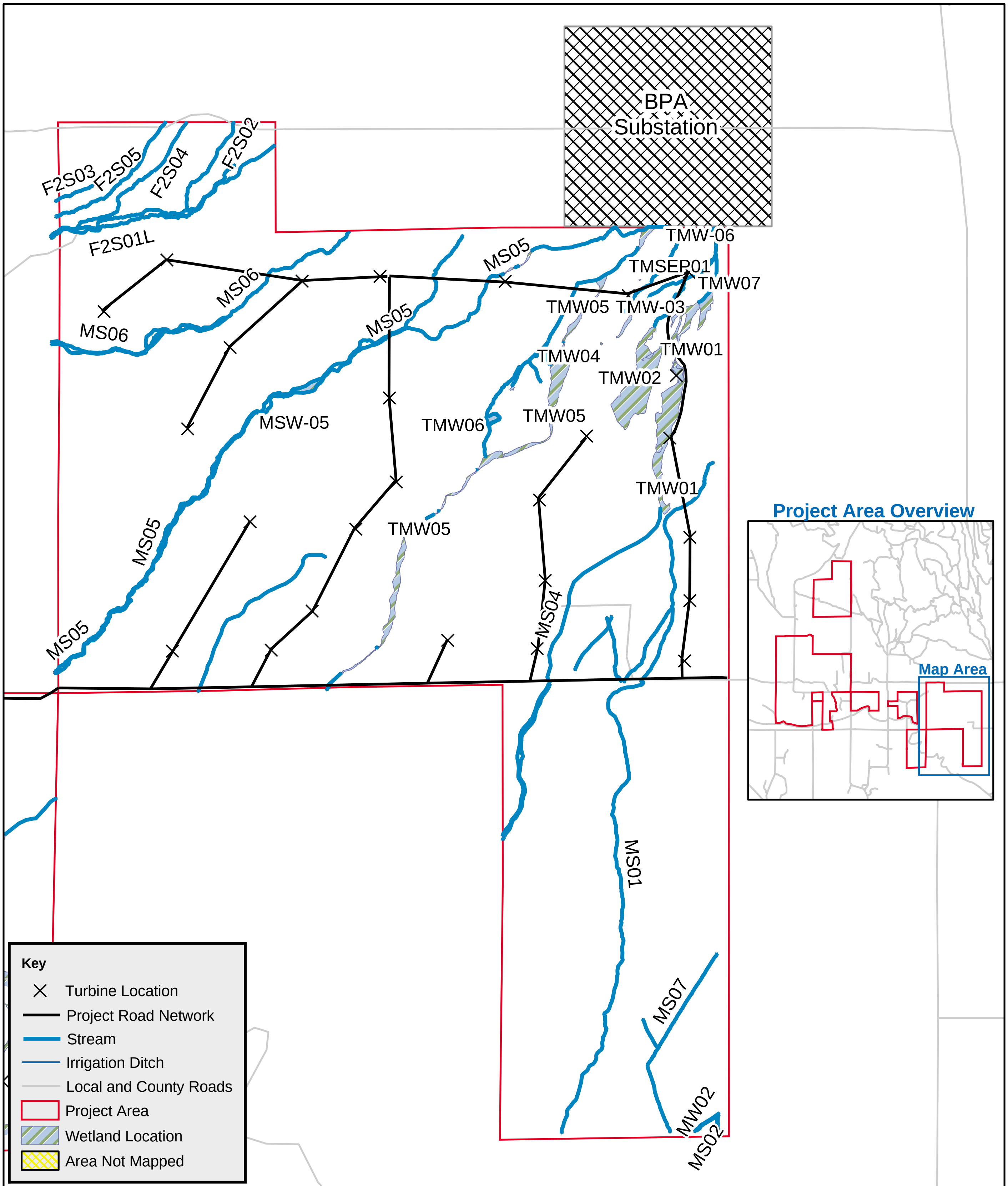
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Job Id:
001775.HW04.02

Date:
July 15, 2004

Developed by:
avh

Map Source Information:



N
W E
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Figure 4D

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.05 0.1 0.2 0.3 0.4 0.5
Miles

Job Id:
001775.HW04.01

Date:
July 15, 2004

Developed by:
avh

Map Source Information:

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Table 6.1-1

Stream Delineation Results

Stream Name West to East	Stream ID	Legal Description of Stream Location	Flow Type	Bank to Bank Bank Width	Water Tributary of	DNR Stream Typing[1]
unnamed stream	No ID	T19N R18E Sec 29 W 1/2	Intermittent	Unavailable	unnamed stream [2]	5
unnamed stream	No ID	1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 W 1/2	Intermittent	Unavailable	Dry Creek [3]	5
Green Canyon Creek	WC-03	1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 E 1/2	Perrenial	4 ft	Dry Creek	3
unnamed stream	No ID	T19N R18E Sec 17 S 1/2 T19N R18E Sec 20 E 1/2 T19N R18E Sec 29 E 1/2	Perrenial	Unavailable	Green Canyon Cree	3
unnamed stream	No ID	T19N R18E Sec 9 W 1/2	Intermittent	Unavailable	Reecer Creek	5
unnamed stream	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2	Intermittent	Unavailable	Reecer Creek	5
Robbins Canyon Creek	No ID	T19N R18E Sec 9 E 1/2	Intermittent	Unavailable	unnamed stream [4]	5
Jones Creek	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2 T19N R18E Sec 21	Intermittent	30 ft	Currier Creek	4
unnamed stream	No ID	T19N R18E Sec 17 SE 1/4	Perrenial	Unavailable	Reecer Creek	3
Reecer Creek	RS-01(M) RS-01(U) N1BS-02	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	Perrenial	25-100ft	Yakima River	3
unnamed stream	No ID	T19N R18E Sec 21	Perrenial	Unavailable	Jones Creek	3
Currier Creek	FS-01 [5] FS-02(L)	T19N R18E Sec 26 T19N R18E Sec 35	Intermittent	3-75ft	Reecer Creek	4
unnamed stream	F2S-02	1/4	Intermittent	8ft	unnamed stream [6]	5
unnamed stream	F2S-01(U) F2S-01(L) FS-02(U)	T19N R18E Sec 24 SW 1/4 T19N R18E Sec 26	Intermittent	4-20ft	Currier Creek	4
unnamed stream	MS-05(U) MS-05(L) LS-05	1/4 T19N R18E Sec 25 T19N R18E Sec 35 NE	Intermittent	1-12ft	Currier Creek	5
unnamed stream	No ID LS-04 LS-04(M)	T19N R18E Sec 25 T19N R18E Sec 35 E 1/2	Intermittent	3-5ft	Currier Creek	5
unnamed stream	No ID LS-02	T19N R18E Sec 25 E 1/2 T19N R18E Sec 35 E 1/2	Intermittent	15-20ft	Currier Creek	5
unnamed stream	MS-04	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	Intermittent	15-20ft	Currier Creek	5
unnamed stream	MS-01(U) MS-01(M) MS-01(L)	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	Intermittent	3-50ft	Currier Creek	5

Note

All streams are within the Upper Yakima Watershed, USGS HUC Code 17030001.

[1] Department of Natural Resources evaluation of stream typing, using the Washington State stream typing system found in RCW 90.03.

[2] Flows into an unnamed stream with the legal description of T19N R18E Sec 17 SW 1/4, Sec 20 W 1/2, Sec 29 W 1/2, which subsequently flows into Dry Creek.

[3] Dry Creek is a tributary of the Yakima River.

[4] Flows into an unnamed stream with the legal description of T19N R18E Sec 21 which subsequently flows into Jones Creek.

[5] No flow was observed at FS-01 at time of site visit.

[6] Flows into an unnamed stream with the legal description of T19N R18E Sec 24 SW 1/4 and Sec 26 , which subsequently flows into Currier Creek.

Table 6.1-2
Stream Disturbance Calculations[1]

Stream Name West to East	Stream ID	Legal Description of Stream Location	Temporary Impacts (linear feet) (Extra Workspace) Turbines	Roads	Collection System	Substation	Total	Permanent Impacts Turbines	Road Crossings	Collection System	Substation	Total
unnamed stream	No ID	T19N R18E Sec 29 W 1/2	0.00	71.08	0.00	0.00	71.08	0.00	27.60	0.00	0.00	27.60
unnamed stream	No ID	T19N R18E Sec 20 W 1/2	76.80	58.99	0.00	0.00	135.79	0.00	31.66	0.00	0.00	31.66
Green Canyon	WC-03	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 E 1/2	398.63	702.78	9.85	0.00	1111.26	41.26	426.77	0.00	0.00	468.03
unnamed stream	No ID	T19N R18E Sec 17 S 1/2 T19N R18E Sec 20 E 1/2 T19N R18E Sec 29 E 1/2	179.59	260.88	9.72	0.00	450.20	0.00	99.51	0.00	0.00	99.51
unnamed stream	No ID	T19N R18E Sec 9 W 1/2	0.00	68.77	0.00	0.00	68.77	0.00	26.79	0.00	0.00	26.79
unnamed stream	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2	0.00	127.36	10.31	0.00	137.67	0.00	49.95	0.00	0.00	49.95
Robbins Canyon Creek	No ID	T19N R18E Sec 9 E 1/2	114.13	69.99	0.00	0.00	184.13	0.00	24.60	0.00	0.00	24.60
Jones Creek	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2 T19N R18E Sec 21	0.00	84.64	18.41	0.00	103.05	0.00	32.32	0.00	0.00	32.32
irrigation ditches	N/A	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29	2122.96	2273.28	105.55	0.00	4501.80	169.87	682.84	0.00	0.00	852.72
unnamed stream	No ID	T19N R18E Sec 17 SE 1/4	0.00	86.95	0.00	0.00	86.95	0.00	26.71	0.00	0.00	26.71
Reecer Creek	RS-01	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	48.83	290.15	0.00	0.00	338.98	0.00	52.09	0.00	0.00	52.09
field identified riparian area	RS-01(U)	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	0.05 (acres)	2.40 (acres)	0.00	0.00	2.82(acres)	0.00	0.93(acres)	0.00	0.00	0.93(acres)
irrigation ditches	N/A	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 21	770.50	1219.52	61.00	0.00	2051.01	41.26	575.31	0.00	0.00	616.56
irrigation ditches	N/A	T19N R18E Sec 28 T19N R18E Sec 27 N 1/2	1508.74	2771.30	0.00	0.00	4280.04	90.02	1040.02	0.00	0.00	1130.04
Currier Creek	FS-01[1] / FS-02(L)	T19N R18E Sec 26 T19N R18E Sec 35	303.23	85.05	0.00	0.00	388.28	0.00	146.95	0.00	0.00	146.95
irrigation ditches	FS-03 & N/A	T19N R18E Sec 26	0.18(acres)	0.07(acres)	12.80 ft	0.00	12.80 ft 0.26(acres)	0.02(acres)	0.02(acres)	0.00	0.00	0.04(acres)
unnamed stream	MS-05 / LS-05	T19N R18E Sec 25 T19N R18E Sec 35 NE 1/4	110.76(ft) 0.02(acres)	155.11	0.00	0.00	265.87(ft) 0.02(acres)	0.00	59.34(ft) 0.02(acres)	0.00	0.00	59.34(ft) 0.02(acres)
unnamed stream	LS-04	T19N R18E Sec 25 T19N R18E Sec 35 E 1/2	0.00	75.39(ft) 0.21(acres)	10.58	0.00	85.97(ft) 0.49(acres)	0.00	26.36(ft) 0.07(acres)	0.00	0.00	26.36(ft) 0.07(acres)
unnamed stream	MS-04	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	0.00	70.05	0.00	0.00	70.05	0.00	26.72	0.00	0.00	26.72
unnamed stream	MS-01	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	0.00	152.25	0.00	0.00	152.25	0.00	56.45	0.00	0.00	56.45
irrigation ditches	N/A	T19N R18E Sec 25 T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	399.51	1199.66	11.68	0.00	1610.85	0.00	613.00	0.00	0.00	613.00
irrigation ditches	N/A	T19N R18E Sec 35 E 1/2	0.00	78.96	0.00	0.00	78.96	0.00	30.68	0.00	0.00	30.68
Stream Totals												
Stream Total (linear feet)			1231.97	2359.44	61.09	0.00	3652.51	41.26	1113.82	0.00	0.00	1155.08
Stream and Irrigation Ditch Total (linear feet)			6033.68	9902.15	417.72	0.00	16353.55	342.41	4055.67	0.00	0.00	4398.08
Stream Total (riparian acres)			0.25	2.68	0.00	0.00	2.93	0.03	0.91	0.00	0.00	0.94

Table 6.1-2
Stream Disturbance Calculations[1]

Stream Name West to East	Stream ID	Legal Description of Stream Location	Temporary Impacts (linear feet) (Extra Workspace) Turbines	Roads	Collection System	Substation	Total	Permanent Impacts Turbines	Road Crossings	Collection System	Substation	Total
Buffer Totals												
Green Canyon Creek (acres)	WC-03	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 E 1/2	2.77	1.09	0.00	0.00	3.86	0.25	0.46	0.00	0.00	0.71
unnamed stream (acres)	No ID	T19N R18E Sec 17 S 1/2 T19N R18E Sec 20 E 1/2 T19N R18E Sec 29 E 1/2	0.00	0.38	0.03	0.00	0.41	0.00	0.17	0.00	0.00	0.17
unnamed stream (acres)	No ID	T19N R18E Sec 17 SE 1/4	0.00	0.38	0.00	0.00	0.38	0.00	0.17	0.00	0.00	0.17
Reecer Creek (acres)	RS-01(M) RS-01(U) N1BS-02	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	0.00	0.25	0.00	0.00	0.25	0.00	0.12	0.00	0.00	0.12
unnamed stream (acres)	No ID	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 W 1/2	0.31	N/A	N/A	0.00	0.31	0.03	N/A	N/A	0.00	0.03
unnamed stream (acres)	MS-04	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	0.82	N/A	N/A	0.00	0.82	0.07	N/A	N/A	0.00	0.07
Buffer Totals												
Total (acres)			3.90	2.10	0.03	0.00	6.03	0.35	0.92	0.00	0.00	1.27

Notes:
For permanent turbine impacts a rectangular disturbance zone measuring 120 ft. long by 40ft. wide was used to calculate impacts for turbines.
For construction impacts a 130 ft. radius from the turbine was used to calculate impacts from extra workspace.
[1] Includes irrigation ditch disturbance calculations, which do not include minor ditches on the western properties.
[2] Unnamed streams that cross multiple properties are listed under the property where they first flow into the project area.
Disturbance calculations prepared using GIS data. Calculations displayed in this table with two significant digits.

Drainage Basin
Streams delineated during the field surveys are located within the Yakima River Basin and eventually drain into the Yakima River. Because the Yakima River Basin receives little direct precipitation (8.9 inches per year), these streams are primarily fed by snowmelt off the ridges to the north of the project area (WRCC 2003).

From west to east, the following named streams bisect the project area: Green Canyon (perennial), Reecer Creek (perennial), Robbins Canyon (intermittent), Jones Creek (intermittent), and Currier Creek (intermittent).

All of the named an unnamed streams either are direct or indirect tributaries of the Yakima River. The Yakima River begins from the eastern slope of the Cascade Range at Keechulus Lake in the Upper Kittitas Valley and flows southeasterly through the lower plateau and river-bottom lands to the Columbia River (Economic and Engineering Services, Inc, 2001).

The North Branch Irrigation Canal also bisects the property, running generally east-west.

Perennial Streams
Five perennial streams were mapped and characterized in the project study area. These streams are expected to have flow throughout the year.

Intermittent Streams
Fourteen intermittent streams were mapped and characterized in the project study area. Intermittent streams (seasonal streams) are dry for a large part of the year. Flow generally occurs for weeks and/or months in response to seasonal precipitation and groundwater recharge. One of these streams is also counted under perennial streams, as it has sustained flow in a different reach within the project area.

Ephemeral Streams
Ephemeral streams were not mapped and characterized in the project area. Ephemeral streams convey runoff for only brief periods during or after rainfall events. These drainages typically have unconsolidated beds of silt, sand, gravel, cobble, or a combination of these substrate types. In general, mapped washes were characterized by a defined bed and bank and were either vegetated or un-vegetated along their banks.

Irrigation Ditches
Many of the streams discussed above convey water to irrigation ditches located throughout the project area. These ditches are particularly prevalent on the Roan, White/Wade, and Nelson properties. Several stock ponds are also present within the project area. Detailed information regarding these features was not collected during the field surveys.

Fisheries or Sensitive Habitats
There are no streams with fisheries concerns located within the project area (WDFW 2003). Five streams exhibited characteristics of a Type 3 stream and the remaining 14 streams exhibited characteristics of a Type 4 or 5 stream.

According to the Washington Department of Fish and Wildlife (WDFW), priority habitats in the project area include riparian areas located along project area streams. Impacts to priority habitat riparian areas are incorporated into Tables 6.1-1 and 6.1-2. Riparian and priority habitats are listed as Critical Areas by Kittitas County (Kittitas County Critical Area Ordinance Title 17A.02.230 and 17A.02.250).

<u>Discussion of Impacts</u>
Based on the on-site investigations, 19 streams were identified within the project vicinity. Table 6.1-2 identifies the streams delineated in the study area, and describes whether the drainages are impacted by turbines, the project access roads, the underground collection system, or the substation.

Buffer setback impacts are also included in Table 6.1-2. Kittitas County buffer setbacks are calculated based on the Washington Department of Natural Resources (WDNR) Forest Practices Stream Type (Kittitas County Critical Area Ordinance Title 17A.07.010). Three stream types are located within the project area, Types 3, 4 and 5. For Type 3 streams a buffer setback of 50 feet from OHWM was used for calculations. For Type 4 streams the project facilities within the project area did not cross within 500 feet of the confluence with a higher order stream (Type 1, 2 or 3). For this reason buffer setbacks of 15 feet from any permanent structures were used for both Type 4 and Type 5 streams.

Turbines
For purposes of calculating temporary disturbance impacts, it is assumed that construction crews would require an area around each of the turbines measuring 130 feet in radius for extra workspace or about 1.25 acre per turbine. This area would provide adequate space for the turbine tower and associated concrete pad, transformers, and the crane pad**.** Construction crews would use this area for constructing the tower foundation, erecting the tower, and installing the transformer. Topsoil, cleared vegetation and onsite supplies would also be stored in this workspace.

At each tower location, a smaller area would be retained for operations, measuring 120 feet long by 40 feet wide or about 0.11 acres. For the purposes of calculating impacts to streams, it is assumed that the rectangular area would be oriented with the long side overlapping with the nearby road. This area would envelop the tower, crane pad, and transformer and would be backfilled with gravel or compacted soil or otherwise altered to prevent full restoration. The turbine towers, transformers and foundations themselves would be permanent, impermeable, above ground facilities. Based on the backfill or type of operations use, this area is not expected to revert back to stream habitat and would therefore be considered permanently impacted. The temporary disturbance zone around turbine locations overlaps with 7 stream segments, including three different reaches of Reecer Creek. A total of 1231.97 linear feet of stream channel would be within the temporary disturbance zone associated with turbine construction. In addition, three riparian areas would be impacted by temporary disturbance at the turbine locations with a total of 0.25 acres of disturbance. Streams and riparian areas within the temporary disturbance zone could be impacted by the clearance of vegetation and soil, compaction from construction equipment, and vehicular traffic. Tower foundations would permanently occupy a total of 41.26 linear feet of stream channel and 0.03 acres of riparian habitat. Foundations placed within streams or riparian areas would result in permanent filling-in of the feature in this area.

One turbine location in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the turbine will be re-located to avoid impacting the stock pond.

Three turbines are located within stream buffer zones. One is classified as a Type 3, and two are classified as Type 5, for a total of 3.90 acres of temporary impacts (see Table 6.1-2). Tower foundations would permanently occupy a total of 0.35 acres within the stream buffer zones.

Access Roads

A network of access roads would also be constructed for the project. The proposed access road layout indicates there would be access road crossings of 16 streams and of these, 8 streams would be crossed at least twice. Each access road is anticipated to be approximately 15 to 20 feet in width, plus a 15% overall increase to account for curves and intersections to non-project roads. Culverts would be installed at each stream crossing to ensure normal flow through the drainage and sized to handle the significant sheet flow that occurs each spring in this area. Within the permanent road footprint, the surface of the road would be cleared of vegetation and graded to a safe slope. Construction crews would also use a narrow area on either side of the road for grading, widening, or otherwise improving existing or creating new roads. Cleared vegetation, soil, rocks and onsite supplies would be stored in the temporary disturbance zone, anticipated to be 15 feet on either side of the road with for a temporary disturbance width of 50 feet, plus a 15% overall increase to account for curves and intersections to non-project roads.

A total of 2359.44 linear feet of stream channel would be within the temporary disturbance zone associated with access road construction. In addition, three riparian areas would be impacted by temporary disturbance for the access roads with a total of 2.68 acres of disturbance. Streams and riparian areas within the temporary disturbance zone would be impacted by the clearance of vegetation and soil, compaction from construction equipment, and vehicular traffic. The access road network would permanently cross a total of 1113.82 linear feet of stream channel and 0.91 acres of riparian habitat. Permanent roads placed within streams or riparian areas would result in relocation of the stream bank or riparian area. Where possible, existing roads would be improved to accommodate project access needs, rather than constructing new roads

One access road located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the access road will be re-located to avoid impacting the stock pond.

The four Type 3 streams that have roads crossings within the stream buffer setback zone have a total of 2.10 acres of temporary impacts. Roads would permanently occupy a total of 0.92 acres within the stream buffer zones.

Substation

The proposed substation north of Reecer Creek Road will be approximately 300 feet by 300 feet in size or approximately 2.1 acres. During construction an extra 50 feet would be utilized on all sides for construction activities and storage. No streams are impacted by the location of this facility.

Underground Collection System

An underground collection system will be installed between each of the turbines to connect the system with the substation. Wherever possible, the collection system would be installed adjacent to existing access roads. The proposed layout indicates the collection system would cross 16 streams within the project. While there would be no permanent above-ground facilities associated with this collection system, there would be temporary impacts to streams during trenching activities to install the collection system.

Construction crews would use a 10-foot wide area centered on the collection system for digging the trench and installing the underground cables. Streams and riparian areas within the temporary disturbance zone would be disturbed by the clearance of vegetation and soil and potential subsequent erosion, as well as compaction from construction equipment and vehicular traffic. A corridor of 10 feet was used for temporary impacts calculations. A total of 61.09 linear feet of stream channel would be impacted by the installation of the underground collections system.

One underground cable located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the underground cable will be re-located to avoid impacting the stock pond.

Other Project Components

The location and dimensions of the O&M facility, communication lines, visitor facilities, and staging areas have not yet been determined. These facilities will be located so as to avoid or minimize impacts to wetlands to the extent possible.

Following installation of the wind power facility, original pre-construction contours and drainage patterns will be restored around the turbines, roads, and substations, thereby minimizing loss of stream functions or associated wildlife habitat.

6.2 Wetlands

Affected Environment

Seventy-six (76) wetlands were delineated as wetland features within the study area. Most of these wetlands were palustrine or fresh water emergent wetlands (NWI code PEM) or palustrine scrub-shrub wetlands (PSS). Some were riparian wetland communities that are located around streams and other bodies of water where groundwater is close to the soil surface. The wetlands support a variety of emergent vegetation and willow shrubs.

Several stock ponds were also identified during the surveys. Areas where wetland vegetation existed outside the defined pond bed and bank were delineated based on soil, hydric vegetation, and hydrology. In these areas, it was noted that the stock pond artificially supplied the hydrology. If vegetation was confined to the pond banks, the feature was considered an isolated, non-jurisdictional surface water feature.

The wetlands consisted primarily of the following hydrophytic vegetation: Baltic rush (*Juncus balticus*), spike rush (*Eleocharis palustris*), slough sedge (*Carex obnupta*), red fescue (*Festuca rubra*), monkey flower (*Mimulus guttatus*), and willows (*Salix lucida* and *Salix exigua*). These species constituted 80% to 100% cover and were present in many of the wetlands. Other dominant vegetation found in delineated wetland areas included: Forget-me-nots (*Myosotis laxa*), White clover (*Trifolium repens*), and Iris (*Iris missouriensis*). These species constituted 50% or lower vegetative cover, but were present in a majority of the wetlands.

Some wetland areas also included riparian vegetation species such as black willow (*Salix nigra*), red alder (*Alnus rubra*) and black hawthorn (*Crataegus douglasii*) trees.

The majority of wetlands in the study area contained hydric soil indicators such as gleyed and low chroma colors, and reducing conditions, such as mottling. Typical A-horizon soils contained dark matrix colors ranging from 10 YR 2/1 to 7.5 YR 2/0. Mottle colors were usually 7.5 YR 5/8.

While no wetlands in the project area support fisheries or other protected species, some wetlands were hydrologically connected to perennial streams such as Reecer Creek and/or associated riparian corridors. Wetlands JPW-06, JPW-12, JPW-15, JPW-20, JPW-21, and JPW-22, which are located on the western portion of the project area, are saturated wetlands adjacent to Reecer Creek. Wetland JPW-06 receives water from both an irrigation ditch and Reecer Creek. Other wetlands are also located along Green Canyon Creek, or other perennial streams listed in table 6.2-1. Leaks from the North Branch Irrigation Canal also contribute water to wetlands on the western portion of the property south of the canal. Wetland JPW-17 receives water from the intermittent Jones Creek.

The remaining wetlands delineated within the project area were fed by artificial irrigation. Numerous irrigation ditches flow from the North Branch Irrigation Canal across the properties to supply water to agricultural fields and/or grazing areas. During the delineation, it was noted where artificial irrigation supplied the only hydrology for the wet areas.

It is possible that the reviewing agencies may determine that some or all of the irrigation-fed wetlands are not jurisdictional wetlands. To facilitate this determination, **Table 6.2-1** provides a summary list of all wet areas delineated within the project area, along with

Table 6.2-1
Wetland Delineation Results

Property / Wetland ID	NWI Classification	Total Wetland Area (acres)	Wetland Criteria Met? Vegetation	Hydrology	Hydric Soils	Comments
T19N R18E Sec 26						
T19N R18E Sec 24 SW 1/4						
FW-01	PEM	0.04	Y	Y	Y	Hydrology provided by irrigation.
FW-02	**PEM**	0.79	Y	Y	Y	Hydrology provided by irrigation and stream FS-03, Tributary to Currier Creek. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
FW-03	PFO	2.84	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
FW-04	PSS	0.88	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
T19N R18E Sec 17 SE 1/4						
T19N R18E Sec 20 E 1/2						
T19N R18E Sec 21						
JPW-01	PEM	8.89	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-02	PEM	2.29	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-03	PEM	12.58	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-04	PEM	14.06	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-05	PEM	1.68	Y	Y	Y	Hydrology provided by seep along hillside.
JPW-06	PEM	4.38	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property and Reecer Creek.
JPW-07	PEM	0.34	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-08	PEM	6.47	Y	Y	Y	Hydrology provided by irrigation.
JPW-09	PEM	8.16	Y	Y	Y	Hydrology provided by irrigation.
JPW-10	PEM	2.00	Y	Y	Y	Hydrology provided by irrigation.
JPW-11	PEM	3.94	Y	Y	Y	Hydrology provided by irrigation ditch.
JPW-12	PEM	1.11	Y	Y	Y	Hydrology provided by irrigation ditch.
JPW-13	PEM	43.53	Y	Y	Y	Hydrology provided by pond. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
JPW-14	PEM	2.63	Y	Y	Y	Hydrology provided by irrigation.
JPW-15	PEM	20.42	Y	Y	Y	Hydrology provided by irrigation.
JPW-17	PEM	9.25	Y	Y	Y	Hydrology provided by Jones Creek.
JPW-18	PSS	0.54	Y	Y	Y	Hydrology provided by irrigation.
JPW-19	PEM	0.55	Y	Y	Y	Hydrology provided by irrigation; also located downstream of where Robbins Canyon Creek becomes intermittent.
JPW-20	PEM	19.72	Y	Y	Y	Hydrology provided by Reecer Creek.
JPW-21	PEM	1.99	Y	Y	Y	Hydrology provided by Reecer Creek.
JPW-22	PEM	3.78	Y	Y	Y	Hydrology provided by Reecer Creek.
T19N R18E Sec 35 E 1/2						
LW-01	PEM	5.59	Y	Y	Y	Hydrology provided by stream LS-03, Tributary to Currier Creek and leaks from the North Branch Irrigation Canal.
LD-01	PSS	3.29	Y	Y	Y	Hydrology provided by stream LS-02, Tributary to Currier Creek and leaks from North Branch Irrigation Canal.
LW-01B	U	Upland	N	N	N	Upland area.
LW-02	PEM	10.37	Y	Y	Y	Hydrology provided by stream LS-01, Tributary to Currier Creek and leaks from North Branch Irrigation Canal. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
LW-02B	U	Upland	N	N	N	Upland area.
LWB-01	PEM	5.00	Y	Y	Y	Hydrology provided by stream LS-04, Tributary to Currier Creek and leaks from North Branch Irrigation Canal.
LWB-02-2	PEM	0.52	Y	Y	Y	Hydrology provided by leaks from North Branch Irrigation Canal.
T18N R18E NE 1/4 and NW 1/4 Sec 27						
NW-01	PEM	1.11	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-02	PEM	0.01	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-03	PEM	0.59	Y	Y	Y	Hydrology provided by stockpond and irrigation.
NW-04	PFO	0.72	Y	Y	Y	Hydrology provided by stockpond and irrigation.
T19N R18E Sec 28						
T19N R18E Sec 27 N 1/2						
NW-1B-01	PEM	10.01	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-1B-01B	PEM	part of above	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-1B-02	PEM	0.36	Y	Y	Y	Hydrology provided by irrigation ditch off canal.
NW-1B-03	PEM	0.39	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-04	PEM	0.15	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-05	PEM	9.17	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-05A	U	Upland	N	N	Y	Upland area.
NW-1B-05B	U	Upland	N	N	N	Upland area.
NW-1B-06	PEM	0.18	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-06A	U	Upland	N	N	Y	Upland area.
NW-1B-06B	U	Upland	N	N	Y	Upland area.
NW-1B-07	PEM	3.38	Y	Y	Y	Hydrology provided by natural spring.
NW-1B-07(U)	U	Upland	N	N	Y	Upland area.
NW-1B-08B	PEM	0.25	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-1B-08A	PEM	part of above	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.

Table 6.2-1
Wetland Delineation Results

Property / Wetland ID	NWI Classification	Total Wetland Area (acres)	Wetland Criteria Met? Vegetation	Hydrology	Hydric Soils	Comments
T19N R18E Sec 25 T19N R19E Sec 30 W 1/2 T19N R19E Sec 31 W 1/2						
TMW-01	PEM	6.28	Y	Y	Y	Hydrology provided by irrigation and headwaters of stream MS-04, Tributary of Currier Creek.
TMW-01(U)	U	Upland	N	N	N	Upland area.
TMW-02	PSS	6.39	Y	Y	Y	Hydrology provided by irrigation ditch.
TMW-03	PEM	0.23	Y	Y	Y	Hydrology provided by irrigation ditch.
TMW-04	PEM	0.01	Y	Y	Y	Hydrology provided by irrigation.
TMSEP-01	PEM	0.01	Y	Y	Y	Hydrology provided by seep.
MSW-05	PFO	0.55	Y	Y	Y	Hydrology provided by MS-05, Tributary to Currier Creek.
TMW-05	PEM	6.37	Y	Y	Y	Hydrology associated with headwaters of stream LS-02. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
TMW-06	PEM	0.68	Y	Y	Y	Hydrology associated with headwaters of stream LS-02.
TMW-07	PEM	0.78	Y	Y	Y	Hydrology provided by irrigation ditch.
T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29						
WC-01	PEM	4.72	Y	Y	Y	Hydrology provided by drainage through low area.
WC-02	PEM	2.06	Y	Y	Y	Hydrology provided by drainage through low area.
WNW-01	PEM	5.42	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-01	PEM	1.36	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-01b	PEM	4.66	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-02	PEM	0.27	Y	Y	Y	Hydrology provided by irrigation.
WW-03	PEM	1.63	Y	Y	Y	Hydrology provided by irrigation.
WW-04	PEM	0.17	Y	Y	Y	Hydrology provided by irrigation. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-05	PEM	0.19	Y	Y	Y	Hydrology provided by irrigation ditch. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-06	PEM	0.57	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-07	PEM	12.96	Y	Y	Y	Hydrology provided by irrigation ditch. ounty is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-08	PEM	0.30	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-09	PEM	0.65	Y	Y	Y	Hydrology provided by irrigation ditch. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-10	PEM	0.03	Y	Y	Y	Hydrology provided by irrigation.
WW-11	PEM	0.06	Y	Y	Y	Hydrology provided by irrigation.
WW-12	PEM	0.20	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-13	PEM	1.56	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-14	U	Upland	N	Y	Y	Upland area used for hay. Hydrology provided by irrigation ditch.
WW-15	PEM	2.63	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-16	PEM	0.47	Y	Y	Y	Hydrology provided by irrigation.
WW-17	PEM	0.49	Y	Y	Y	Hydrology provided by irrigation.
WW-18	PEM	0.34	Y	Y	Y	Hydrology provided by irrigation.
WW-19	PEM	7.72	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
WW-20	PEM	0.19	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
Total		**293.91**				

information on whether the feature met the hydrology, soils, and vegetation criteria for wetlands. Comments are provided in the table for each wetland, describing areas with natural versus artificial hydrology. The data sheets in Appendix A provide complete details on the dominant vegetation, including hydric indicator status and relative percent cover; hydrology, including comments on level of saturation and sources of water; and soils, including map series and phase, matrix and mottle color, and any hydric soil indicators. Note that for ease of review, the soil map series and phase and description are abbreviated in the data sheets. Please refer to the Soil Description Key preceding the wetland data sheets for details on each of the soils.

<u>Discussion of Impacts</u>

Based on the on-site investigations, E & E identified seventy-six (76) areas meeting all three wetland parameters within the project vicinity. The wetlands delineated were identified as palustrine, emergent or scrub-shrub wetlands, which support hydrophytic vegetation. Field survey results indicate that the proposed construction area will affect a total of 17.1 acres. The operations area, including the turbines, permanent access roads, and the substation, will affect 3.2 acres of wetlands. **Table 6.2-2** provides a list of individual wetlands identified within the project area and the total acreage of wetlands that will be potentially affected by construction and operation of the proposed project.

Buffer setback impacts are also included in Table 6.2-2. Kittitas County buffer setbacks are calculated based wetland categories (Kittitas County Critical Area Ordinance Title 17A.04.020 and Title 17A.02.310). Of the 76 wetland present onsite, 70 are Category III (average value) and 6 are Category IV (less than average value). Only one Category IV wetland, NW-03, was impacted; the rest of the impacted wetlands were Category III. For Category III wetlands a buffer of 80 feet was used, and for Category IV wetlands a setback of 25 feet was used.

Turbines

For purposes of calculating temporary impacts, it is assumed that construction crews would require an operating area measuring 130 feet in radius around the base of each turbine. This factor translates into a total area of temporary construction disturbance of approximately 1.25 acres per turbine. Construction crews would use this area for constructing the tower foundations and storing topsoil, cleared vegetation and onsite supplies. Each wind turbine and associated tower is 12 feet in diameter. Permanent wetland impacts associated with turbine locations coinciding with wetland boundaries were calculated using a rectangular zone of permanent disturbance at each turbine location, measuring 120 feet long by 40 feet wide or 0.11 acres for each of the subject proposed turbine points. Pad-mounted transformers would also be installed at the base of each turbine. This includes the impacts from the pad-mounted transformers. The turbine towers and transformers would be permanent, impermeable, above ground facilities.

Table 6.2-2
Wetland Disturbance Calculations

Property Legal Description / Wetland ID	Temporary Impacts (acres)					Permanent Impacts (acres)				
	Turbines	Roads	Below Ground Collection System	Substation	Total	Turbines	Roads	Below Ground Collection System	Substation	Total
T19N R18E Sec 17 SE 1/4, T19N R18E Sec 20 E 1/2, T19N R18E Sec 21										
JPW-03	0.59	0.72	0.00	0.00	1.31	0.06	0.27	0.00	0.00	0.33
JPW-04	1.13	0.78	0.00	0.00	1.91	0.11	0.30	0.00	0.00	0.41
JPW-06	0.54	0.18	0.00	0.00	0.71	0.05	0.05	0.00	0.00	0.10
JPW-07	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
JPW-09	0.50	0.06	0.01	0.00	0.56	0.05	0.02	0.00	0.00	0.06
JPW-13	1.26	0.46	0.00	0.00	1.72	0.11	0.17	0.00	0.00	0.28
JPW-15	0.91	0.05	0.00	0.00	0.96	0.07	0.00	0.00	0.00	0.07
JPW-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JPW-17	0.00	0.25	0.00	0.00	0.25	0.00	0.10	0.00	0.00	0.10
JPW-18	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01
JPW-20	1.14	0.96	0.00	0.00	2.10	0.11	0.36	0.00	0.00	0.48
JPW-21	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
JPW-22	0.66	0.26	0.00	0.00	0.92	0.04	0.10	0.00	0.00	0.15
T19N R18E Sec 35 E 1/2										
LW-01	0.80	0.98	0.00	0.00	1.78	0.11	0.39	0.00	0.00	0.50
LW-02	0.00	0.09	0.00	0.00	0.09	0.00	0.03	0.00	0.00	0.03
T19N R18E Sec 28, T19N R18E Sec 27 N 1/2										
NW-03	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
NW-1B-07	0.33	0.29	0.00	0.00	0.63	0.00	0.12	0.00	0.00	0.12
T19N R18E Sec 25, T19N R19E Sec 30 W 1/2, T19N R19E Sec 31 W 1/2										
TMW-01	1.11	0.11	0.00	0.00	1.22	0.06	0.01	0.00	0.00	0.08
TMW-05	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01
T19N R18E Sec 4 SE 1/4, T19N R18E Sec 9, T19N R18E Sec 17 SW 1/4, T19N R18E Sec 20 W 1/2, T19N R18E Sec 29										
WC-02	0.00	0.07	0.00	0.00	0.07	0.00	0.02	0.00	0.00	0.02
WW-01	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
WNW-01	0.80	0.00	0.00	0.00	0.80	0.10	0.00	0.00	0.00	0.10
WW-06	0.25	0.17	0.00	0.00	0.42	0.03	0.09	0.00	0.00	0.12
WW-07	0.96	0.12	0.00	0.00	1.08	0.11	0.04	0.00	0.00	0.15
WW-08	0.06	0.05	0.00	0.00	0.11	0.02	0.02	0.00	0.00	0.04
WW-09	0.01	0.08	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.01
WW-10	0.00	0.03	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01
WW-13	0.00	0.15	0.00	0.00	0.16	0.00	0.05	0.00	0.00	0.05
Total Acreage Wetlands										
Total	11.10	5.94	0.02	0.00	17.06	1.04	2.19	0.00	0.00	3.23
Buffer Disturbance Calculations by Wetland Category										
Category III Wetlands	10.99	12.66	0.80	0.10	24.54	0.92	4.77	0.00	0.00	5.69
Category IV Wetlands	0.06	0.09	0.00	0.00	0.16	0.00	0.04	0.00	0.00	0.04
Total Acreage Buffers										
Total	11.05	12.75	0.80	0.10	24.70	0.92	4.81	0.00	0.00	5.73
Total Acreage Combined										
Total	22.15	18.69	0.82	0.10	41.76	1.96	7.00	0.00	0.00	8.96

Notes

This table only lists wetlands that have the potential to be impacted by construction or operation. For all other wetlands, there would be no impacts.

The proposed substation is not located near any wetlands.

Disturbance calculations prepared using GIS data. Calculations displayed in this table with two significant digits.

The assumed envelope of construction disturbance around the proposed turbine locations overlaps with the mapped boundaries of 18 wetlands. Wetlands within the temporary disturbance zone could be impacted by the clearance of vegetation and soil, alteration of contours and therefore hydrology, compaction from construction equipment, and vehicular traffic. A total of 11.1 acres of wetland area would be temporarily affected by construction disturbance. For 14 of the 18 wetlands, the permanent footprint of the turbine pad itself extends into the mapped wetland area. The permanent project facilities would displace a total wetland area estimated at 1.0 acre. Foundations placed within wetlands areas would result in permanent filling-in of the feature in this area.

One turbine location in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the turbine will be re-located to avoid impacting the stock pond.

The buffer zone impacts for turbines include an additional 11.0 acres for Category III wetlands and 0.06 acres for Category IV wetland for a total of 11.1 acres of buffer zone temporary impacts. Tower foundations would permanently occupy a total of 0.9 acre within the Category III wetland buffer zones.

Access Roads

Each project access road is anticipated to be approximately 15 feet in width with a 2-foot shoulder on each side, and 20 feet plus shoulders on the curves. As such, permanent impacts to wetlands located coincident within the road system layout were calculated using a 19-foot road width, plus a 15% overall increase to account for curves and intersections to non-project roads. Within the permanent road footprint, the surface of the road would be cleared of vegetation and graded to a safe slope. For purposes of calculating temporary impacts, it was assumed that construction activity would occur within a 15-foot area on either side of the road alignment, for a total construction disturbance width of 50 feet, plus a 15% overall increase to account for curves and intersections to non-project roads. Construction crews would use this area for grading, widening, or otherwise improving existing or creating new roads. Cleared vegetation, soil, rocks and onsite supplies would be stored in the temporary disturbance zone. Where possible, existing roads would be improved to accommodate project access needs, rather than constructing new roads. As such, the 50-foot construction disturbance width might not be used to its entirety and impact calculations for areas of disturbance may overstate the actual extent of impact to some degree.

The assumed disturbance envelope for the access road layout overlaps the mapped boundaries for 25 wetlands, for which the area of temporary construction impact was calculated at 5.9 acres. Wetlands within the temporary disturbance zone could be impacted by the clearance of vegetation and soil and potential subsequent erosion, as well as compaction from construction equipment and vehicular traffic. The map analysis indicated that 2.2 acres of wetland area would be occupied by permanent access roads.

Permanent roads placed within wetlands areas would result in conversion of wetland areas to roads.

One access road located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the access road will be re-located to avoid impacting the stock pond.

The buffer zone impacts for access roads include an additional 12.7 acres for Category III wetlands and 0.09 acres for Category IV wetland for a total of 12.8 acres of buffer zone temporary impacts. Project access roads would permanently occupy a total of 4.8 acres within the Category III wetland buffer zones.

Substation

The proposed substation north of Reecer Creek Road will be approximately 300 feet by 300 feet in size or approximately 2.1 acres. During construction an extra 50 feet would be utilized on all sides for construction activities and storage. No wetlands are located within proximity of the proposed substation.

Underground Collection System

An underground collection system would be installed between each of the turbine locations to connect them with the project substation. Wherever possible, the collection system will be installed adjacent to existing access roads. The proposed layout indicates the installation of the collection system would cross 7 wetlands. While there would be no permanent aboveground facilities associated with this collection system, there would be temporary impacts to the wetlands from soil compaction, vegetation clearing, or operation activities.

Installation of the collection system will require a 10-foot wide corridor for digging the trench and installing the underground cables. Wetlands within the temporary disturbance zone would be disturbed by the clearance of vegetation, soil compaction from construction equipment and vehicular traffic, and potential subsequent erosion. A total of 0.02 acres would be impacted within the temporary disturbance zone associated with the underground collections system. The underground collections system would have no permanent impacts.

One underground cable located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the underground cable will be re-located to avoid impacting the stock pond.

The buffer zone impacts for underground collection systems include an additional 0.8 acres for Category III wetlands. There would be no permanent underground collection system impacts.

Other Project Components

The location and dimensions of the O&M facility, communication lines, meteorological towers, visitor facilities, and staging areas have not yet been determined. These facilities will be located so as to avoid or minimize impacts to wetlands to the extent possible. Following installation of the wind power facility, original contours and drainage patterns will be restored around the turbines, roads, and substations, thereby minimizing loss of wetland area or hydrological functions or associated on wildlife habitat. functions and values of emergent wetlands within the construction areas are expected to be restored.

6.3 Non-Wetland Areas

Nine areas delineated within the project area were determined to be non-wetland areas based on unmet wetland criteria such as non-hydric soils. Most of these areas did not support hydric vegetation and were sampled to determine the boundaries of other wetland areas. These areas are considered upland because they do not meet one of the three criteria for delineating wetlands.

7.0 Conclusion

Waters of the United States and wetland delineations were conducted in accordance with the USACE 1987 *Wetland Delineation Manual* (Environmental Laboratory 1987) and other USACE regulations regarding waters of the United States.

Seventy-six wetlands containing all three wetland parameters (hydrology, vegetation, and soils) and 19 streams were identified within the project area.

Of the wetlands delineated within the study area, 23 wetlands and 16 streams will be impacted permanently by the construction of turbines, roads, or other facilities needed for operation. Wetlands and waters of the United States impacted temporarily by construction activities and will be returned to pre-construction conditions.

Temporary impacts shall be restored, and permanent impacts replaced through wetland creation or enhancement (KCCAO Section 17A.04.050, Ord. 94-22 (part), 1994).

The replacement ratios are seperated by Category of the wetland impacted. The actual replacement, enhancement or creation ratio is determined during the permitting process with the U.S. Army Corps of Engineers, Department of Ecology, and Kittiatas County, which takes into account the wetland function, acreage, category, and location.

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Exhibit 2

Well Database

Appendix B, Exhibit 2
Ground Water Resources
Well Database

Well	Owner's Name		Date	Log	USE	GS	Total	Well	Static	WL	Exposure	Depth		Elevation		Aquifer Test		
ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm)	s(ft)	t(hr)
18/18/5/D1	Bob	Burke	7/10/78	Y	Dom	1920	120	110	40	1880	open	110	120	1810	1810	15	25	2
18/18/6/D2	Tom	Roth	8/10/98	Y	Dom	1880	165	163	102	1778	open	163	165	1717	1717	35	160	1
18/18/6/D3	Steve ar	Emery	7/31/95	Y	Dom	1880	118	118	35	1845	open	116	118	1764	1762	27-30	115	1
18/18/6/D4	Lyle	Defoor	10/21/95	Y	Dom	1880	340	340	245	1635	perf	300	340	1580	1540	30		
18/18/6/D5		Roth Land	9/15/97	Y	Dom	1920	380	380	300	1620	perf	360	380	1560	1540			
18/18/6/D6		Roth Land	1/6/99	Y	Dom	1920	200	200	58	1862	open	142	200	1778	1720			
18/18/6/D7		Ellensburg Algrl	10/14/96	Y	Dom	1920	320	320	60	1860	open	320	320	1600	1600	85	10-14	2
18/18/6/D8	Joe	Howe	5/1/97	Y	Dom	1920	140	140	50	1870	open	118	140	1802	1780			
18/18/6/D9	Howard	Mitchell	8/15/95	Y	Dom	1900	306	306	255	1645	perf	280	360	1620	1594	15		
18/19/5/D10	Jennifer	Clerf	11/16/00	Y	Dom	2160	160	160	32	2128	open	158	160	2002	2000	12-15		
19/18/2/D13	John	Wright	5/30/88	Y	Dom	5000	140	140	28	4972	open	19	140	4981	4860			
19/18/2/D14	Leon	Baker	7/23/90	Y	Dom	4400	244	244	120	4280	open	18	244	4382	4156			
19/18/3/D15	Ron	Cleaver	10/6/96	Y	Dom	4000	300	189	dry	dry	open	35	189	3965	3811			
19/18/3/D16	Jim and	Stanley	9/1/99	Y	Dom	3320	405	405	dry	dry	open	23	405	3297	2915			
19/18/5/D17	Bill	Allenbaugh	5/11/89	Y	Dom	3800	43	41	1	3799	open	39	43	3761	3759			
19/18/6/D18	Paul	Dobbins	7/18/95	Y	Dom	2960	245	245	150	2810	perf	225	245	2735	2715	7		
19/18/6/D19	Neil J.	Hoff	5/16/94	Y	Dom	2980	100	100	30	2950	perf	60	80	2920	2880	5	70	1
19/18/6/D20	Mark an	Swanberg	11/7/96	Y	Dom	3040	80	80	23	3017	open	78	80	2962	2960			
19/18/6/D21	Jeff	Hoff	11/2/96	Y	Dom	3040	800	800	471	2569	open	97	800	2943	2240			
19/18/6/D22	Randall	Clark	5/16/96	Y	Dom	3040	180	180	100	2940	perf	120	180	2920	2860	20	175	2
19/18/7/D23	Dick	Saoba	6/1/89	Y	Dom	2720	840	832	410	2310	open	115	840	2605	1888	8-35	775-725	
19/18/7/D24	Robert	Best	12/13/01	Y	Dom	2700	280	280	65	2635	open	85	280	2615	2420	7	0	4
19/18/8/D25	Edsel	Heslip	10/1/98	Y	Dom	2660	440	440	250	2410	o @ bot	440	440	2220	2220	40		
19/18/8/D26	Gordon	Cresse	9/15/97	Y	Dom	2820	435	435	312	2508	open	345	435	2475	2385			
19/18/8/D27	Ken	Moraites	6/18/99	Y	Dom	2720	626	626	510	2210	open	606	626	2114	2094	12-25	560-600	
19/18/8/D28	Gaylen	Waschell	7/28/95	Y	Dom	2670	600	600	480	2190	perf	580	600	2090	2070	10	595	1
19/18/8/D29	Judy	Feling	10/27/93	Y	Dom	2570	560	560	485	2085	perf	530	550	2040	2010	2-3	560	1
19/18/8/D30	Pat	Kinnear	10/7/95	Y	Dom	2570	640	640	465	2105	perf	580	640	1990	1930	15	630	2
19/18/8/D31	Jerry	Gudgel	8/18/95	Y	Dom	2620	560	560	470	2150	perf	480	540	2140	2060	3-4	550	3
19/18/8/D32	George	Grigg	6/1/93	Y	Dom	2580	660	640	500	2080	perf	640	660	1940	1940	15		
19/18/9/D33	Claude	Frable	10/16/91	Y	Dom	2940	895	895	678	2262	perf	855	895	2085	2045	2		
19/18/10/D34	John	Daily	7/26/96	Y	Dom	3020	380	375	275	2745	perf	355	375	2665	2645	3		
19/18/11/D35	Kevin	Greene	5/3/83	Y	Dom	3160	225	225	Art		open	220	225	2940	2935	6	120	3
19/18/11/D36	Kevin	Parssons	8/4/86	Y	Dom	3200	310	310	NA		open	240	310	2960	2890			
19/18/11/D37	Mike	Dummann	9/21/98	Y	Dom	3200	205	205	dry	dry	open	68	205	3132	2995			
19/18/11/D38	Kevin P.	Greene	7/1/89	Y	Dom	3080	322	322	Art		open	315	322	2765	2758	50		
19/18/12/D39	Shan	Rowbotham	9/14/79	Y	Dom	3720	120	120	15	3705	open	118	120	3602	3600	20	50	3
19/18/14/D40	Norman	Brush	6/1/98	Y	Dom	2800	438	425	324	2476	perf	365	425	2435	2375	4-6	420	5
19/18/14/D41	Bruce E.	Heidel	10/31/94	Y	Dom	2880	640	640	400	2480	perf	600	640	2280	2240	6		
19/18/14/D42	Greg an	Smith	7/20/94	Y	Dom	2880	520	520	61	2819	perf	500	520	2380	2360	6		
19/18/14/D43	Willie	Dones	9/30/99	Y	Dom	2540	645	NA	550	1990	perf	500	580	2040	na	1-2	590	2
19/18/14/D44	Wilbur	Whitbeck	4/20/94	Y	Dom	2730	85	85	44	2686	open	83	85	2647	2645	15	80	2
19/18/14/D46	Robert a	Patrick	12/5/79	Y	Dom	2530	390	390	300	2230	perf	330	390	2200	2140	9	60	1
19/18/14/D47	Steve ar	Dahlquist	3/12/99	Y	Dom	2580	813	787	430	2150	perf	240	253	2340	1793	79	810	1
19/18/14/D48	Dan	Dantzler	7/3/88	Y	Dom	2500	125	125	100	2400	open	120	125	2380	2375	3		
18/19/16/D49	Don	Sherman	9/20/00	Y	Dom	2580	190	190	26	2554	perf	180	190	2400	2390	15		2
19/18/17/D50	Keley	Dormater	9/5/96	Y	Dom	2500	480	475	375	2125	open	460	480	2040	2025	15	475	1
19/18/17/D51	David	Boyovich	3/31/97	Y	Dom	2500	640	635	408	2092	perf	575	635	1925	1865			
19/18/17/D52	Dean	Auve	6/1/87	Y	Dom	2500	550	550	400	2100	open	340	550	2160	1950	10		
19/18/17/D53	Barry	Snover	12/10/02	Y	Dom	2460	500	500	NA		perf	440	500	2020	1960	5	490	3

Appendix B, Exhibit 2
Ground Water Resources
Well Database

Well ID	Owner's Name First	Owner's Name Last	Date Completed	Log Avail?	USE	GS Elev.	Total Depth	Well Depth	Static WL	WL Elev.	Exposure Type	Depth Top	Depth Bottom	Elevation Top	Elevation Bottom	Aquifer Test Q (gpm)	Aquifer Test s(ft)	Aquifer Test t(hr)
19/18/17/D54	Ron	Stiffler	11/4/96	Y	Dom	2460	600	600	400	2060	perf	540	600	1920	1860	30	590	2
19/18/17/D55	Jeff	Wippel	2/26/97	Y	Dom	2530	440	440	340	2190	perf	380	440	2150	2090	12		
19/18/17/D56	Don	Herts	4/19/87	Y	Dom	2460	540	530	380	2080	perf	430	530	2030	1930	15		
19/18/21/D57	Jim	Roan	5/1/79	Y	Irrig	2360	700	700	180	2180	perf	300	325	2060	1660	400		
19/18/22/D58	Jerry	Salisbury	6/1/94	Y	Dom	2320	380	380	253	2067	perf	340	380	1980	1940	40		
19/18/22/D59	Donald	McLaughlin	8/23/85	Y	Dom	2340	160	160	96.6	2243	perf	114	154	2226	2180			
19/18/22/D60	Mikail	Tarasenko	9/12/98	Y	Dom	2360	305	300	205	2155	open	300	305	2060	2060	25	29	2
19/18/22/D61	Art	Manz	8/21/85	Y	Dom	2340	300	300	180	2160	open	160	300	2180	2040	25		
19/18/22/D62	David	Lee	9/8/00	Y	Dom	2290	285	285	163	2127	open	257	285	2033	2005	40-45		
19/18/23/D63	Coldwell	Banker	7/14/88	Y	Dom	2560	513	NA	373	2187	open	191	513	2369	na	15		
19/18/23/D64	Dennis	Romppel	9/27/89	Y	Dom	2440	110	110	45	2395	open	100	110	2340	2330	10	100	4
19/18/23/D65	Arnold	Volger	5/25/93	Y	Dom	2400	500	500	360	2040	perf	460	500	1940	1900	5	490	3
19/18/25/D66	Bill	Linder	6/17/83	Y	Dom	2350	148	148	37	2313	open	50	148	2300	2202	30		
19/18/25/D67	Pat	Burke	7/2/83	Y	Dom	2320	110	110	70	2250	open	106	110	2214	2210	15	0	3
19/18/26/D68	Charlie	Schantz	7/7/01	Y	Dom	2130	90	87	43	2087	open	77	87	2053	2043	50	0	4
19/18/26/D69	Scott	Manson	11/1/00	Y	Dom	2090	340	340	240	1850	open	340	340	1750	1750	12-15		
19/18/27/D70	R and U	Miller and Weicht	1/8/01	Y	Dom	2180	133	130	64	2116	open	127	133	2053	2050	9	126	2
19/18/27/D71	W.	Zuppe	5/30/78	Y	Dom	2130	282	280	195	1935	open	235	282	1895	1850	10	0	
19/18/27/D72	Kevin ar	Persson	7/22/97	Y	Dom	2030	200	200	138	1892	open	178	200	1852	1830	16	180	1
19/18/28/D73	George '	Plase	11/16/77	Y	Dom	2110	363	347	230	1880	open	344	317	1766	1763	50		
19/18/28/D74	Don	Neumeister	11/28/94	Y	Dom	2150	390	350	250	1900	open	330	350	1820	1800	20	330	1
19/18/28/D75	E.W.	Nelson	11/10/00	Y	Dom	2160	360	360	255	1905	open	360	360	1800	1800	6-7		
19/18/28/D76	Nicholas	Schimtt	NA	Y	Irrig	2190	955	955	NA		open	665	955	1525	1235			
19/18/28/D77	Jill	Eichman	9/5/01	Y	Dom	2060	379	379	167	1893	open	358	379	1702	1681	30		
19/18/28/D78	Jackie	Orgill	7/16/01	Y	Dom	2060	300	300	198	1862	open	273	300	1787	1760			
19/18/28/D79	Lee	Burtchett	11/16/01	Y	Dom	2050	345	324	210	1840	open	303	324	1747	1726	15		
19/18/30/D80	Shird J.	Burks	11/8/89	Y	Dom	2100	160	160	15	2085	open	140	160	1960	1940	20	140	2
19/18/31/D81	Jamie	Gordon	10/24/97	Y	Dom	2020	160	160	90	1930	open	156	160	1864	1860	20	158	1
19/18/31/D82	Sam and	Ahlardt	7/16/97	Y	Dom	2020	170	170	82	1938	open	158	170	1862	1850	30		
19/18/31/D83	Tom	Roth	12/1/99	Y	Dom	2030	207	207	120	1910	perf	187	207	1843	1823	15-20	180	1
19/18/31/D84	Ron	Norton	11/30/00	Y	Dom	2030	116	116	55	1975	open	114	116	1916	1914	40		
19/18/31/D85	Paul	Kyllo	5/24/01	Y	Dom	2020	161	161	106	1914	open	160	161	1860	1859	25		
19/18/31/D86	Jamie	Mays	5/25/96	Y	Dom	2020	160	160	85	1935	o @ bot	160	160	1860	1860	16	155	1
19/18/31/D87		Beaconsfield Assoc.	9/1/94	Y	Dom	2000	227	227	90	1910	open	223	227	1777	1773	20	220	1
19/18/31/D88	Steve	Kyllo	6/25/96	Y	Dom	1970	180	NA	33	1937	open	158	180	1812	na	27	160	
19/18/31/D89	Gary and	Baryo	5/6/97	Y	Dom	1940	165	165	48	1892	open	119	165	1821	1775	30		
19/18/31/D90		Roth Land	7/14/97	Y	Dom	1940	180	167	64	1876	open	158	187	1782	1773	20-22		
19/18/31/D91	Paul	Kyllo	5/1/96	Y	Dom	1940	240	240	80	1860	open	190	240	1750	1700	15-20	235	
19/18/31/D92	Donald J	Rhine	8/18/97	Y	Dom	2040	100	100	50	1990	open	98	100	1942	1940	20	98	1
19/18/31/D93	John	Harris	4/19/96	Y	Dom	1920	160	100	30	1890	open	100	160	1820	1820	20	95	1
19/18/31/D94	Rober C	Sparks	9/29/89	Y	Dom	1860	131	131	27	1833	open	127	131	1733	1729	18	4	1
19/18/32/D95	Dick	Simmon	4/30/00	Y	Dom	1990	142	142	55	1935	open	139	142	1851	1848	20		1
19/18/32/D96	Lori	Kelln	3/21/94	Y	Dom	1990	100	100	40	1950	o @ bot	100	100	1890	1890	15		
19/18/32D97	Barbara	Calkins	12/3/91	Y	Dom	1990	103	103	18	1972	open	80	103	1910	1887	25		
19/18/32/D98	Paul	Noelover	7/17/78	Y	Dom	1970	125	125	60	1910	open	110	125	1860	1845	15	20	2
19/18/32/D99	A.J.	Mihelich	5/22/96	Y	Dom	1920	40	38	13	1907	open	30	40	1890	1882	20	30	1
19/18/33/D10	Cliff and	Sands	2/2/01	Y	Dom	2030	220	220	167	1863	open	199	220	1831	1810	25	0	4
19/18/33/D10	Ken	Hunt	5/21/91	Y	Dom	2030	200	200	120	1910	open	160	200	1870	1830	20	195	2
19/18/33/D10	Ed	Olson	6/11/95	Y	Dom	2030	260	260	155	1875	open	220	260	1810	1770	15		2
19/18/33/D10	Gerald	Hunt	11/6/81	Y	Dom	1950	145	145	60	1890	open	120	145	1830	1805	15	20	3

Appendix B, Exhibit 2
Ground Water Resources
Well Database

Well	Owner's Name		Date	Log	USE	GS	Total	Well	Static	WL	Exposure	Depth		Elevation		Aquifer Test		
ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm)	s(ft)	t(hr)
19/18/33/D10	Ken	Helm	5/14/02	Y	Dom	1960	160	NA	60	1900	open	120	160	1840	na	15	155	3
19/18/34/D105		Klampher	11/4/90	Y	Dom	1970	135	135	35	1935	open	120	135	1850	1835	15	130	2
19/18/35/D10	Mike	Stanavich	10/28/97	Y	Dom	1980	155	155	80	1900	open	149	155	1831	1825	10	145	1
19/18/35/D10	Bill	Grueter	11/24/97	Y	Dom	1910	260	260	40	1870	perf	248	260	1662	1650	85	240	1
19/19/18/D10	Keith	Riexinger	4/7/01	Y	Dom		420	420	138	-138	perf	380	420	-380	-420	20	0	1
19/19/19/D109		Shea Construction/E	5/6/93	Y	Dom	2570	503	500	300	2270	perf	480	500	2090	2070	30		
19/19/20/D11	Frank	Arnold	2/28/98	Y	NA	2550	380	380	186	2364	open	267	380	2283	2170	30		
19/19/28/D11	Allen	Aronica	8/8/78	Y	Dom	2310	70	NA	25	2285	open	37	70	2273	na	1		
19/19/29/D11	Preston	Shugart	1/6/03	Y	Dom	2450	270	270	158	2292	perf	230	270	2220	2180	10	250	1
19/19/29/D11	Don	Smith	2/9/94	Y	Dom	2350	36	36	20	2330	o @ bot	36	36	2314	2314	45		
19/19/29/D11	Mike	Smith	12/21/93	Y	Dom	2370	260	260	95	2275	perf	220	260	2150	2110	10		
19/19/29/D11	Leonard	Nichols	5/8/78	Y	Dom	2310	40	40	5	2305	open	35	40	2275	2270	60		
19/19/29/D11	Mike	Smith	9/19/91	Y	Dom	2320	200	200	60	2260	perf	140	200	2180	2120	20	195	2
19/19/29/D11	John	Strong	9/8/95	Y	Dom	2330	305	305	137	2193	perf	261	305	2069	2025	7	301	2
19/19/30/D11	Doug	Burnett	5/14/02	Y	Dom	2450	433	433	210	2240	perf	390	430	2060	2017	10	430	1
19/19/30/D11	Ross	Marvin	11/9/01	Y	Dom	2330	505	505	220	2110	perf	445	505	1885	1825	50		
19/19/31/D120		Johnson	5/31/96	Y	Dom	2250	150	150	42	2208	open	140	150	2110	2100	8-10	150	3
19/19/31/D12	Alla Ditta	Choudary	3/6/02	Y	Dom	2240	165	134	102	2138	perf	114	134	2126	2106	5-6		
19/19/31/D12	Ken	Gamon	3/5/02	Y	Dom		202	202	103	-103	perf	162	202	-162	-202	5	200	1
19/19/31/D12	Tim	Richardson	7/23/84	Y	Dom	2220	95	95	15	2205	open	90	95	2130	2125	20	30	3
19/19/31/D12	Amir	Shaterian	11/20/02	Y	Dom	2150	230	230	40	2110	perf	190	230	1960	1920	40		
19/19/32/D12	Gabe	Reyes	9/11/01	Y	Dom	2270	265	256	67	2203	open	256	265	2014	2014	40	260	1
19/19/32/D12	Lyle D.	Ramsey	9/19/85	Y	Dom	2280	174	NA	45	2235	perf	156	166	2124	na	25		
19/19/32/D12	Walt	Kaminsky	9/9/92	Y	Dom		185	185	35	-35	perf	80	100	-80	-185	12	80	1
19/19/32/D12	Scott	Zimmerman	3/29/02	Y	Dom	2250	138	138	38	2212	perf	98	138	2152	2112	25	135	2
19/19/32/D12	Paul M.	Zeck	5/14/93	Y	Dom	2260	138	138	NA		open	138	140	2122	2122	30		
19/19/32/D13	Bruce A.	Rayfield	6/25/93	Y	Dom	2250	180	180	60	2190	perf	160	180	2090	2070	20		
19/19/32/D13	Bill	Owen	6/12/77	Y	Dom	2240	162	162	10	1840	perf	60	80	2180	2078	8	147	1
19/19/32/D132		Jim Maisson Constru	9/19/80	Y	Dom	2250	190	190	45	2205	perf	150	190	2100	2060	25		
19/19/32/D13	Walter P	Davenport	6/27/89	Y	Dom	2260	400	400	55	2205	perf	340	400	1920	1860	35		
19/19/32/D13	Harriet	Melton	8/15/88	Y	Dom	2260	120	120	47	2213	perf	60	120	2200	2140	11	120	1
19/19/32/D13	Walter	Davenport	2/16/94	Y	Dom	2260	300	200	50	2210	perf	160	200	2100	2060			
19/19/32/D13	Tom	Stevenson	6/26/79	Y	Dom	2270	80	80	20	2250	perf	43	48	2227	2190	17		1
19/19/32/D13	Gene	Emerson	6/2/93	Y	Dom	2270	160	160	60	2210	perf	140	160	2130	2110	5	140	1
19/19/32/D13	Julia A.	Potter	5/15/79	Y	Dom	2230	100	80	30	2200	open	20	100	2210	2150	8	80	1
19/19/32/D13	Darrell	Hoadley	9/16/85	Y	Dom	2230	103	97	30	2200	perf	59	97	2171	2133	20		
19/19/32/D14	Robert	Winningham	10/15/98	Y	Dom	2270	260	260	85	2185	perf	200	260	2070	2010	15	250	2
19/19/32/D14	Glen	Bare	9/18/80	Y	Dom	2230	100	100	NA		perf	60	100	2170	2130	13		
19/19/32/D14	Gil and I	Justiss and Roth	3/4/90	Y	Dom	2210	184	180	32	2178	open	114	184	2096	2030	11		
19/19/32/D14	William	Owens	5/18/89	Y	Dom	2190	200	200	21	2169	open	85	200	2105	1990	25	195	2
19/19/32/D14	Clay	Mock	10/11/96	Y	Dom	2210	300	300	39	2171	perf	240	280	1970	1910	11		
19/19/32/D14	Andy	Bacon	11/14/02	Y	Dom	2210	60	60	12	2198	perf	40	60	2170	2150	25	60	2
19/19/32/D14	Don	Cobain	5/3/90	Y	Dom	2210	100	100	4	2206	perf	70	100	2140	2110	20	100	1
19/19/32/D14	Joe and	Lunstrum	8/2/99	Y	Dom	2210	185	185	28	2182	perf	145	185	2065	2025	11-12		2
19/19/32/D14	Bobbi	Bopp	6/4/79	Y	Dom	2190	75	75	12	2178	open	70	75	2120	2115	20	15	2
19/19/32/D14	Larry	Gretves	12/10/91	Y	Dom	2190	208	NA	32	2158	perf	188	208	2002	na	20	200	
19/19/32/D15	Tom	Barker	NA	Y	Dom	2190	190	190	23	2167	perf	150	190	2040	2000	15	180	4
19/19/32/D15	Phip	Morris	4/20/96	Y	Dom	2170	260	260	27	2143	perf	220	260	1950	1910	16-18		
19/19/32/D15	Debbie	Jimmerson	9/26/96	Y	Dom	2170	220	220	39	2131	open	157	200	2013	1950	15		
19/19/33/D15	Dick	Lunstrum	3/4/80	Y	Dom	2220	80	80	14	2206	open	65	80	2155	2140	15	15	3

Appendix B, Exhibit 2
Ground Water Resources
Well Database

Well	Owner's Name		Date	Log	USE	GS	Total	Well	Static	WL	Exposure	Depth		Elevation		Aquifer Test		
ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm)	s(ft)	t(hr)
19/19/33/D15	Louise	Becker	4/8/93	Y	Dom	2230	200	200	15	2215	o @ bot	200	200	2030	2030	15	190	2
19/19/33/D15	Milt	Richards	5/17/90	Y	Dom	2190	130	130	9	2181	perf	50	113	2140	2060	30	113	1
19/19/33/D15	Milt	Richards	2/22/90	Y	Dom		120	120	26	-26	perf	70	120	-70	-120	30	120	1
19/19/33/D15	Charles	Williams	8/26/77	Y	Dom	2220	140	140	35	2185	open	136	140	2084	2080	8	100	1
19/19/33/D15	Mark	Halloway	10/28/97	Y	Dom	2210	142	142	27	2183	perf	122	142	2088	2068	12		
19/19/33/D16	Ron and	Mogee	10/16/92	Y	Dom	2210	220	215	60	2150	open	215	215	1995	1995	15	215	1
19/19/33/D16	Jerry	Hunt	7/23/92	Y	Dom	2210	65	60	50	2160	open	60	65	2150	2150	12		
19/19/33/D16	W	Bacon	10/2/78	Y	Dom	2190	49	47	10	2180	open	47	49	2143	2143	15		
19/19/33/D16	Jerry	Anderson	7/16/88	Y	Dom	2210	240	240	45	2165	open	160	240	2050	1970	12		
19/19/33/D16	Bob	Kibber	7/1/78	Y	Dom	2210	60	60	6	2204	open	50	60	2160	2150	15	10	2
20/18/31/D16	David T.	Hedges	7/3/01	Y	Dom	3160	379	368	290	2870	open	359	379	2801	2792	30	256	1
20/18/33D16	Nelson	Cox	9/5/85	Y	Dom	3800	67	67	35	3765	open	67	67	3733	3733	40	5	4

Dom= Domestic
Irrig= Irrigation
perf= perforated
o @ bot= open at bottom
Note: All numbers are in feet, except where otherwise indicated
Art= Artesian

APPENDIX C

Plants and Animals

Contents

Exhibit 1

Threatened and Endangered Species Report

APPENDIX C,
EXHIBIT 1

THREATENED AND ENDANGERED SPECIES

This report provides detailed information on threatened, endangered and sensitive species considerations for the Desert Claim Wind Power Project. The technical documentation in this exhibit supports the summary information presented in **Section 3.4, Plants and Animals**, of the EIS. The organization of the exhibits reflects the subheadings used in the respective portions of **Section 3.4** addressing vegetation, wildlife and fish.

1. Affected Environment

1.1 Plants

Review of federal and state lists of rare plant species suggests that 21 such species could occur in the project area, based on the type of habitats present (**Table 1**). Of the 21 rare plant species, one (Ute ladies'-tresses) is a federally-listed threatened species, with a state ranking of endangered. Five are federal 'species of concern', with state rankings of threatened or sensitive. The remaining 15 are listed at the state level as either sensitive or review species. The Washington Natural Heritage Program (WNHP) database has records for two state sensitive species in or adjacent to the project area. One historic record (1959) for Piper's daisy includes the western portion of the project area, and one current record (1991) for long-sepal globemallow is located adjacent to the eastern end of the project area.

In the project area, the wet meadows provide potential habitat for the Ute ladies'-tresses orchid, federally listed as a threatened species in 1992 (USFWS 1992). The primary threats to the species are a general lack of knowledge about the species ecology and distribution, habitat loss or degradation, and invasion of exotic species (USFWS 1995). Very little is known about the historic distribution of this plant. It was previously thought to only have occurred in Nevada, Utah, and Colorado. However, since the early 1990's new populations have been discovered in Wyoming, Nebraska, Montana, Idaho, and Washington. In Washington, Ute ladies'-tresses orchid is known to occur in north-central Washington in Okanogan and Chelan Counties. Ute ladies' tresses orchids flower in late July through August and occasionally into September and October if conditions are favorable (USFWS 1992). It is believed that individual plants rarely flower in consecutive years or under unfavorable conditions, and populations of Ute ladies' tresses orchid are known to fluctuate from year to year, possibly depending on site conditions such as water availability, disturbance history, or encroachment by invasive weeds (USFWS 1995). This orchid has a close affinity with floodplain areas where the water table is near the surface during the growing season providing continuous sub-irrigation and where the vegetation is relatively open and not overly dense (USFWS 1995). Ute ladies' tresses tolerate areas with some disturbance such as flooding, grazing, or haying to reduce overstory cover from competing plants (USFWS 1995). The wet meadow habitats in the project area were searched for Ute ladies'-tresses orchid in early September 2002, but no Ute ladies'-tresses were found (Young et al 2003).

Table 1
Rare Plants Potentially Occurring in the Project Area

Species	Federal Status	State Status	General Habitat	Flowering 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
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
Piper's daisy *Erigeron piperianus*		S	Dry, open places, often with sagebrush	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
Hedgehog cactus *Pediocactus simpsonii* var. *robustior*		R1	Desert valleys and low mountains	May-July
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

Species	Federal Status	State Status	General Habitat	Flowering Period
Sticky goldenweed *Pyrrocoma hirta* var. *sonchifolia*		R1	Meadows and open or sparsely wooded slopes	July-August
Ute ladies'-tresses Spiranthes 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 – early September
Hoover's tauschia **Tauschia hooveri**	SOC	T	Basalt lithosols within sagebrush-steppe	March-mid April

Federal Status
LT = Listed Threatened: Likely to become endangered.
SOC = Species of Concern: A taxon whose conservation standing is of concern but for which status information is still needed. Species of concern lists are not published in the Federal Register.

State Status
E = Endangered: Any taxon in danger of becoming extinct or extirpated from Washington within the foreseeable future if factors contributing to its decline continue. Populations of these taxa are at critically low levels or their habitats have been degraded or depleted to a significant degree.
T = Threatened: Any taxon likely to become endangered in Washington within the foreseeable future if factors contributing to its population decline or habitat degradation or loss continue.
S = Sensitive: Any taxon that is vulnerable or declining and could become endangered or threatened in the state without active management or removal of threats.

R1 = Review Group 1: Of potential concern but needs more field work to assign another rank.

Surveys for the other rare plant species were focused on areas of likely disturbance from the proposed project. The field surveys did not locate any federal species of concern or state listed plant species that might occur in the project area (Young et al, 2003).

1.2 Wildlife and Fish

A list of federal special-status wildlife and fish species (endangered, threatened, proposed, and candidate species) was solicited from the U.S. Fish and Wildlife Service (USFWS), and the Washington Department of Fish and Wildlife (WDFW) Species of Concern list was queried for state special-status species potentially occurring in the study area (WDFW 2000). The USFWS species list indicates that gray wolf (*Canis lupus*), endangered; bald eagle (*Haliaeetus leucocephalus*), threatened; bull trout (*Salvelinus confleuntus*), threatened; northern spotted owl, (*Strix occidentalis caurina*), threatened; Ute ladies'-tresses orchid (*Spiranthes diluvialis*), threatened; western sage grouse (*Centrocercus urophasianus phaios*), candidate; and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), candidate; may be present near and therefore may be affected by the proposed project. Ute's ladies tresses orchid, a wetland plant, is addressed under the Vegetation section. Middle Columbia River steelhead *(Oncorhynchus mykiss),* an anadromous fish, is listed by NOAA Fisheries as a federal threatened species and may occur in Reecer Creek and throughout the Yakima River. In addition, 30 state special status species may occur near the proposed project based on known species range (**Table 2**). Of these, four species, golden eagle, northern goshawk, sage thrasher, and loggerhead shrike were documented in the study area in low numbers (see Young et al. 2003a).

The USFWS indicated that no designated critical habitat for listed species was present near the project. 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 specific geographic area(s) designated by the USFWS for a particular species. Under the ESA, it is unlawful to adversely modify designated critical habitat. According to the USFWS, there is no critical habitat as defined by the ESA for threatened or endangered species that may be affected by the project. Therefore, construction, maintenance, and operation of the proposed wind power project would not adversely modify critical habitat for endangered or threatened species.

1.2.1 Gray Wolf

Gray wolf is an endangered species throughout the lower 48 states, except in Minnesota where it is listed as threatened, and in Idaho and Wyoming where it is listed as non-essential, experimental. Historically, gray wolves occurred throughout North America from the arctic to northern Mexico and the southern U.S. and inhabited a wide range of habitats including coniferous forests, grasslands, arctic tundra, and deserts. Large wilderness tracts with little human disturbance are believed to be essential in maintaining healthy wolf populations. Today, gray wolves are fairly abundant in Canada and Alaska, and there are also native populations in northern Minnesota, Michigan, Wisconsin, and northern Montana (USFWS 2000). Due to the reintroduction efforts of the USFWS, gray wolves also occur in Idaho, Wyoming, and southern Montana. There are no known wolf packs in Washington (WDFW 1999). Occasionally, individual wolves are reported in the state that are believed to be lone wolves dispersing from Canada or released wolf-dog hybrids (WDFW 1999). There are several historical records of wolves, the latest of which occurred in 1993, in the mountains west and north of the project area in the PHS database (WDFW PHS 2002). Due to the successful wolf reintroduction effort in central Idaho, wolves may eventually disperse in to eastern Washington. Habitat throughout the northern Cascade Range and in extreme northeastern Washington is considered suitable for wolves (WCFWRU 1999). Wolves are not expected to occur in the project area due to the heavy human influence, lack of large tracts of suitable habitat, and uncertain population status in Washington.

1.2.2 Bald Eagle

In 1978, the USFWS listed bald eagle throughout the lower 48 States as endangered except in Michigan, Minnesota, Wisconsin, Washington, and Oregon, where it was listed as threatened (USFWS 1978). In 1995, bald eagle was reclassified from endangered to threatened in all of the lower 48 states (USFWS 1995). In July 1999, the USFWS proposed de-listing bald eagle (USFWS 1999), however to date, bald eagle has not been removed from the list of threatened species. Between the late 1970s and mid-1990s, the species had been doubling its breeding population in the U.S. every 6-7 years (USFWS 1995). In 1963, a National Audubon Society survey reported only 417 active nests in the lower 48 states, with an average of 0.59 young produced per active nest. In 1994, about 4,450 occupied breeding areas were reported with an estimated average young per occupied territory (for 4,110 territories) of 1.17 (USFWS 1995).

TABLE 2
State and Federal Special-Status Wildlife and Fish Species of Known or Potential Occurrence in the Study Area

Common Name and Scientific Name	Federal Status	WDFW Status	Occurrence in Study Area	Occurrence Documentation
Mammals				
Gray Wolf *(Canis lupus)*	E	E	**Not documented.** Historical records from Wenatchee NF; unlikely to occur due to lack of suitable habitat, current known range, and high human use of project area.	WDFW 1999; WDFW PHS 2002
Wolverine *(Gulo gulo)*	SoC	C	**Not documented.** Unlikely due to lack of suitable habitat; recorded in mountain habitats north and west of project.	WDFW PHS 2002; WCFWRU 1999
Fisher *(Martes pennanti)*	SoC	E	**Not documented.** Unlikely due to lack of suitable habitat; recorded in mountain habitats north and west of project.	WDFW PHS 2002; WCFWRU 1999
Western Gray Squirrel *(Sciurus griseus)*	Soc	T	**Not documented.** Unlikely due to lack of suitable habitat; WDFW PHS records from foothills north and west of project.	WDFW PHS 2002; WCFWRU 1999
Black-tailed jackrabbit *(Lepus californicus)*	N/A	C	**Not documented.** Possible occurrence based on suitable grassland/shrub habitats; documented in southeast Kittitas County.	WCFWRU 1999; TNC 1999
White-tailed jackrabbit *(Lepus townsendi)*	N/A	C	**Not documented.** Possible occurrence based on suitable grassland/shrub habitats; one record from northwest Kittitas county	WCFWRU 1999; TNC 1999
Merriam's shrew *(Sorex merriami)*	N/A	C	**Not documented.** Possible occurrence based on suitable sagebrush shrub and mesic grass/shrub habitats; documented in southeast Kittitas county.	WCFWRU 1999; TNC 1999
Townsend's big-eared bat *(Coryhorhinus townsendii)*	SoC	C	**Not documented.** Unlikely to occur due to lack of suitable habitat in project area.	TNC 1999
Birds				
Peregrine falcon *(Falco peregrinus)*	SoC	E	**Not documented.** Unlikely breeder due to lack of suitable nest habitat (cliffs); possible rare migrant; no observations on site.	Smith et al., 1997, Young et al., 2003a
Bald eagle *(Haliaaetus leucocephalus)*	T	T	**Documented on site.** Annual winter resident from approximately mid-February to early-April; multiple observations on site and nearby; Yakima River riparian corridor important winter habitat.	Young et al 2003a; WDFW PHS 2002
Ferruginous hawk *(Buteo regalis)*	SoC	T	**Not Documented.** Possible resident but unlikely due to marginal habitat suitability; no observations on site; records from southeast Kittitas County.	Young et al. 2003a; Smith et al 1997

TABLE 2
State and Federal Special-Status Wildlife and Fish Species of Known or Potential Occurrence in the Study Area

Common Name and Scientific Name	Federal Status	WDFW Status	Occurrence in Study Area	Occurrence Documentation
Northern goshawk *(Accipiter gentilis)*	N/A	C	**Documented on site.** Likely rare migrant; one incidental observation on site during spring migration season; no suitable nesting habitat (coniferous and aspen woodlands) on site; records from Wenatchee NF to north.	Young et al. 2003a; Smith et al 1997; WDFW PHS 2002
Golden eagle *(Aquila chrysaetos)*	N/A	C	**Documented on site.** One winter observation from the site; no nest sites found; likely a rare but regular transient; records from other parts of Kittitas County.	Young et al. 2003a; Smith et al 1997; WDFW PHS 2002
Merlin *(Falco columbarius)*	N/A	C	**Not Documented.** Unlikely but possible rare migrant through area; no observations on site; no suitable nesting habitat on site.	Young et al. 2003a; Smith et al 1997
Spotted owl (*Strix occidentalis*)	T	E	**Not Documented.** Unlikely due to lack of suitable habitat; occurrence would be accidental; no observations on site; records from forests north and west of project area.	Young et al. 2003a; Smith et al 1997; WDFW PHS 2002
Flammulated owl (*Otus flammeolus*)	N/A	C	**Not Documented.** Unlikely due to lack of suitable habitat; no observations on site; recorded in forests north and west of project area.	Young et al. 2003a; Smith et al 1997
Western yellow-billed cuckoo (*Coccyzus americanus)*	C	C	**Not Documented.** Unlikely due to lack of suitable habitat; no observations on site; thought to be extirpated as a breeder in Washington	Young et al. 2003a; Smith et al 1997
Western sage grouse *(Centrocercus urophasianus)*	C	T	**Historical.** Unlikely due to lack of suitable habitat; no observations on site; recorded in southeast Kittitas County.	Young et al. 2003a; Smith et al 1997; Hays et al. 1998a
Sharp-tailed grouse *(Tympanuchus phasianellus)*	N/A	T	**Historical.** Unlikely due to lack of suitable habitat (grasslands, native prairie); no observations on site; historical records from Kittitas County.	Hays et al. 1998b; Young et al. 2003a; Smith et al 1997
Vaux's swift *(Chaetura vauxi)*	N/A	C	**Not documented.** No suitable nesting habitat; unlikely rare migrant; no observations on site.	Young et al. 2003a; Smith et al 1997
White-headed woodpecker (*Picoides albolarvatus*)	N/A	C	**Not documented.** No suitable habitat; unlikely rare transient or migrant; no observations on site; records from forests north and west of project.	Young et al. 2003a; Smith et al 1997
Lewis woodpecker *(Melanerpes lewis)*	N/A	C	**Not documented.** No suitable habitat; unlikely rare transient or migrant; no observations on site; records from forests north and west of project.	Young et al. 2003a; Smith et al 1997;

TABLE 2
State and Federal Special-Status Wildlife and Fish Species of Known or Potential Occurrence in the Study Area

Common Name and Scientific Name	Federal Status	WDFW Status	Occurrence in Study Area	Occurrence Documentation
Pileated woodpecker (*Dryocopus pileatus*)	N/A	C	**Not documented.** No suitable habitat; unlikely rare transient or migrant; no observations on site; records from forests north and west of project.	Young et al. 2003a; Smith et al 1997
Black-backed woodpecker (*Picoides arcticus*)	N/A	C	**Not documented.** No suitable habitat; unlikely rare transient or migrant; no observations on site; records from forests north and west of project.	Young et al. 2003a; Smith et al 1997
Sage thrasher *(Oreoscoptes montanus)*	N/A	C	**Documented on site.** Observed during spring and summer surveys on site; suitable sagebrush cover for nesting.	Young et al. 2003a; Smith et al 1997
Loggerhead shrike *(Lanius ludovicianus)*	SoC	C	**Documented on site.** Observed incidentally during avian surveys on site; suitable sagebrush and shrub cover for nesting.	Young et al. 2003a; Smith et al 1997
Sage sparrow *(Amphispiza belli)*	N/A	C	**Not documented.** Unlikely due to lack of suitable habitat (mature old growth sagebrush); no observations on site; records from southeast Kittitas County.	Young et al. 2003a; Smith et al 1997
<u>Reptiles</u>				
Sagebrush lizard *(Sceloporus graciosus)*	N/A	C	**Not documented.** Possible due to potentially suitable habitat (sagebrush, shrub steppe); recorded in extreme southeast Kittitas County	Nussbaum et al. 1983; WCFWRU 1999
Striped whipsnake *(Masticophis taeniatus)*	N/A	C	**Not documented.** Possible due to suitable habitat (grasslands, sagebrush, dry rocky canyons); records from southeast Kittitas County.	Nussbaum et al. 1983; WCFWRU 1999
Sharptail Snake *(Contia tenuis)*	N/A	C	**Not documented.** Possible due to potentially suitable habitat (mixed forest; riparian); recorded in Kittitas County	Nussbaum et al. 1983; WCFWRU 1999
<u>Amphibians</u>				
Columbia spotted frog *(Rana luteiventris)*	N/A	C	**Not documented.** Possible in suitable habitat (ponds, wetlands with open water, slow moving streams); records from Kittitas County.	Nussbaum et al. 1983; WCFWRU 1999
Western toad *(Bufo boreas)*	SoC	C	**Not documented.** Possible in suitable habitat (ponds, wetlands with open water, slow moving streams); records from Kittitas County.	Nussbaum et al. 1983; WCFWRU 1999

TABLE 2
State and Federal Special-Status Wildlife and Fish Species of Known or Potential Occurrence in the Study Area

Common Name and Scientific Name	Federal Status	WDFW Status	Occurrence in Study Area	Occurrence Documentation
<u>Fish</u>				
Middle Columbia River steelhead *(Oncorhynchus mykiss)*	T	C	**Not documented but possible.** Possible because of cross-basin water diversion from First Creek; also possible in the mainstem Yakima River and larger perennial tributaries.	Chapman et al. 1994; WDFW PHS 2002; B. Renfrow, WDFW, pers. comm.
Chinook salmon (*Oncorhynchus tshawytscha*)	T	C	**Not documented.** Unlikely due to lack of habitat (rivers, perennial streams); possible in the mainstem Yakima River and larger perennial tributaries.	Chapman et al. 1994; WDFW PHS 2002
Bull trout *(Salvelinus confluentus)*	T	C	**Not documented.** Unlikely due to lack of habitat (near pristine stream habitat with cold water and loose clean gravel); generally in mountainous areas; records from Yakima River.	WDFW 2000b; WDFW PHS 2002
Mountain sucker (C*atostomus platyrhynchus*)	N/A	C	**Not documented.** Unlikely due to lack of habitat (perrenial mountain streams); generally in mountainous areas.	WDFW PHS 2002

Codes:
E = Endangered.
T = Threatened.
C = Candidates.
SoC = Species of concern
N/A = not applicable; no status

Historically, bald eagles occurred over most of North America in a variety of habitats. In Washington, bald eagles occur year round and are common west of the Cascades Mountains but also occur along major rivers in eastern Washington (Smith et al. 1997). The bald eagle population in Washington has been increasing since the early 1980’s. Between 1980 and 1998, the state population increased at an annual rate of 10% from approximately 105 occupied territories to 666 occupied territories (Watson et al. 2002). The distribution of breeding bald eagles also increased as areas unoccupied in 1980 (e.g., northeast and southeast regions of the state) experienced an influx of nesting pairs. In winter, Washington experiences a significant influx of bald eagles from Canada, Alaska, Montana, and California, and the population may increase to three to six times the breeding population (Stinson et al. 2001). Based on winter surveys conducted from 1982-1989, the winter bald eagle population increased from approximately 1,200 to 2,800 individuals. It is estimated that the current winter population of bald eagles in Washington may exceed 4,500 individuals (Stinson et al. 2001).

Bald eagles are winter residents in the Kittitas Valley but are not known to breed in the area (Smith et al. 1997). The WDFW PHS (2002) database identifies the Yakima River riparian corridor from Yakima Canyon to Swauk Creek as important wintering habitat for 25-30 bald eagles, and upstream from Swauk Creek as important winter habitat for 10-15 eagles. The PHS database identifies the Teanaway River riparian corridor to the west as wintering habitat for bald eagles but does not provide an estimate of the number of bald eagles using this area. Christmas bird counts for the Ellensburg count circle (latitude 47^{o}, longitude 120.6^{o}; approximately northwest Ellensburg town limits) indicates an increasing trend in bald eagles counted from approximately 0-2 in the late 1970s to approximately 13-15 in 2000-2001.

During the baseline studies of the project area, two roadside survey routes were established along public roads near the study area (see Young et al. 2003a) and surveyed a total of 18 times between March 1 and April 12, 2002 and December 12, 2002 and April 12, 2003. During the surveys, a total of 39 bald eagles were observed (duplicate observations possible). The maximum number of bald eagles observed during one survey day was 18 (March 1, 2002). On average, 2.4 bald eagles were observed per survey day (2 routes), for an average of 0.11 bald eagles per survey per mile of route. Approximately, 54 percent of the observations were adults, 5 percent were subadults (1-3 years of age), 36 percent were juveniles (<1 year old), and 5 percent were of unknown age (unidentified due to poor visibility).

From the baseline study, the primary period of bald eagle occupation in the project area appears to be between approximately mid-February and early-April. No regular night roost sites were found in or near the study area and based on observations made, it appears as if bald eagles opportunistically roost in suitable trees near foraging areas. Many of the bald eagle observations were associated with cattle grounds and calving operations where they were observed foraging on carrion (dead cows) or calving byproducts (afterbirth).

1.2.3 Bull Trout

Bull trout was listed as threatened for the Klamath River and Columbia River distinct population segments in June 1998 due to a variety of concerns such as habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices and the introduction of non-native species (USFWS 1998). Bull trout historically occurred in major river drainages throughout the Pacific Northwest. It is estimated that bull trout presently occur in 45% of the historical range (Quigley and Arbelbide 1997). Bull trout exhibit resident and migratory life-history strategies (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in a tributary or stream in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from 1 to 4 years before migrating to either a lake (adfluvial), large river (fluvial) or, in certain coastal areas, to saltwater (anadromous), where maturity is reached (Fraley and Shepard 1989; Goetz 1989). Habitat components that influence bull trout distribution and abundance include cold water temperatures; instream cover such as large woody debris, undercut banks, boulders, and pools; clean loose substrate gravel for spawning and rearing; and unobstructed migratory corridors (Fraley and Shepard 1989; Goetz 1989; Rieman and McIntyre 1993; Watson and Hillman 1997). The nearest known bull trout inhabited streams to the project area are the Yakima and Teanaway Rivers (WDFW PHS 2002). No bull trout are known to occur in Reecer and Wilson Creeks or tributaries in and near the project area (WDFW PHS 2002).

1.2.4 Northern Spotted Owl

Northern spotted owl was listed as a threatened species in June 1990 due to habitat loss, degradation and fragmentation due primarily to old growth timber harvest (USFWS 1990). Spotted owls historically occurred throughout the Pacific Northwest from central California north into southern British Columbia. In Washington, spotted owls occur in low and moderate elevation coniferous forests of the Cascade Mountain range and the Olympic peninsula (Smith et al. 1997). Spotted owls are territorial and may occupy territories up to 22 square miles (58 km^2) in size (Gutierrez et al. 1995). Spotted owl habitat consists of four components: nesting, roosting, foraging, and dispersal (AFWO 2001). Nesting and roosting habitat consists of dense mature coniferous forest (spruce/cedar/hemlock or Douglas-fir) with multiple canopy layers and an abundance of large trees. They nest almost exclusively in mature coniferous forest tracts greater than 1,200 acres in size with dense canopy cover (Gutierrez et al. 1995). Spotted owls will forage within nesting habitat but, depending on the characteristics of their home range, they will also utilize more open and fragmented forests for foraging (AFWO 2001). Dispersal habitat consists of forest stands with adequate tree size and canopy cover to provide protection from other predators (e.g., great horned owl) while the owl travels. Dispersal habitat may not provide good characteristics for nesting, roosting, or foraging. The WDFW PHS database maintains records of spotted owl site centers and management circles for the state of Washington. A management circle is the area encompassed by a 1.8-mile radius circle around the site center (spotted owl location), which effectively plots a spotted owl territory. Site centers are ranked based on the observation of the spotted owl(s) within the circle, (e.g., a single owl, two or more owls detected, established pair, and documented reproduction). There are spotted owl management circles throughout the Wenatchee National Forest north of the Project. At the closest point, the northernmost portion of the project is located approximately 0.75 mile (1.2 km) south of a spotted owl management circle or 2.5 mile (4.0 km) south of a site center. Other spotted owl site centers and management circles are located further north and west of the project. No spotted owls were observed during field surveys of the project area and they are not expected to occur in the vicinity of the project due to lack of suitable habitat.

1.2.5 Western Sage Grouse

The USFWS was petitioned to list western sage grouse under the Endangered Species Act in 2000 and 2003. In 2001, they found that the action may be warranted but was precluded by higher priority actions (USFWS 2001a). In 2003, they found that the petition did not present substantial information indicating that listing of the species was warranted (USFWS 2003). Western sage grouse is included on the list of candidate species. Western sage grouse is a subspecies of sage grouse that historically occurred from southern British Columbia south through central Washington. In Washington, sage grouse occurred in most counties east of the Cascades but today only occur in two locations: (1) Douglas County and northern Grant County; and (2) southeastern Kittitas County and northern Yakima County (Smith et al. 1997). There are other recent records from Lincoln and Benton Counties but no confirmed breeding in these locations (Hays et al. 1998a, LaFramboise and LaFramboise 1999). Sage grouse are found in areas with extensive tracts of native sagebrush steppe habitat with medium to high sagebrush canopy cover and healthy bunchgrass stands (Hays et al. 1998). The project is located in a transition zone to the foothills of the Cascade Mountains and the primary habitats are shrub-steppe and grassland with scattered areas of lithosol, conifer, agriculture, pasture, and riparian habitats. According to the Washington State Gap Analysis Project (GAP)[1], the project area falls outside mapped and modeled habitat for sage grouse in Washington (Smith et al. 1997; WCFWRU 1999). No sage grouse were observed during field surveys in the project area and they are not expected to occur in the vicinity of the project.

1.2.6 Western Yellow-Billed Cuckoo

The USFWS was petitioned to list yellow-billed cuckoo as an endangered species in 2000 but found that while the action may be warranted, it was precluded by higher priority actions (USFWS 2001b). Yellow-billed cuckoos are found from southern Canada south into central Mexico. It is commonly thought that

[1] 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

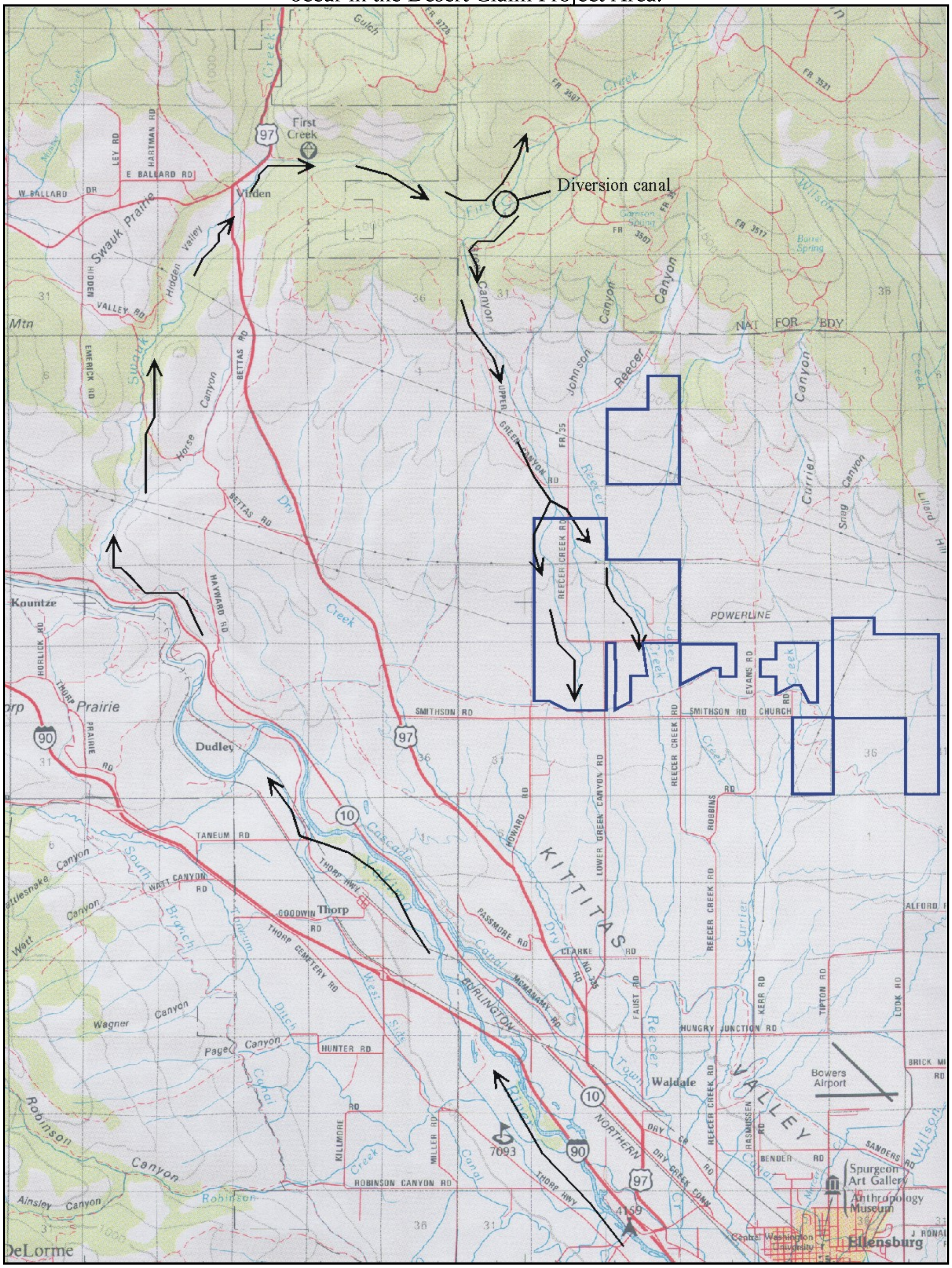
there are two subspecies, eastern and western, separated approximately by the Rocky Mountains. Western yellow-billed cuckoo is considered a Distinct Population Segment (DPS) under USFWS policy (USFWS 2001b). Yellow-billed cuckoos are migratory, occupying the breeding grounds from May through September and wintering as far south as South America. Western yellow-billed cuckoos are insectivorous and breed primarily in large cottonwood and willow riparian areas along large rivers (USFWS 2001b). According to the Washington breeding bird atlas, yellow-billed cuckoo is believed to have been extirpated as a breeder in Washington (Smith et al. 1997). The project is located in a transition zone to the foothills of the Cascade Mountains and the primary habitats are shrub-steppe and grassland with scattered areas of lithosol, conifer, agriculture, pasture, and riparian habitats. The riparian habitat in the project area is mainly associated with Reecer Creek and some smaller tributaries as well as some irrigation ditches. The riparian areas are dominated by cottonwood, willow and hawthorn with a herbaceous understory (see Vegetation section). While these areas may technically be suitable for yellow-billed cuckoos, they are patchy in nature (i.e., no extensive tracts) and, based on current knowledge of western yellow-billed cuckoos in Washington, they are not expected to occur in the project area. Habitat suitable for their occurrence would not be affected by the project and no cuckoos were observed during field surveys in the project area.

1.2.7 Middle Columbia River Steelhead

The National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) has listed several populations of steelhead [(designated Evolutionary Significant Units (ESU)] throughout the western U.S. including the Middle Columbia River population of this species as threatened (NOAA 2004). The Middle Columbia River population includes those individuals that use the Yakima River. In general, steelhead are the anadromous form of rainbow trout that spend a portion of their life in the ocean and spawn in freshwater streams. Steelhead are commonly named after the season in which their spawning runs occur. For example, the steelhead that use the Yakima River spawn in the summer and are referred to as summer steelhead. These fish usually spend 2 years in the ocean and enter freshwater rivers up to 1 year before spawning, and may spawn more than once. Individual steelhead from the Middle Columbia River ESU are known to utilize the Yakima River and also Reecer Creek south (downstream) of the project (WDFW PHS 2002). However, due to water diversions (irrigation channels) and the intermittent nature of many of the streams in the project area, it is not believed that steelhead using the lower reaches of Reecer Creek would occur within the project area.

According to WDFW, a radio-tagged steelhead recently spawned in First Creek in the foothills of the Wenatchee Mountains north of the project area (B. Renfrow, WDFW, pers. comm.). First Creek is a tributary of Swauk Creek, which is approximately 5 miles west of the project area. Water in First Creek is diverted with an unscreened diversion facility into a ditch that winds over a low pass into Green Canyon and intercepts a few other small streams (Figure 1). Fish in First Creek can be transferred via the ditch to the canal in Green Canyon and other small tributaries, and eventually into the Reecer Creek subbasin. Because a radio-tagged steelhead spawned in First Creek, it is possible for juvenile steelhead to occur in the ditch and move down to the Reecer Creek drainage above the North Branch Canal and through the Desert Claim project area (B. Renfrow, WDFW, pers. comm.). Streams and interconnected channels in the Reecer Creek subbasin could therefore be rearing habitat for juvenile steelhead. Figure 1 illustrates how juvenile steelhead might find their way into the Desert Claim project area.

Figure 1. Schematic of interconnected streams and waterways showing route by which steelhead could occur in the Desert Claim Project Area.



2. Environmental Impacts of the Proposed Action

2.1 Plants

Due to the absence of known populations within the project area, no project-related impacts are anticipated to rare plant species. These include federally listed endangered, threatened, proposed, or candidate plant species and Washington State endangered, threatened, sensitive, or review plant species.

2.2 Wildlife and Fish

For most of the federal and state listed species identified, the project would have no effect. Resource information indicated that gray wolf, bull trout, northern spotted owl, western sage grouse, and western yellow-billed cuckoo are not likely to occur in the project area and that essential habitat for these species is lacking within the project area. Bull trout may occur downstream of the project in the Yakima River, however, the project should have minimal affect on streams and water resources and should have no effect on the Yakima River, more than 8 miles downstream. For the majority of the state listed species, available information also indicates that they are unlikely to occur in the project area (see **Table 2**). The proposed wind power project would not affect these species and no further discussion of potential impacts is included.

Of the state or federally listed species, bald eagle and Middle Columbia River steelhead, federal and state threatened; and golden eagle, northern goshawk, loggerhead shrike, and sage thrasher, all state candidate species; were documented on or near the site. Given their potential occurrence in the project, these species might be affected by the project construction and/or operation and are discussed in more detail below.

Avian species are thought to be most at risk from wind power development due to potential collision with wind turbines and met tower. **Table 3** provides a qualitative discussion of risk factors for those sensitive species that have been documented on or near the site and are expected to occur in the project area in the future. Other sensitive avian species may migrate through the project area, but their low level of use and temporary occurrence in the area reduces their risk of being affected by the project.

2.2.1 Bald Eagle

Available information and results of the baseline studies indicate that bald eagles occur on site during the winter and early spring seasons. Direct effects to bald eagles from the project might include loss of winter habitat (temporary and long-term) and potential mortality (temporary due to construction or long-term due to operation of wind plant). Indirect effects might include disturbance and displacement related effects from construction (short-term) as well as operation (long-term) of the wind plant.

Habitat Loss

The primary bald eagle winter habitat in the area includes the Yakima River riparian corridor for roosting and foraging and adjacent upland areas for foraging. Bald eagles use the large trees within the riparian corridor and scattered tree patches in upland areas for perching and roosting. They likely forage in the river for fish and are frequently observed in upland areas where livestock operations occur scavenging/ foraging on carrion (dead cows) and calving operation byproducts (afterbirth).

The project would be constructed in steppe and grassland habitats along the flats and ridge tops in the transition zone to the mountain foothills to the north. The project would not result in the permanent (long-term) loss of important winter roosting or perching habitat. The actual turbine pads, roads, met towers, substation, and maintenance facilities would result in the loss of approximately 78 acres of upland habitat which is not considered important bald eagle winter habitat. These areas are not heavily used by wintering bald eagles except when dead cows or dead big game animals are present, creating scavenging/ foraging opportunities. At the nearest point, construction activity would be approximately 3 miles from the Yakima River riparian corridor (southwestern most turbines), which is unlikely to cause any temporary habitat loss due to disturbance of eagles roosting along the river. Temporary loss of roosting habitat due to construction disturbance in the project area would be for the duration of the construction period (9-12 months) and would affect only a minor portion of available roosting habitat (scattered patches of trees).

Mortality

The possibility of short-term (due to construction activity) mortality effects from the project is considered negligible and very unlikely to occur. Bald eagles in the area during the construction period are unlikely to occur within the construction zones due to noise and high human and equipment presence, and therefore are unlikely to be at risk of construction related mortality. In addition, the majority of construction is likely to take place during late spring, summer and fall months when bald eagles do not occur in the area.

Once the wind project is operational, bald eagles in the area might be at risk of collision with turbines or met towers. Based on the baseline studies and available information about bald eagle use of the valley, potential bald eagle mortality due to operation of the wind plant would be limited to the winter and early spring seasons - approximately late December to mid-April. Bald eagles would not be at risk of collision during summer or fall because they are not known to occur in the area during those seasons. Many avian species, including several raptor species, are documented casualties due to collision with wind turbines (see Erickson et al. 2001). Raptor mortality has been documented at many wind plants, although raptor mortality at the newer generation wind plants is estimated to be 3-7 times less than the wind plant at Altamont Pass, California, which has many older generation wind turbines (Young et al. 2003b). Golden eagles appear to be more susceptible to collision mortality than other raptors, but there have been no documented bald eagle fatalities at wind plants (Erickson et al. 2001).

Estimates of bird mortality from wind projects may be based on bird use of a site and the propensity for that species to fly within the rotor swept area or zone of risk. For the proposed project, there were 13 observations of bald eagles made during standardized point counts across the project area. Of those observations, 9 of the eagles were observed flying, and approximately 78% of the flying eagles were within the zone of risk, defined as the area between 25 and 125 m above ground level based on common wind turbine and tower heights. While the sample size is relatively small, it does show that wintering bald eagles have some exposure to turbines by flying within the rotor swept area.

Table 3
Collision Risk Factors for Special Status Avian Species Potentially Occurring in the Study Area

	Risk Factors		
Species	**Behavioral and Environmental Factors**	**Abundance and Distribution Factors Based on Field Studies and Existing Information**	**Generalized Level of Risk (Impact Level)**
Bald eagle	Feeds on carrion, fish, waterfowl in winter; wintering habitat along Yakima River and cattle yards in Kittitas Valley; flight heights include the rotor swept area.	Many individuals observed in study area in winter; no fatalities observed at other wind plants	Level of risk is believed low due to winter foraging behavior and low use of actual wind plant area
Northern goshawk	Forest-dwelling species, migrant or transient through non-forested areas; would most likely be found in forest patches and/or tree habitat on site; flight heights include rotor swept area	One observation in study area; rare migrant or transient; no fatalities known from other wind plants	Level of risk is believed very low
Golden eagle	Grassland and shrub-steppe species, nesting in trees or cliffs, hunts small/medium mammals, birds, reptiles; flight heights include rotor swept area	One observed in study area in winter; possible migrant or transient in fall and winter; fatalities at wind plants in California (primarily Altamont) and Wyoming; common at Foote Creek Rim (WY), 1 fatality observed in 2 years	Level of risk considered low due to rare occurrence
Loggerhead shrike	Nests in sagebrush shrubland or areas with scattered trees and shrubs in open habitats; migrates to winter range in southern U.S.; flight typically below rotor height; migration flights may include rotor swept area	Observed in study area in low numbers; possibly a breeding resident and/or migrant through study area; one fatality known from Tehachapi Pass wind plant	Level of risk is believed low due to low numbers; risk may be greater during migration periods
Sage thrasher	Nests in sagebrush steppe of relatively good quality; migrates to winter range in southern U.S.; flight typically below rotor height; migration flights may include rotor swept area	Observed in study area in low numbers; possibly a breeding resident and/or migrant through study area; 1 fatality documented at Foote Creek Rim wind plant (WY) during 2-year study	Level of risk is believed low due to low numbers; risk may be greater during migration periods

The number of potential bald eagle fatalities due to the project is difficult to predict. Based on the results of the baseline studies and monitoring studies at other existing wind plants, it was predicted that between 3 and 4 raptors might be killed at the proposed wind plant each year (see Young et al. 2003a). Based on the use estimates from the study, bald eagle was the third most common raptor on the site during the winter, comprising approximately 12% of all winter raptor use, and the sixth most common raptor in the spring, comprising 3% of all spring raptor use (Young et al. 2003a). Over all seasons combined (one year), bald eagles comprised approximately 4% of all raptor use of the site. If the risk of collision with a turbine for raptors is proportional to their use of a site, then we would expect that 4% of the annual raptor mortality would be bald eagles. If 4 raptors were killed by the wind plant each year, then we would expect 0.16 bald eagle death per year or 1 dead bald eagle every 6.25 years. This is at best a conservative estimate, which does not take into account changes in bald eagle use over time (e.g., increasing bald eagle population), the behavior of bald eagles (e.g., passive foraging/scavenging), seasonal variation in wind power production (e.g., turbines turning less in winter), and mode of use of the project area (e.g., attracted to the site for foraging or simply passing through), all of which could influence annual mortality of a species. In any event, the death of one bald eagle every 6 years due to the project, while an adverse effect (take) under the Endangered Species Act, would not affect the wintering population of bald eagles in Kittitas Valley. This level of mortality would not have a measurable effect on the bald eagle population.

Disturbance/Displacement

Construction of the project might create short-term (life of construction) disturbances and operation of the wind plant (operating turbines) might create long-term disturbances that could affect bald eagles in the area. These effects are believed to be negligible for a number of reasons. Based on the available information, bald eagles only occur in the area during the winter and early spring. Most of the construction activity is likely to take place during the late spring, summer and fall when weather conditions are more favorable, minimizing the potential for construction related disturbances. In addition, bald eagle use of the project site is minimal compared to surrounding areas such as the Yakima River riparian corridor and area cattle yards, which is likely based on the availability of prey or carrion. Bald eagles are not expected to frequently occur within the project area and operation of the wind plant should have minimal disturbance effect on bald eagles.

Wintering bald eagles will sometimes utilize night roosts located in secluded, sheltered, upland areas away from human disturbances, and which may be considerable distances from foraging areas. There is the possibility that winter roosts may occur in forested areas north of the project and bald eagles could travel across the project area from areas closer to the Yakima River. Should a roost occur north of the project and bald eagles travel back and forth across the site, both construction and operational disturbances from the wind plant might displace or alter eagle movement patterns. No evidence that winter roosts occur north of the project was observed during the winter roadside surveys for bald eagles. Due to the concentration of eagle observations south of the project (see Young et al 2003a), it is more likely that eagles roost in the riparian areas and move from the river to upland foraging areas (e.g., winter cattle yards).

2.2.2 Golden Eagle

Golden eagles appear to be rare winter residents or migrants in the project area. During the baseline studies, only one golden eagle was observed in the study area in the winter. Golden eagles have been documented throughout Kittitas County and they are expected to breed in the county (Smith et al. 1997), however, no golden eagle nests were found during the raptor nest survey for the baseline study (see Young et al. 2003a). Based on the available information, they are expected to occur in the study area in low numbers and possibly on a regular basis. Due to the low use of the area, construction activities are not expected to affect golden eagles. There would be little potential for direct or indirect effects from construction of the wind plant (mortality, disturbance or displacement effects) on golden eagles.

Once the wind project is operational, golden eagles in the area might be at risk of collision with turbines or met towers. Based on studies at the Altamont Pass wind plant in California, golden eagles appear to be more susceptible to collision with turbines than many other raptor species; however, many of the turbines at Altamont are older turbines that may cause greater impacts to avian species. Raptor mortality at newer generation wind plants is estimated to be 3-7 times less than the wind plant at Altamont Pass in California (Young et al. 2003b). A single golden eagle fatality was reported from the Foote Creek Rim wind plant in Wyoming, based on a 2-year study of 105 turbines (Young et al. 2003c). Golden eagle use of Foote Creek Rim is high and comparable to use at Altamont, suggesting that the newer generation turbines, which are often much larger, present less risk of collision to golden eagles. In any event, given the current use of golden eagles of the proposed wind project site, mortality for this species due to the project is expected to be nearly zero. Should the golden eagle population of Kittitas County increase over time, potential collision impacts to golden eagles would be expected to increase.

2.2.3 Northern Goshawk

As with golden eagles, northern goshawks appear to be a rare migrant or transient through the project area. A single northern goshawk was observed incidentally during a bald eagle survey in the study area is the spring of 2001. Currently there is no breeding habitat, coniferous or aspen forest, for goshawks in the project area. There is however, ample breeding habitat in the Wenatchee National Forest to the north and they have routinely been documented in areas to the north and west of the project (WDFW PHS 2002). It is possible that a few northern goshawks regularly move through the project area, despite the lack of extensive forest habitats, as they migrate to and from the breeding areas. They are expected to occur in the project area only in very low numbers. Construction activities are not expected to affect northern goshawks. There is little potential for direct or indirect impacts (mortality, disturbance or displacement) on goshawks from construction of the wind plant.

Once the wind project is operational, goshawks moving through the area might be at risk of collision with turbines or met towers. Based on studies at other wind plants, no northern goshawk fatalities have been documented (Erickson et al. 2001). Given the very low use of the proposed wind project site by goshawks, mortality for this species is expected to be nearly zero. No northern goshawk fatalities are expected from the project.

2.2.4 Loggerhead Shrike and Sage Thrasher

These species are possible breeding residents in the study area. While they were observed in low numbers, they were observed during the spring and summer and there is potential breeding habitat for them scattered through the project area. They are expected to migrate to more southerly climates in the fall and winter in the southern U.S. and Mexico. Sage thrashers nest in big sagebrush stands and loggerhead shrikes nest in sagebrush or dense woody shrub vegetation in open habitats. Direct effects to these species from the project might include loss of breeding habitat (temporary and long-term) and potential mortality (temporary due to construction or long-term due to operation of wind plant). Indirect effects from the project might include disturbance and displacement related effects from construction (short-term) as well as operation (long-term) of the wind plant.

The project would be constructed in steppe and grassland habitats along the flats and ridge tops in the transition zone to the mountain foothills to the north. The actual project facilities would result in the loss of approximately 38 acres of shrub steppe vegetation type, which is considered breeding (nesting, foraging, loafing) habitat for sage thrashers and loggerhead shrikes. The other vegetation types impacted by the project are not as important to these species, but they may periodically move through or forage throughout the project area. The possibility of short-term (due to construction activity) mortality effects from the project is considered unlikely to occur and would most likely be due to destruction of a nest in shrub vegetation directly impacted by construction activity. The majority of construction is likely to take place during late spring, summer and fall months, when these species would potentially occupy the area.

Once the wind project is operational, loggerhead shrikes and sage thrashers in the area might be at risk of collision with turbines or met towers. Many avian species, including both sage thrasher and loggerhead shrike, are documented casualties due to collision with wind turbines (see Erickson et al. 2001) indicating their susceptibility to collision mortality. A single loggerhead shrike casualty was documented at the Tehachapi Pass Wind Plant in California (Erickson et al., 2001) and a single sage thrasher casualty was found at the Foote Creek Rim Wind Plant in Wyoming (Young et al. 2003b). However, due to the low level of use of the project area by these species (see Young et al 2003a), mortality impacts to these species are not expected to be substantial. In addition, based on the vegetation type distribution, sage thrashers and loggerhead shrikes are not expected to commonly occur over the whole project area, limiting risk to those turbines in areas where suitable habitat occurs.

2.2.5 Middle Columbia River Steelhead

Based on recent information from the WDFW, juvenile steelhead may occur in the diversion canal from First Creek, and from there may enter Green Canyon, Reecer Creek and other interconnected waterways in the project area (Figure 1). In 2003, a radio-tagged steelhead moved up Swauk Creek into First Creek and spawned (B. Renfrow, WDFW, pers. comm.). It is conceivable that juvenile steelhead could then move down First Creek, encounter the unscreened diversion facility that transfers water into Green Canyon and move into this drainage. This water eventually flows into the Desert Claim project area and, due to interconnected canals, some of it flows into the Reecer Creek drainage. Due to this situation, it is possible that juvenile steelhead may occur in the Desert Claim project area. Stream habitat in the project area could therefore act as rearing habitat for juvenile steelhead.

Operation and maintenance activities in the wind plant are not expected to affect any of the waterways or creeks and therefore should not affect juvenile steelhead in the project area. Construction activities may affect juvenile steelhead if they affect any of the streams or waterways in which steelhead could occur. Construction could adversely affect these waterways through sediment-laden runoff entering the water or through direct effects from construction occurring in the channel (e.g. a road crossing) or channel changes to accommodate the wind plant layout. Based on the wind plant layout, turbine access roads would cross Reecer Creek in 2 locations and there would also be 11 road crossings of other interconnected waterways from the Green Canyon channel or tributaries to Reecer Creek in which steelhead could occur. In addition there would be at least two locations where underground collector/communications lines would cross channels independent of access roads. Construction at these stream crossings may directly affect juvenile steelhead though mortality or indirectly through reduced habitat conditions from water quality degradation (sediment, fuel/oils contamination) or blockage if the crossing does not allow fish passage. These impacts, should they occur, would be considered adverse. Steelhead potentially affected would be rearing juveniles. Provided Best Management Practices (BMPs) for construction, appropriate and adequate site management practices, and erosion control measures are employed, impacts to streams and waterways should be minimized or avoided; however, the in-stream construction required to place culverts and road fill would result in some sedimentation from disturbance of stream bottoms, stream banks, and the placement of fill material. Also, provided the crossings are designed to allow continual water flow and fish passage during low water conditions, impacts to fish movement would be minimized. The use of oversized culverts buried below the normal water line would allow a natural stream bottom to form inside the culvert, further minimizing habitat effects.

3.Impacts of the No Action Alternative

Under the no action alternative the proposed Desert Claim Wind Power Project and all associated features including the turbines, met towers, access roads, utilities, and substations would not be constructed. There would be no impacts from the wind power facility on state or federal species since it would not be constructed. The project area and Kittitas Valley do not contain habitat for a large number or variety of federally or state listed species. The listed species of most abundance is bald eagle. Alternate land uses or power production through other technologies, such as natural gas or coal-fired plants, could have significant impacts on bald eagles, steelhead or listed species in other areas. Other development of the area, which might not occur if the wind plant were constructed, such as residential homes, could have significant impacts in the form of habitat loss, degradation of streams, and displacement of bald eagles by altering land use. For example, pressure to develop additional rural residences could reduce or eliminate existing land uses such as cattle production or roosting areas along the Yakima River, thus reducing the amount of important winter habitat for bald eagles. Wintering bald eagles in the Kittitas Valley have been increasing in number and will likely continue to increase as bald eagles continue to recover as a species. If the area does not provide adequate winter roosting areas or foraging opportunities, wintering bald eagles may be forced to winter elsewhere.

4. Cumulative Effects

The project area and Kittitas Valley do not contain habitat for a large number or variety of federally or state listed species. The listed species of greatest abundance is bald eagle. Juvenile Middle Columbia River steelhead could also occur in Reecer Creek and some of the irrigation water canals in the project area. Because of the low potential occurrence of most listed species potentially occurring in the project area, development of the project is not expected to contribute to cumulative effects on these species. Potential impacts on bald eagles and steelhead are treated in more detail below.

Bald Eagle
Currently, there are two other wind plants proposed for Kittitas County in addition to the Desert Claim project. These projects are the Kittitas Valley wind project, located approximately 3 miles west of Desert Claim, and the Wild Horse wind project, located approximately 12 miles southeast of Desert Claim. If all three projects were constructed there would be a total of between 350 and 370 turbines in the county. Baseline avian studies similar to the Desert Claim study also occurred at the Kittitas Valley and Wild Horse sites (Erickson et al. 2003a and 2003b). Results of a cumulative effects analysis based on the three data sets are presented in a technical report prepared to support the Environmental Impact Statements for all three projects (Young and Erickson 2003). Use of the Wild Horse site by bald eagles is extremely low and it is not expected to individually have an effect on wintering bald eagles in the area (Erickson et al 2003b). Only one bald eagle was observed at this site during winter point count surveys and the Wild Horse site does not have the same land use characteristics (e.g., nearby large riparian corridor and winter cattle grounds and calving operations) that occur near the Kittitas Valley and Desert Claim site and which are attractants to bald eagles. Cumulative effects on bald eagles arising from the projects would primarily be due to the Kittitas Valley and Desert Claim projects. Further discussion of cumulative effects is based primarily on these two projects.

As with a single project, the cumulative effects of three wind projects would have similar potential impacts including loss of winter habitat, mortality, and disturbance/displacement effects. For bald eagle, the primary impact of most concern is the potential for fatalities due to collisions with turbines or met towers. Winter habitat loss or disturbance/displacement effects for each project would be minimal and not result in significant effects cumulatively. The Kittitas Valley wind project, located approximately 3 miles west of Desert Claim, occurs in much the same vegetation types as Desert Claim but is slightly closer to the Yakima River. Neither project would contribute to the loss of important bald eagle roosting habitat (Yakima River riparian corridor) or foraging areas (cattle lots and calving operations). Additionally, neither project should result in substantial disturbance or displacement effects, primarily because of the seasonal occupancy of bald eagles in the area and the lack of impacts to important winter bald eagle habitat (i.e., the construction would be taking place in areas not frequently occupied by bald eagles).

When standardized by survey miles conducted, slightly more bald eagles were observed during winter roadside surveys in and around the Kittitas Valley site, likely due to its closer proximity to the river (Erickson et al. 2003a). Winter and spring use of the Kittitas Valley and Desert Claim sites by bald eagles was similar. For the winter season, bald eagle was the third most common raptor for the Kittitas Valley and Desert Claim area, and for the spring season, the sixth most common raptor observed. Potential mortality for bald eagles due to the proposed projects is difficult to predict. Given the very low bald eagle use at the Wild Horse project, no bald eagle mortality is expected at that site. No bald eagle fatalities have been reported from other wind plants so the level of susceptibility to collision with turbines is unknown. Based on the low use of the Kittitas Valley and Desert Claim project areas, annual bald eagle mortality is expected to be nearly zero. However, due to the nearby vicinity of important roosting (riparian) and foraging areas (cattle lots), bald eagles might regularly move through the wind plants, increasing their exposure. A conservative estimate would be that, assuming risk of collision is proportional to use, on average one bald eagle would be killed every 6 years at either Kittitas Valley or Desert Claim (see Section 2.2.1 above). If both wind projects are constructed, to approximately double the number of turbines in the area, the overall risk to bald eagle might increase to one bald eagle fatality every 3 years. Given the very low bald eagle use at the Wild Horse site, this level of potential mortality would not increase measurably if that project were also constructed. Mortality over the long term is difficult to predict and likely would vary depending on the population levels of bald eagles near the projects and changes in land use (e.g., reduction in cattle operations). This low level of mortality would not have a measurable effect on the increasing winter population in the Kittitas Valley or in the State of Washington.

Other projects or actions in addition to wind development that are occurring in the Kittitas Valley and which may impact bald eagles would include population growth, particularly in Ellensburg and the Kittitas Valley; new housing developments and subdivisions; increased infrastructure to accommodate population growth; increased utilities/pipelines due to increased development; increased gravel/materials mining to accommodate development and roads; logging of nearby forests; and future agriculture practices including livestock grazing.

The proposed project is not expected to contribute to population growth and associated development activities such as new housing, but is designed to accommodate future power needs associated with population growth and development. The Ellensburg area and Kittitas County are undergoing substantial population growth, and scattered rural residential home sites and subdivisions are common in the foothills and area surrounding Ellensburg, including areas immediately north of the project. These developments have the effect of reducing open space, rangeland, and forests and activities associated with those landscapes such as livestock production or logging. Further development may contribute cumulative effects to bald eagles by creating additional disturbances, reducing foraging and secluded sheltering opportunities, and creating collision hazards. To a large degree, livestock production has benefited bald eagles by providing sources of carrion and forage. Reduction of livestock operations in the Kittitas Valley due to city expansion, development, and housing will reduce these resources for bald eagles.

Other cumulative effects associated with increased development, such as increased infrastructure and increased human presence and disturbance, may also affect bald eagles simply by using more space that could be utilized by bald eagles and creating more disturbances. Bald eagles are large avian predators capable of wide ranging movements. While bald eagles can become accustomed to human activity, they are generally sensitive to human encroachment. Future developments and associated human actions would be expected to affect wintering bald eagles, especially as they allow more human use of eagle occupied areas. Additional use of open and secluded spaces by humans would be expected to cause some habitat degradation or reduce use by bald eagles as they avoid humans. Also, more human activity in the area will lead to more disturbance, displacement, and contribute to other environmental impacts, for example, water quality degradation. The impacts would depend, in part, on where human activities occur, particularly in relation to the Yakima River and winter foraging areas. For example, the more activity that occurs in riparian areas along the Yakima River and results in the loss of riparian vegetation, the greater the potential for impacts to bald eagle roosting habitat.

The magnitude of all cumulative effects on bald eagles is difficult to measure. While cumulative effects to bald eagles are likely occurring from increased development and human population growth of the area, the bald eagle population itself in Kittitas valley, the State of Washington and North America is also increasing. The number of wintering bald eagles in Kittitas Valley is expected to increase despite potential cumulative effects as the species is well on the way to recovery (USFWS 1999, Watson et al. 2002). It is possible that cumulative effects to wintering bald eagles in the Kittitas Valley are presently occurring, but without knowing a baseline with which the population may increase in the absence of any effects, it is difficult to determine if the cumulative effects are adverse. Finally, the presence of the wind plant itself might preclude some additional development such as houses and subdivisions and other cumulative effects, and preserve some of the historic land uses (livestock production), thus indirectly preserve some important winter habitat for bald eagles.

Steelhead

According to available information, some individuals of the Middle Columbia River ESU of steelhead use the Yakima River and tributaries and spawn in Swauk Creek and tributaries. These individuals may occur periodically, or in the case of juveniles, year round in the Desert Claim and Kittitas Valley wind project areas. There is no information that steelhead would occur within the Wild Horse project. Operation and maintenance activities of wind plants are not expected to adversely affect the waterways or creeks within the wind plants in which steelhead could occur. Adverse effects are more likely to occur from the construction activity, which causes land disturbance and can result in adverse effects to waterways from run off (sedimentation) or construction within streams. Provided appropriate BMPs and erosion control measures are employed during construction, these impacts can be greatly reduced or eliminated. Adverse impacts are more like to arise from in-stream construction from road crossings or channel changes to accommodate the wind plant layout.

According to the Kittitas Valley wind plant EIS, the project would not affect Swauk Creek or the Yakima River and should therefore not affect steelhead. The Desert Claim project may affect steelhead through adverse effects to Reecer Creek and interconnected waterways from road crossings. As such, the cumulative effects from the three wind plants to steelhead would not be greater than those from the Desert Claim project (see Section 2, Environmental Impacts above).

The overall magnitude of cumulative effects on steelhead is difficult to measure due to the life history strategy of this species. Being anadromous and spending a fair amount of the life cycle in the ocean, effects on the species could arise from far reaching activities in the Pacific Ocean all along the Columbia River to the spawning habitat in upper Kittitas Valley. Other projects or actions in addition to wind development that are occurring in the Kittitas Valley and that may impact steelhead would include actions that may affect occupied stream course (e.g., Yakima River, Swauk Creek drainages) such as new housing developments and subdivisions; increased infrastructure to accommodate population growth; increased utilities/pipelines due to increased development; increased gravel/materials mining to accommodate development and roads; logging of nearby forests; and future agriculture practices including livestock grazing. To a certain degree, as these activities occur in nearby upland areas away from streams they would have no effect on spawning steelhead but the overall impact from increased development often results in lower stream quality in an area. These activities may adversely affect steelhead if they result in degradation of streams and stream habitats. For example, and similar to bald eagle, the more activity that occurs in riparian areas along the Yakima River and results in the loss of riparian vegetation, the greater the potential for adverse effects to the river and therefore steelhead habitat.

While adverse effects may arise from the Desert Claim project, and other the cumulative effects are likely occurring from increased development and human population growth of the area, the overall cumulative effects to the Middle Columbia River steelhead ESU are not expected to increase significantly due to the construction of the Desert Claim project. Finally, the presence of the wind plant itself might preclude some additional development such as houses and subdivisions and other cumulative effects, and preserve some of the historic land uses (livestock production), thus indirectly helping to preserve some important juvenile rearing habitat for steelhead.

5. Mitigation Measures

The following measures would be incorporated into the Project construction to minimize potential short-term (construction) effects on bald eagles and steelhead from the project:

- minimize construction activity that occurs during the winter;
- best management practices should be employed to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint;
- the construction footprint at all stream or water channel crossing should be strictly minimized to avoid peripheral impacts to stream habitat;
- a site management plan should be developed to, at a minimum, provide adequate on-site waste disposal, fire prevention and management, and establish erosion control procedures;
- construction equipment refueling stations should be a minimum of 100 feet from any drainage, stream, irrigation channel, or riparian area;
- adhere to the NPDES permit stipulations, including erosion control measures;
- all stream and channel crossings should be designed to allow continual waterflow under all (low) conditions and insure fish passage;
- reclaim disturbed areas as soon as practical following construction.

The following measures would be employed to minimize potential long-term (operational) effects from the Project:

- establish and enforce reasonable driving speed limits within the wind plant to minimize the potential for road killed wildlife or livestock that may attract foraging bald eagles;
- provide adequate on-site waste disposal;
- remove and disposed of all carcasses of livestock, big game, and other wildlife from within the

wind plant that may attract foraging bald eagles;

- ensure that livestock calving areas of participating landowners remain outside the wind plant;
- install bird flight diverters on all guy wires associated with met towers;
- bury all power and communication lines on-site underground where feasible;
- install raptor perch guards on all power poles constructed for the wind plant;
- any permanent on-site equipment fueling or maintenance stations should be established greater than 200 feet from any drainage, creek, irrigation channel, or riparian area .

6. Significant Unavoidable Adverse Impacts

There are no significant unavoidable adverse impacts that would occur to state or federally listed threatened, endangered, proposed or candidate species from implementation of the project.

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Exhibit 2

Baseline Avian Studies Report

BASELINE AVIAN STUDIES FOR THE PROPOSED DESERT CLAIM WIND POWER PROJECT KITTITAS COUNTY, WASHINGTON

FINAL REPORT
July 2003

Prepared For:

Desert Claim Wind Power, LLC
Ellensburg, Washington

Prepared By:

WEST, Inc.

Western EcoSystems Technology, Inc.
Cheyenne, Wyoming

BASELINE AVIAN STUDIES FOR THE PROPOSED DESERT CLAIM WIND POWER PROJECT, KITTITAS COUNTY, WASHINGTON

FINAL REPORT

March 2002 - March 2003

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July 10, 2003

EXECUTIVE SUMMARY

Desert Claim Wind Power LLC, wholly owned and managed by enXco, Inc., is evaluating the feasibility of wind power development in Kittitas County, Washington. The proposed site, *Desert Claim*, is located in the transition from the rangelands of the valley floor to the foothills of the Wenatchee Mountains approximately 8 miles north of Ellensburg, Washington. The site is relatively level and open and slopes gradually from the south as it approaches the foothills. The proposed development would have a generation capacity of at least 180 MW and be a maximum of 120 turbines depending on turbine model, electricity markets, transmission constraints, and results of site surveys.

Desert Claim Wind Power and enXco have committed to characterizing the avian use and resources at the Desert Claim site to estimate the level of potential impacts the project could have on these resources. Subsequently, enXco contracted Western EcoSystems Technology, Inc. to develop a study protocol and conduct a twelve-month baseline study of avian use and other biological resources of the project area.

Studies conducted for the project included fixed-point surveys that targeted raptors and large birds, roadside surveys for bald eagles, raptor nest surveys, vegetation mapping, rare plant surveys, and general wildlife observations. The principal objectives of the baseline studies were to: (1) quantitatively describe the temporal and spatial use by birds of the study area; and (2) provide baseline information on avian species and their habitat sufficient to use in evaluating the probable impact of the development. Methodology of the surveys for each study component is provided below in the text of the report.

From the avian fixed-point surveys, use estimates of the study area by species and groups were calculated as the number of detections per survey (30 minutes) standardized to a fixed plot size (800 m radius). Two measures of species diversity in the study area were also calculated. Frequency of occurrence was calculated as the percent of surveys where a particular species was observed, and species composition was the mean use for a species divided by the total use for all species and multiplied by 100 to provide percent composition. An exposure index was calculated by species and group which is a relative measure of the risk of each species coming in contact with a turbine based on use of the study area by a species, the proportion of observations of that species flying, and the proportion of observations of that species flying within the rotor swept area.

Between March 22, 2002 and March 13, 2003, a total of 162 30-minute point count surveys were conducted. Passerines comprised 48% of all groups observed and 72% of the total number of birds observed. Raptors comprised approximately 23% of all groups but only 5% of all birds observed. Waterfowl comprised only 3% of all groups but 13% of all birds observed, corvids (magpies, crows, and ravens) comprised approximately 14% of all groups and 5% of all birds observed, and other birds (upland gamebirds, shorebirds, doves, and other non-passerine species) comprised approximately 12% of all groups and 5% of all birds observed.

Use varied across seasons. For spring, based on use, the four most abundant species in the study area were American robin (4.58 detections/30-minute survey), western meadowlark (2.66

detections/survey), European starling (2.13 detections), and Brewer's blackbird (1.36). Together these species comprised approximately 52% of the total bird use during the spring. During the summer, the four most abundant species were European starling (2.37 detections/survey), Brewer's blackbird (2.22), western meadowlark (1.02), and American goldfinch (0.56). These species comprised approximately 49% of the total bird use during the summer. In the fall, the four most abundant species were European starling (5.81 detections/survey), American robin (3.76), California quail (0.93), and Western meadowlark (0.87), which comprised more than 62% of the total bird use. In the winter, the four most abundant species were European starling (13.45), mallard (6.74), American robin (3.73), and unidentified finch (1.82). These species comprised more than 72% of the total bird use for the winter. Overall seasons, European starling was the most common bird observed with 6.46 detections per survey, followed by American robin (3.21), mallard (2.40), and western meadowlark (1.13). These four species comprised more than 57% of all bird use of the site for the year.

Only two species, western meadowlark (38.9% of surveys) and black-billed magpie (30.3%) were observed in more than or roughly one-third (33%) of the surveys. Five other species, red-tailed hawk (29.5%), common raven (25.2%), American robin (22.7%), killdeer (21.8%) and vesper sparrow (20.4%) were observed in approximately one-quarter (25%) of the surveys. Together, these seven species made up approximately 30% of all bird use (29.2%). In contrast, European starling alone made up 28.2% of all bird use at the site but was only observed in 16% of the surveys. The high bird use for starling was due to the majority of observations being large flocks. Eight other species, European starling (16.0%), horned lark (14.68%), Brewer's blackbird (14.1%), rough legged hawk (13.5%), American kestrel (12.5%), northern harrier (11.4%), American goldfinch (10.5%), and California quail (10.1%) were observed in more than 10% of the surveys. The majority of species were observed in less than 5% of the surveys.

Two aerial surveys for raptor nests were conducted (May 2-5 and June 5, 2002) within the raptor nest study area (the study area plus two-mile radius buffer). The total area searched was approximately 52 square miles (134 km^2). A total of 29 raptor or large stick nests were located, 18 of which were classified as active raptor nests during the first survey. Nest density for buteos [red-tailed hawk and unidentified buteo] was 0.28 nest/mi^2 (0.11 nest/km^2). Nest density for all raptors located (buteos and owls) was approximately 0.34 nest/mi^2 (0.13 nest/km^2).

Two roadside bald eagle survey routes (Reecer Creek and Wilson Creek) were established along public roads near the study area. These routes were surveyed a total of six times between March 1 and April 12, 2002 and twelve times between December 12, 2002 and April 12, 2003. A total of 39 bald eagles were observed during the surveys. The maximum number of bald eagles observed during any one survey was 18 (March 1, 2002). On average, 2.4 bald eagles were observed per survey day (2 routes). Approximately 54 percent of the observations were adults, 5 percent were subadults (1-3 years of age), 36 percent were juveniles (<1 year old), and 5 percent were unknown (unidentified due to poor visibility). Most of the bald eagles observed during the winter surveys occurred approximately 1-3 miles south and east of the study area. Based on the surveys, the primary period of bald eagle occupation in the study area appears to be between approximately mid-February and early-April. No regular night roost sites were identified in or near the study area. Many of the eagle observations were associated with cattle grounds and calving operations south of the project.

The vegetation in the study area was mapped and classified into ten types (shrub-steppe, grassland, lithosol, agriculture, wet meadow, riparian shrub, riparian tree, pine forest, open water, developed). The primary vegetation type was shrub-steppe which made up approximately 53.4 percent of the study area (approximately 2,794 acres). The grassland type made up approximately 30.2 percent of the study area (approximately 1,578 acres) and lithosol made up approximately 3.8 percent (approximately 199 acres). Agriculture made up approximately 4.8 percent of the study area (252 acres). The remaining types were minor components of the study area comprising approximately 7.8 percent cumulatively. The shrub-steppe and grassland types were typically used for livestock production and showed signs of grazing with few large perennial bunchgrasses and areas of the invasive annual cheatgrass. No rare plants listed either federally or by Washington State were found in the project area.

Eight species of mammals (mule deer, elk, porcupine, raccoon, long-tailed weasel, yellow-bellied marmot, least chipmunk, and coyote) and one species of reptile (short-horned lizard) were recorded in the study area. Mule deer was the only regularly observed big game species on site. The number of mule deer observations increased in the winter. Bald eagle was the only federally listed species observed in the study area. Four Washington State candidate species, golden eagle, sage thrasher, loggerhead shrike, and northern goshawk, were also recorded during the study.

Overall the results of the study were similar to other wind plants studied in the Washington - Oregon region. The diversity of species observed during the study was slightly higher than other sites studied; however, the majority of avian use on the site was from several common passerine species. Raptor use on the site was above average. Spatial use by raptors of the site was generally scattered but there were a few topographic features that appeared to concentrate buteo use. Bald eagle use of the site was confined to the winter months and appeared to be primarily eagles passing through the area to suitable foraging areas nearby. Waterfowl use of the site was also heaviest in the winter months. Raptor nest density was typical of other sites studied. Estimated impacts from the project are not expected to exceed what has been reported from other newer generation wind plants that have been studied. Additional discussion topics and potential mitigation and monitoring measures are addressed in the text below.

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1.0 INTRODUCTION

Desert Claim Wind Power LLC, wholly owned and managed by enXco, Inc., is evaluating the feasibility of wind power development in Kittitas County, Washington. The proposed site, *Desert Claim*, is located in the transition from the rangelands of the valley floor to the foothills of the Wenatchee Mountains approximately 8 miles north of Ellensburg, Washington (Figure 1). The site is relatively level and open and slopes gradually from the south as it approaches the foothills. The proposed development would have a generation capacity of at least 180 MW and be a maximum of 120 turbines depending on turbine model selected, electricity markets, transmission constraints, and results of site surveys.

Desert Claim Wind Power and enXco have committed to characterizing the avian use and resources at the Desert Claim site to estimate the level of potential impacts the project could have on these resources. Subsequently, enXco contracted Western EcoSystems Technology, Inc. (WEST) to develop a study protocol and conduct a twelve-month baseline study of avian use of the project area.

The principal goal of the baseline study was to collect sufficient information on avian species in the proposed development useful in evaluating the potential impacts of wind power development in the area. The principal objectives of the studies were to: (1) quantitatively and qualitatively, depending on the species or resource, describe the temporal and spatial use by birds and other wildlife of the study area; (2) describe the vegetation types present on the site; (3) list the occurrence and potential use of the site by special status species of plants and wildlife; (4) describe and estimate the winter bald eagle use of the area; and (5) provide baseline information on these resources that could be used in evaluating the probable impact of wind power development in the area.

Key questions addressed by the study included:

- What species of birds and other wildlife use the study area during different seasons?
- What vegetation types are present in the study area and what are the dominant plant species in each type?
- Where in the study area (spatial use) do species occur and what habitats do they use?
- What is the seasonal and daily (temporal) use of the study area for given species or groups of species?
- Are there key habitat features (biotic and/or abiotic) which increase the probability of species use of an area?
- How do indices of use of the study area by birds compare to other wind plants that have been studied in the region (primarily Oregon and Washington)?
- Based on avian use, habitat, and other factors at the site and by comparing with avian use, habitat, and mortality at existing wind plants, what are the expected impacts from the proposed project.

The study protocol follows similar avian studies conducted at numerous wind plants and proposed wind plants across the west and mid-west including the Vansycle and Stateline Wind Plant in Oregon and Washington (Erickson *et al*. 2000), the Buffalo Ridge Wind Plant in southwest Minnesota (Johnson *et al*. 2000a), the Foote Creek Rim Wind Plant in Wyoming (Johnson *et al*. 2000b), the Nine Canyon Wind Project, Washington (Erickson *et al*. 2001), and the Klondike Wind Project, Oregon (Johnson *et al*. 2002), and other proposed wind plants in Oregon and Washington (e.g., Combine Hills Turbine Ranch, Oregon; the Maiden Wind Farm, Washington; Zintel Canyon, Washington).

Both the Washington Department of Fish and Wildlife (WDFW) and the U.S. Fish and Wildlife Service (USFWS) were integral in the preparation of the study plan and agreed to the final protocol. Each agency was provided a copy of the draft study protocol for review and comment prior to study implementation and two meetings were held with agency representatives in Ellensburg, Washington to discuss the studies and issues or concern. While the primary concern and study objectives centered around avian resources, information was also recorded on other wildlife groups and biological resources (e.g., vegetation) due in part to concerns raised by the agencies. To the extent practical, the field studies were modified to address agency concerns. For example, potential impacts to big games species and shrub steppe habitat were of concern to the agencies. To help address these issues, the fixed-point survey (see below) methods were modified to include recording observations of big game species and background information on shrub steppe conditions was gathered on which to base a functional assessment if needed.

The following report contains the results of the avian baseline study for the one-year period from March 2002 to March 2003. This baseline study provides data for describing the temporal and spatial use by birds and other biological resources of the study area and for evaluating the probable impact of wind power development in the study area. Results from the baseline avian study may be used in the overall environmental impact assessment for the project.

2.0 STUDY AREA

The Desert Claim project area lies in the northern portion of Kittitas Valley south of Table Mountain of the Wenatchee National Forest (Figure 1). The proposed development area is approximately 8 square miles of private land with some interspersed land administered by the Washington Department of Natural Resources. The site is approximately 8 miles north of Ellensburg, Washington (Figure 1). At its nearest point, the Yakima River is located approximately 3 miles southwest of the project. The project area ranges in elevation from approximately 2000 to 3100 feet

Dominant vegetation of the Desert Claim project area is a mix of steppe types (shrub and grassland steppe) or a variety of less extensive types such as agriculture, wet meadow, and riparian types. Roughly speaking the eastern half of the project area is shrub steppe and the western half is grassland and agriculture (hay meadows). The northern most section of the project is foothills shrub with scattered conifer forest. The steppe types are primarily shrub and grass dominated areas with predominantly native sagebrush (*Artemisia spp.*), rabbitbrush

(*Chrysothamnus spp.*), bunchgrasses [e.g., Sandberg's bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegnaria spicatum*)] and exotic annuals such as the introduced cheatgrass (*Bromus tectorum*)]. Bands of riparian habitat are present along Reecer Creek, Wilson Creek, and other small streams that roughly run north-south through or near the project area. Stands of deciduous trees and wet meadows of various sizes exist along the creeks as well as near water bodies, houses, and other developments.

The study area includes the proposed wind power development area and an adjacent buffer of variable width depending on the study component. The primary study area includes the proposed development area or the location of the wind turbines and associated facilities such as met towers, substations, new roads, operations and maintenance facility, and underground overhead powerlines, and equipment storage or lay-down areas, parking areas, and the area within a buffer of approximately 1 mile (1.6 km) from all project facilities. At the time of the study set-up, WEST obtained a list of participating landowners which was used to define the boundaries of the primary study area. As the project area changed and new landowners were included, the primary study area was adjusted to incorporate the new areas.

All avian use surveys, general wildlife observations, and vegetation surveys occurred within the primary study area. The raptor nest study area included the primary study area and the surrounding area within two miles. The helicopter surveys for raptor and other large bird nests occurred within this area. The bald eagle survey routes utilized public roads that were near the project area and allowed observation of an area larger than the primary study area.

3.0 METHODS

The baseline avian studies consisted of five primary components:

1) fixed-point surveys - point count surveys for all birds but which target raptors, other large birds, and big game species;
2) raptor nest survey - aerial and ground surveys to locate raptor nests on and within two miles of the site;
3) bald eagle surveys - winter roadside surveys for bald eagles around the study area;
4) vegetation mapping and rare plant survey; and
5) general wildlife observations.

3.1 Fixed-point Survey

The primary objective of the fixed-point surveys was to estimate the spatial and temporal use of the site by birds and in particular raptors and other large birds. Point counts (variable circular plots) were conducted on the development area using methods described by Reynolds et al. (1980) and Bibby et al. (1993). The points were selected to survey as much of the project area as possible while also providing relatively even coverage without overlap of surveyed area. The emphasis of these surveys was locating and counting raptors and other large birds (waterfowl, shorebirds, waterbirds, corvids, and upland gamebirds), however, all birds seen during the point counts were recorded.

3.1.1 Survey Plots

Initially four survey plots (points A, B, C, D) were established over the study area (Figure 2). As new property was added to the project, two additional fixed-point survey plots were established (points E and F). The observation points were established to provide good coverage of the habitats and topographic features of the area and so that 800 m radius buffers around each point did not overlap (see Figure 2). Each survey plot was a variable circular plot centered on an observation point marked in the field. The survey effort concentrated within an approximate 800 m (0.5 mi) radius circle centered on the observation point. Observations of birds beyond the 800 m radius were recorded, but were not included in the analysis so that results were standardized between survey plots at the site as well as with other similar wind project studies.

Survey periods at each point were 30 minutes long. All birds observed during the survey were recorded. All raptors and other large birds observed were assigned a unique observation number and plotted on a map of the survey plot (see Appendix A). The date; start and end time of the observation period; and weather information such as temperature, wind speed, wind direction, and cloud cover were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, height above ground, activity (behavior), and habitat(s) were recorded for each bird observed. Flight or movement paths were mapped for all raptors and large birds and given the corresponding unique observation number.

Four instantaneous counts were made during each 30-minute observation period. The first instantaneous count was made at the beginning of the observation period and the remaining counts occurred at 10-minute intervals. An instantaneous count consists of a summary of all birds present in and near the plot at a particular time. During the instantaneous count, the observer scanned the full survey plot recording all birds seen at that moment. For each raptor/large bird seen during an instantaneous count, the approximate height above ground and distance to the observer were recorded.

The behavior of each raptor/large bird observed and the habitat in or over which the bird occurred were recorded. Behavior categories include perched, soaring, flapping, flushed, circle soaring, hunting, gliding, and other (noted in comments). Habitats were recorded as shrub-steppe, grassland, deciduous shrub/tree, conifer forest, rock/rock outcrop, riparian, agriculture, and other (noted in comments). The initial flight patterns and habitats (first observation) were uniquely identified on the data sheet and subsequent patterns and habitats (if any) also recorded. The flight direction of observed birds was recorded on the data sheet map (Appendix A). Approximate flight height at first observation was recorded to the nearest meter or 5-meter increment and the approximate lowest and highest flight heights observed were also recorded. Any comments or unusual observations were noted in the comments section.

Raptors, other large birds, any species of concern, and species not previously seen on site that were observed between point counts were coded as in-transit observations and also recorded on field maps with unique observation numbers. Mapped information such as point of first observation and flight paths were digitized for describing spatial use of the site.

3.1.2 Observation Schedule
Sampling intensity was designed to document avian use and behavior by habitat and season within the project area. Surveys took place for one full year. Efforts were made to survey all plots on an approximately weekly basis with at least one observer on site one day per week. Surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season. Seasons were defined as spring: March 15 - May 31; summer: June 1- August 14; fall: August 15-October 31; and winter: November 1-March 14. To the extent practicable, all stations were surveyed about the same number of times each season; however, the schedule varied in response to adverse weather conditions (e.g., rain, snow, fog), which caused delays and/or missed surveys.

3.1.3 Big Game Observations
Observations of big game species seen while conducting fixed-point surveys were also recorded. Preliminary project investigations indicated the project area is winter range for mule deer (*Odocoileus hemionus*), and an elk (*Cervis elaphus*) migration corridor is located to the north of the project. Observations of any big game species were plotted on the data sheet maps and the number of individuals in each group recorded. The objective of recording this data was to provide baseline information about big game in the project area and estimate seasonal variation in use by these species.

3.2 Raptor Nest Survey

The objective of the raptor nest survey was to gather information on species nesting in the area including nest locations, nesting season (timing), and nest success as well as locate nests which may be subject to disturbance and/or displacement effects from wind plant construction and operation. The nest survey area included the proposed development area and the area within an approximate 2-mile buffer of the site excluding extensive tracts of dense coniferous forest (Figure 3).

The focal species for the nest survey was ferruginous hawk (*Buteo regalis*) a state threatened species. Richardson (1996) reports that ferruginous hawks in Washington initiate their nesting activity in late-March and early-April. The initial nest survey was conducted via helicopter from May 2-5, 2002 when ferruginous hawks in the study area would be actively incubating eggs or brooding/attending young (Richardson 1996). GPS coordinates were recorded for all nests located of all raptor or other large bird species and mapped on a GIS ArcView™ project utilizing USGS topographic maps (1:24000 scale) as the base. A follow up survey was conducted on June 5, 2002 to visit located nests and look for evidence of nest success (e.g., fledged young nearby, full grown chicks in the nest) and to gather data on later nesting species [e.g., Swainson's hawk (*Buteo swainsoni*)].

Locations of all nests were recorded, including inactive nests as they could be occupied during other years. Survey methods involved flying over the area while searching for suitable nesting areas and substrate (e.g., trees, rock outcrops, cliffs, and other structures, such as power poles). Once suitable nesting areas were found they were searched thoroughly from the air and all nests found, whether active or inactive, were given a unique identification number and their locations recorded in Universal Transverse Mercator (UTM) coordinates. The surveys were conducted by a biologist experienced in raptor nest surveys. In additional to the helicopter survey, public roads within the raptor nest survey area were driven to search for nest sites that were visible from the ground.

3.3 Bald Eagle Surveys

Information from the WDFW PHS database indicated that the Kittitas Valley and Yakima River riparian corridor is important habitat for wintering bald eagles (*Haliaeetus leucocephalus*) and, therefore, a potential concern for the proposed project. The objective of the bald eagle surveys was to determine the abundance and location of wintering bald eagles near the proposed development area. Surveys were conducted which were designed to locate bald eagles, concentration areas, and/or potential roost sites near the project.

Two survey routes were established along Reecer Creek Road and Wilson Creek Road near the project site (Figure 2). These routes were surveyed periodically from early March 2002 to mid April 2002 and again from late December 2002 to mid April 2003. A survey consisted of driving slowly (20 mph) the predetermined route while visually scanning all areas visible from the road. Periodic stops were made in safe locations to scan areas of large trees with binoculars or spotting scope to look for perched eagles. Depending on the traffic and safe pull-off availability, when an eagle or species of interest was spotted, the observer stopped the vehicle to record the appropriate data and location. UTM coordinates for the observer location (along the road) were recorded and later corrected for approximate distance and direction to the eagle. Surveys were conducted primarily in the morning hours to look for perched eagle but a few evening surveys were also conducted. Other special status wildlife and species of interest observed during the surveys were also recorded.

3.4 General Wildlife Observations

The objective of recording general wildlife observations on the site was to document wildlife other than avian species that may be affected by the proposed development. General wildlife observations were made year round while observers were on site conducting other surveys. Raptors, unusual or unique avian sightings, sensitive species, mammals, reptiles, and amphibians sighted while field observers were on or near the site or traveling between plots were recorded on data sheets for incidental observations. The data recorded were similar to those recorded during the plot studies. The observation number, date, time, species, number, sex/age class, height above ground (for birds), and habitat were recorded. Observations of uncommon species and species of concern were mapped on a project map by observation number.

3.5 Vegetation Surveys

The objective of the vegetation surveys was to characterize the dominant vegetation and vegetation communities of the study area that may be impacted by the proposed project.

Information from the surveys may be used in the overall environmental impact assessment, to describe habitats used by wildlife species observed, assess habitat suitability for special status species of wildlife, determine the need for more detailed vegetation impact analyses, and determine areas where rare plant surveys would be needed.

3.5.1 Vegetation Mapping
Vegetation in the study area was mapped according to "vegetation types". For vegetation mapping, the "study area" included the 5,200 acres where Desert Claim has landowner permission to develop the project (Figure 1). "Vegetation types" are considered to be generally recognizable assemblages of plant species that occur in a pattern across the landscape. Vegetation types were determined based on visual assessment of dominant plant species. Commercially available black and white digital aerial photography dated 2000 with a minimum pixel size of 1 meter was used for mapping. The vegetation types were mapped during September 2002 and late April to early May 2003. Initially, the roads in and around the project site were driven in order to correlate vegetation types with the signature (color, shading, texture) on the aerial photos. Each vegetation 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 vegetation type within another are not shown. The mapped boundaries of each habitat type were digitized using ArcView™. Observations of dominant species, general condition, and land uses were recorded for each vegetation type

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

3.5.1 Rare Plant Survey
The objective of the rare plant survey was to identify listed, sensitive, or otherwise rare plants that occur in the development area that may be impacted by construction or operation of the wind plant. The rare plant survey considered both federal and state listed plant species. At the federal level, listed species included those listed as threatened or endangered that potentially occur in the study area, as well as species that have been formally proposed or are candidate species for federal listing, or "species of concern". The "species of concern" status is an unofficial status for species that appear to be in jeopardy, but information is insufficient to support listing. At the state level, listed species included those identified as endangered, threatened, sensitive, review, or extirpated by the Washington Natural Heritage Program (WNHP) that potentially occur in the study area. State-listed species that potentially occur in the study area were determined based on the WNHP database, which maintains the most complete database available for state-listed species. The WNHP was also contacted to obtain records for any known rare plant populations in the study area or general project vicinity.

To supplement the information provided by the above agencies, a number of other sources were consulted for additional information regarding rare plant species potentially found in the study area, including critical information such as habitat preferences, morphological characteristics, phenologic development timelines, and species ranges. Sources included: taxonomic keys and species guides (WNHP 2003; USFWS 2001; Cronquist et al. 1977; Hitchcock and Cronquist 1973) and online databases of common and rare plant species (Ilanga Inc. 2003; USDA 2003).

It should be noted that the Endangered Species Act of 1973 (16 USC 1531, *et seq.*, as amended), does not give plant species legal protection on non-federal lands unless a State law or regulation is being violated (ESA Section 9(a)(2)(B)). Rare plant species are not legally protected in Washington State (Swope Moody, WNHP, pers. comm.). Despite the lack of legal protection, every effort was made to locate rare plant species that could be impacted by the project and, if present, identify mitigation measures to avoid or minimize impacts to these resources.

Using data collected during the pre-field review and the habitat map of the study area, pedestrian field surveys were performed on September 5 and 6, 2002 and April 28 and May 15, 2003 to locate rare plant species within the study area. The surveys were timed to locate as many target species as possible. Methods for surveying for rare plants followed guidelines and recommendations of the WDFW and the Washington Natural Heritage Program. The areas surveyed included those areas of native habitat within the study area in which one or more of the rare plant species could occur. Surveys were not conducted on gravel or paved roads or other developed areas (e.g., farms, equipment storage areas, gravel pits) or in agricultural areas (i.e., hay fields). The surveys were accomplished by performing meandering pedestrian transects back and forth across the survey area. 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. Care was taken to thoroughly search all unique features and habitats encountered with high probability of occurrence of rare species.

During the surveys a list of vascular plants encountered was made (Appendix B). 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 used where applicable (USDA 2003; Ilanga Inc. 2003). Notes were also taken regarding general plant associations, land use patterns, unusual habitats, and wildlife use. Photographs of the habitat types and representative individual plants were taken using a digital camera.

3.6 Data Compilation and Report Preparation

3.6.1 Data Compilation and Storage

A database was created to store, retrieve and organize field observations. Data from field forms were keyed into electronic data files using a pre-defined format that made subsequent data analysis straightforward. All field data forms, field notebooks, and electronic data files have been retained for future reference.

3.6.2 Quality Assurance/Quality Control

QA/QC measures were implemented at various stages of the study, including in the field, during data entry, during data analysis, and report writing. Each observer was responsible for inspecting his or her data forms for completeness, accuracy, and legibility. The study team leader periodically reviewed data forms to ensure completeness and legibility. Problems detected were corrected and changes made to the data forms were initialed and dated by the person making the change.

The electronic database was compared to the original data sheets by randomly choosing electronic records and verifying these with the field data sheet. Any errors detected were corrected by referencing the raw data forms and/or consulting the observer(s) who collected the data. Any irregular codes detected, or any data suspected as questionable, were discussed with the observer and study team leader. 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 were made.

3.7 Statistical Analysis and Products

Statistics/data generated for the study include the following:

- Species lists and observations by season;
- Relative use by species, species group, season, and observation point (habitat);
- Mean frequency of occurrence and species composition;
- Mapped summary of raptor observations and flight paths by species or group;
- Mean flight characteristics by species and species group;
- Exposure indices by species and species group;
- Other wildlife and sensitive species lists and locations mapping;
- Vegetation type mapping and rare plant mapping (if applicable);
- Raptor nest location by species mapping;
- Table of raptor nests and success by species;
- Comparisons of avian use and raptor nest density between the proposed project and other new or existing wind plants.

The number of raptors and other species seen during each point count survey was standardized to a unit area and unit time searched. Avian use by species was calculated as the mean number of observations per 30-minute survey within 800 m of the survey point. Standardizing the data to a unit area and unit time allows comparison of avian use within the site between survey plots (habitat) and seasons and from the site to other wind plants that have been studied with similar methods.

The frequency of occurrence by species was calculated as the percent of surveys in which a particular species was observed. Species composition was represented by the mean use for a species divided by the total use for all species and multiplied by 100 to provide percent composition. Frequency of occurrence and percent composition provide relative estimates of the avian diversity of the study area. For example, a particular species may have high use estimates of the site based on just a few observations of large flocks, however, the frequency of occurrence will indicate that it occurs during very few of the surveys and therefore, may be less likely affected by the project.

A relative index to collision exposure (*R*) was calculated for bird species observed flying during the fixed-point surveys using the formula:

$$R = A * P_f * P_t$$

Where A = mean relative use for species *i* (observations within 800 m of observer) averaged across all surveys, P_f = 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 P_t = proportion of all flight height observations of species *i* within the rotor-swept area. This index does not account for differences in behavior other than flight characteristics (i.e., flight heights and percent of birds observed flying).

Data were plotted (means and 90% confidence intervals) to illustrate differences in raptor and other bird use between survey period (seasons) and stations (habitat). Because of the relative close proximity of points to each other, the variability of estimates of avian use were based on survey to survey variability (i.e., temporal variability). Maps of bird use (perches and flight paths) by observation point were developed to identify, to the extent possible, habitats or other topographic features that appeared related to bird use.

4.0 RESULTS

4.1 Fixed-point Raptor and Large Bird Surveys

Surveys were conducted at fixed-point count stations located within the study area (Figure 2) approximately once each week between March 22, 2002 and March 13, 2003. Varying weather conditions caused some surveys to be missed and the number of fixed-point stations increased from 4 to 6 in the fall of 2002 when new area was added to the project. Over the whole study period, a total of 162 30-minute point count surveys were conducted.

A total of 68 avian species and an additional 6 unidentified bird types (best possible identification, e.g., unidentified buteo) were observed during the fixed-point surveys (Table 1). 3,992 total observations in 816 different groups[1] were recorded during the fixed-point surveys (Table 1). These are raw counts of observations, that are not standardized by the number of hours of observation, but do provide an overall list of what was observed. These counts likely contain duplicate sightings of the same birds.

Passerines were the most numerous group; European starling (*Sturnis vulgaris*), American robin (*Turdus migratorius*), western meadowlark (*Sturnella neglecta*), and American goldfinch (*Carduelis tristis*) were the most numerous passerines observed. Passerines comprised 48% of

[1] Group is defined as an observation of a species of bird regardless of number seen together. For example, a flock of 8 American robins flying together is considered a group as well as an individual robin observed by itself.

all groups observed and 72% of the total number of birds observed. Raptors comprised approximately 23% of all groups but only 5% of all birds observed. In contrast, waterfowl comprised only 3% of all groups but 13% of all birds observed. Corvids (magpies, crows, and ravens) comprised approximately 14% of all groups and 5% of all birds observed. Other birds (upland gamebirds, shorebirds, doves, and other non-passerine species) comprised approximately 12% of all groups and 5% of all birds observed (Table 1).

4.1.1 Avian Use

To standardize the data for comparison between points, seasons, and other studies; avian use, frequency of occurrence, and species composition were calculated from observations within 800 m of the survey point. Avian use by species was calculated as the mean number of observations per 30-minute survey (Table 2). Because individual birds were not marked, counts do not distinguish between individuals; rather, they provide an estimate of avian use of the study area. For example, if one red-tailed hawk (*Buteo jamaicensis*) was observed during five surveys, it is unknown if this was the same bird seen five times or five different birds seen once. But this does provide an index of how often or frequent red-tailed hawks occur in the study area, and therefore are at risk of being affected by the proposed project. References to abundance are use estimates and not absolute density or numbers of individuals.

Use varied across seasons (Table 2). For **spring**, based on use, the four most abundant species in the study area were American robin (4.58 detections/30-minute survey), western meadowlark (2.66 detections/survey), European starling (2.13 detections/survey), and Brewer's blackbird (*Euphagus cyanocephalus*) (1.36 detections/survey). Together these species comprised approximately 52% of the total bird use during the spring (Table 3). During the **summer**, the four most abundant species were European starling (2.37 detections/survey), Brewer's blackbird (2.22), western meadowlark (1.02), and American goldfinch (0.56). These species comprised approximately 49% of the total bird use during the summer (Table 3). In the **fall**, the four most abundant species were European starling (5.81 detections/survey), American robin (3.76), California quail (*Callipepla californica*) (0.93), and Western meadowlark (0.87), which comprised more than 62% of the total bird use (Table 3). In the **winter**, the four most abundant species were European starling (13.45), mallard (*Anas platyrhynchos*) (6.74), American robin (3.73), and unidentified finch (1.82). These species comprised more than 72% of the total bird use for the winter (Table 2). Over all seasons, European starling was the most common bird observed with 6.46 detections per survey, followed by American robin (3.21), mallard (2.40), and western meadowlark (1.13) (Table 2). These four species comprised more than 57% of all bird use of the site for the year (Table 3)

Averaged over all seasons and based on use, passerines were the most abundant group observed followed by waterfowl/waterbirds, raptors, and corvids (Table 2). Passerines as a group had the highest use in all four seasons. Waterfowl had the second highest use in the winter, however, raptors had the second highest use estimates in the spring, summer, and fall. The high winter waterfowl use was due primarily to large flocks of mallards that frequented the study area during the winter season (see Table 1). Mean use for passerines and raptors, the two most abundant groups most of the year based on use, was plotted by survey period. Passerine use was relatively constant across the seasons but a spike caused by large flocks of starlings observed in the winter caused a slight overall increase for the winter season (Figure 5). Raptor use fluctuated throughout the study period with the highest use occurring in early spring (Figure 5). Raptor use did not drop in winter due mainly to an increase in rough-legged hawk observations. Mean use for these two groups was also plotted by survey station (Figure 6). Passerine use was highest at survey plots B and E which had a mix of vegetation types (see Figures 2 and 4). Plot B encompassed grassland, shrub-steppe, agriculture, and riparian habitats. Plot E was on a ridge in shrub-steppe overlooking riparian, grassland, and some developed area. Similarly, plot C also had higher use and encompassed a variety of habitats. Raptor use across the study area was similar to passerine use in that plots with a diversity of vegetation had the higher use estimates (Figure 6), however, these plots were also the most topographically diverse. Plots C and E were located on a roughly north-south ridge line that may have influenced raptor use (see below Spatial Use).

4.1.2 Species Composition and Frequency of Occurrence

Species composition is represented by the mean use for a species divided by the total use for all species and multiplied by 100 to provide percent composition (Table 3). Frequency of occurrence was calculated as the percent of surveys where a particular species was observed (Table 4). Frequency of occurrence and percent composition provide relative estimates of the avian diversity of the study area. For example, only two species, western meadowlark (38.9% of surveys) and black-billed magpie (30.3%) were observed in more than or roughly one-third (33%) of the surveys. Five other species, red-tailed hawk (*Buteo jamaicensis*) (29.5%), common raven (*Corvus corax*) (25.2%), American robin (22.7%), killdeer (*Charadrius vociferus*) (21.8%) and vesper sparrow (*Pooecetes gramineus*) (20.4%) were observed in approximately one-quarter (25%) of the surveys. Together, these seven species made up approximately 30% of all bird use (29.2%). In contrast, European starling alone made up 28.2% of all bird use at the site but was only observed in 16% of the surveys. The higher bird use for starling was due to the majority of observations being large flocks (see Table 1). Eight other species, European starling (16.0%), horned lark (*Eremophila alpestris*) (14.68%), Brewer's blackbird (14.1%), rough legged hawk (*Buteo lagopus*) (13.5%), American kestrel (*Falco sparverius*) (12.5%), northern harrier (*Circus cyaneus*) (11.4%), American goldfinch (10.5%), and California quail (10.1%) were observed in more than 10% of the surveys. The majority of species were observed in less than 5% of the surveys (Table 4).

As a group, and due primarily to the abundance of several common species, passerines comprised more than 73% of the avian use on site (Table 3) and were observed in more than 79% of all surveys (Table 4). Raptors as a group comprised approximately 5% of the avian use of the site (Table 3) and were observed in approximately 58% of the surveys (Table 4

Frequency of occurrence for passerines and raptors was plotted by survey period (Figure 5). Passerine occurrence was variable but highest in the spring and summer when passerines were recorded in 100% of the surveys (Figure 5). Raptor occurrence was also fairly variable but had a decreasing trend from spring through summer to fall and then increasing in winter (Figure 5). Frequency of occurrence for these two groups was also plotted by survey station (Figure 6). Passerine occurrence was somewhat even across the study area except for plot F, the northern most station, where they were observed less frequently (Figure 6). Raptor occurrence was more variable and was similar to raptor use in that plots C and E had the highest frequency of occurrence (Figure 6).

An additional index of species diversity is the mean number of species observed per survey. In general, the mean number of species per survey peaked in spring and decrease through the year to a low in winter (Figure 7).

4.1.3 Flight Height Characteristics
The proportion of observations of a bird species flying within the rotor swept area provides a rough estimate of the propensity of that species to fly within the area occupied by the turbine rotors (Table 5). The turbines and tower heights identified for the project would have a maximum height with the blade pointed up of approximately 120 m. Using the estimated range of tower heights and rotor diameters, the "zone of risk" included the area from approximately 25 m above ground level (AGL) to 125 m AGL. This range was a conservative estimate that included a small buffer of approximately 5 m on the upper and lower limits. Most of the passerines observed, with the exception of finches and swallows, were regularly observed flying less than 25 meters above the ground (Table 5). The larger birds tend to fly higher, and frequently flew greater than 25 meters high, which is within the primary zone of risk for turbine blades for most newer generation turbines. As a group, 93% of waterfowl observed flying were observed in the zone of risk. Flying eagles were observed in the zone of risk 80% of the time and flying buteos approximately 66% of the time. Flying passerines were observed within the zone of risk approximately 53% of the time (Table 6).

4.1.4 Exposure index
The exposure index is a relative measure of the risk of each species observed on-site during the fixed-point surveys coming in contact with a turbine, based on the use (measure of abundance) of the site by the species and the flight characteristics observed for that species. European starling, mallard, and American robin had the highest exposure indices (Table 7). These three species were commonly observed on site and often observed flying in large flocks. Of the raptors, red-tailed hawk had the highest exposure index. Most of the other raptors were seen less frequently (i.e., use was lower) which reduced their exposure index. Common raven also had a relatively high exposure index due to its propensity to fly in the zone of risk.

4.1.5 Spatial Use
The objective of mapping observed bird locations was to look for areas of concentrated use by raptors. Point of first observation, approximate flight paths, and perch locations were mapped for each raptor observed in the project area (Figures 8-10). Red-tailed hawks were the most common raptor observed. Most red-tailed observations were in the mid and eastern portions of the project area (Figure 8). Other raptors such as accipiters, falcons, and harriers appeared more random and were relatively evenly distributed across the study area (Figures 9-10). For most raptors there did not appear to be a strong association of use with topographic features of the site. For red-tailed hawks and rough-legged hawks there were a few locations that appeared to be correlated with use. In particular the ridgeline located within survey points C and E appeared to concentrate use by buteos (see Figure 8). Another area that also appeared to have more concentrated use by buteos was the hillside within survey plot B. There was a concentration of

observations in this area although they were spread out over a broader area. This area is also just outside the proposed development area.

4.1.6 Big Game Observations
Only one species of big game, mule deer, was commonly observed in the project area (Table 8). Some individuals were observed in all seasons, however, there was an increase in the number observed in the winter. Mule deer were fairly evenly distributed over the study area (Figure 11). Based on available information, there is also the potential for elk to occur on the site, however, only one group was observed incidentally near the site in March 2003. No elk were observed within the study area.

4.2 Raptor Nest Survey

Two aerial surveys for raptor nests were completed within the raptor nest study area (the study area plus two-mile radius buffer). The total area searched was approximately 52 square miles (134 km^2) (Figure 3). A total of 29 raptor or large stick nests were located. Eighteen active raptor nests were located during the first survey (Table 10). The most common nesting raptor in the study area was red-tailed hawk with 12 active nests. There were also three unknown buteo nests which were active. Generally these were nests with young or eggs present, but where no adult was observed at the nest or near by to provide species identification. It is likely that most of these were also red-tailed hawks. Nest density for buteos [red-tailed hawk and unidentified buteo] was 0.28 nest/mi^2 (0.11 nest/km^2). Nest density for all raptors located (buteos and owls) was approximately 0.34 nest/mi^2 (0.13 nest/km^2).

The second nest survey was intended to gather as much information as possible about nest success from the active nests located during the first survey and search for new nests to the extent practical. Based on the second survey, both red-tailed hawk and great horned owl were confirmed producing or fledging chicks in the study area (Table 10). The calculated nest success rates (Table 10) are based on relatively small sample sizes but they provide an estimate of approximate nest success (i.e., percent of nests that are successful by species), and a record of successful breeding by two raptor species in the study area.

In general, the raptor nest survey area contained marginal habitat in terms of nest site availability. There were no large riparian corridors in the survey area and no noticeable cliffs. There are several powerline corridors which had several nests present (see Figure 3) but most nests were in isolated patches of trees or along the Wilson Creek riparian area. The aerial survey method enables/facilitates locating nests that are easily seen from the air and generally focuses on locating suitable raptor nest structures. Ground nesting species are generally missed with this type of survey due to the difficulty of locating nests on the ground from the air. It is likely that some ground nesting species such as northern harriers and possibly short-eared owls nest within the survey area. No ground nesting raptors were located during other activities in the study area such as the vegetation surveys or while walking to point count locations.

4.3 Bald Eagle Surveys

The WDFW estimates that between 35-50 bald eagles winter in the Kittitas Valley along the Yakima River riparian corridor (WDFW PHS 2002). Two roadside bald eagle survey routes were established along public roads near the study area (see Figure 2), and labeled Reecer Creek and Wilson Creek. These routes were surveyed a total of six times between March 1, 2002 and April 12, 2002 and twelve times between December 12, 2002 and April 12, 2003 (Table 10).

A total of 39 bald eagles were observed during the surveys (Table 10). The maximum number of bald eagles observed during any one survey was 18 (March 1, 2002). On average, 2.4 bald eagles were observed per survey day (2 routes). Approximately 54 percent of the observations were adults, 5 percent were subadults (1-3 years of age), 36 percent were juveniles (<1 year old), and 5 percent were unknown (unidentified due to poor visibility). Most of the bald eagles observed during the winter surveys occurred approximately 1-3 miles south and east of the study area (Figure 12). In addition to the survey observations, a fair number of bald eagles were observed incidentally in the project vicinity outside the scheduled bald eagle surveys or while observers were traveling to the site (see Table 11).

Based on the surveys, the primary period of bald eagle occupation in the study area appears to be between approximately mid-February and early-April. No regular night roost sites were identified in or near the study area and it appears as if bald eagles may opportunistically roost in suitable trees near foraging areas. Many of the eagle observations were associated with cattle grounds and calving operations where they were observed foraging on carrion (dead cows) or calving byproducts.

4.4 General Wildlife and In-Transit Observations

4.4.1 Avian species

Avian species of interest were recorded when seen during periods when observers were traveling to survey points, in-transit between survey points, traveling to the site, or on-site for other purposes (Table 11). Many incidental observations occurred near the site but were not on property contained within the proposed development. While general wildlife or incidental observations are not standardized in any fashion, they are a record of species of interest on or near the project area and a record of some species on-site not observed during standard surveys.

Several raptor species were observed on-site or near by outside of the scheduled surveys (fixed-point or bald eagle surveys), including bald eagle, red-tailed hawk, rough-legged hawk, American kestrel, prairie falcon (*Falco mexicanus*), northern harrier, Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), northern goshawk (*Accipiter gentilis*), turkey vulture (*Cathartes* aura), and barn owl (*Tyto alba*). Several species of waterfowl were seen incidentally and not during surveys including common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), ring-necked duck (*Aytha collaris*), and northern shoveler (*Anas clypeata*). Other avian species of interest observed incidentally included spotted sandpiper

(*Actitis macularia*), loggerhead shrike (*Lanius ludovicianus*), and long-billed curlew (*Numenius americanus*).

4.4.2 Threatened, Endangered, Candidate Species
Bald eagle, a federally and state threatened species, was observed in the study area during the winter (see Section 4.3 above). No other federally listed species were observed in the study area.

Four state candidate species, golden eagle (*Aquila chrysaetos*), sage thrasher (*Oreoscoptes montanus*), loggerhead shrike, and northern goshawk, were also recorded on the site. A single golden eagle and numerous sage thrashers were observed during the point count surveys. The northern goshawk and loggerhead shrike were observed during bald eagle roadside surveys.

4.4.3 Non avian species
Eight species of mammals, mule deer, elk, porcupine (*Erethizon dorsatum*), yellow-bellied marmot (*Marmota flaviventris*), least chipmunk (*Eutamius minimus*), long-tailed weasel (*Mustela frenata*), raccoon (*Procyon lotor*), coyote (*Canis latrans*); and one species of reptile, short-horned lizard (*Phrynosoma douglassi*) were observed in the study area during the study period. Mule deer were fairly common on-site (see section 4.1.6 above) but a few individuals of the other species were observed (Table 11).

4.5 Vegetation Surveys

4.5.1 Vegetation Mapping
The vegetation in the study area was mapped and classified into ten types (Figure 4, Table 12). Within the study area, the primary vegetation type is shrub-steppe. This type comprises 53.4 percent of the study area and is primarily found in the eastern and northern parcels. The shrub-steppe type consists of upland areas dominated by shrubs, primarily bitterbrush (*Purshia tridentata*), rigid sagebrush (*Artemesia rigida*), and big sagebrush (*A. tridentata*) with an understory of mixed grasses and forbs. Rigid sagebrush is found on the ridge-tops and exposed areas. Bitterbrush is also common in these areas, but dominates in the drainages and swales where it is generally denser and larger (up to approximately 6 feet tall). Areas of dense shrub steppe in the northern parcel dominated by mature bitterbrush were mapped separately (Figure 4). Interspersed within the shrub steppe are lithosol habitats (areas of exposed shallow, rocky soils) dominated by Sandberg's bluegrass and scattered rigid sagebrush. These inclusions were too small and numerous to be delineated separately from the shrub steppe at the scale of aerial photography used. The lithosol, however, was primarily found on exposed sites. Cattle graze in most of the shrub steppe areas and cattle trails were common; however, the shrubs did not appear stressed or in otherwise poor condition due to cattle grazing. Grass species and grass cover were less common than would be expected though, presumably due to past livestock grazing. Livestock grazing has been observed to result in a decline in large perennial grasses and an increase in annual cheatgrass in shrub steppe habitat (Daubenmire 1970). A few weedy species, including cheatgrass and knapweed (*Centaurea* sp.), were observed in the shrub-steppe type, but native species dominate.

Grasslands make up 34 percent of the study area, primarily in the western portion of the study area. The grasslands are areas dominated by grasses and a variety of forbs. Common species include bluebunch wheatgrass, Sandberg's bluegrass, cheatgrass, bulbous bluegrass (*Poa bulbosa*), and forbs such as lupines (*Lupinus spp*), balsamroots (*Balsamorhiza hookeri* and *B. sagittata*), Hood's phlox (*Phlox hoodii*), and various lomatiums (*Lomatium nudicaule, L. canbyi,* and *L. dissectum*). Soils range from shallow and rocky to moderately deep. The shallow-soiled lithosols are common and are interspersed throughout the grasslands. Sandberg's bluegrass dominates the lithosols. The grassland vegetation types are primarily used for cattle grazing.

For this project, areas classified as "agricultural" were those areas used for irrigated hay meadows that appear to be routinely cut for hay production. While other lands, primarily shrub steppe and grasslands, are used for agricultural purposes (e.g., cattle production), these areas are not considered under the "agricultural" category because they consist primarily of native vegetation. Agricultural areas make up 4.8 percent of the study area primarily in the western half (Figure 4).

Wet meadows are found scattered throughout the study area in drainages and swales, and along the North Branch Canal and around stock ponds. Wet meadows make up approximately 2.9 percent of the study area. These areas dominated by hydrophytic vegetation, including various sedges (*Carex spp.*), grasses, and rushes (*Juncus spp.*) and other herbaceous species such as smartweed (*Polygonum lapathifolium*), monkeyflower (*Mimulus guttatus*), and speedwell (*Veronica* sp.). These areas appear to be saturated or inundated most of the year, either from leakage from the canal or stockponds, surface water flow, or high groundwater. Evidence of occasional cattle use was observed, such as hoof prints in the soft ground, however, these areas did not appear adversely affected by cattle. Weeds were observed in some of the individual wet meadows, primarily chicory (*Cichorium intybus*). Wetland delineations, in accordance with the U.S. Army Corps of Engineers methods, were not conducted in these areas for this study.

The riparian shrub type consists of riparian areas adjacent to perennial or intermittent streams where shrubs are common, but often scattered. This type makes up approximately 2.1 percent of the study area. Common shrub species include black hawthorn (*Crataegus douglasii*) and coyote willow (*Salix exigua*). Various herbaceous species are also present including grasses such as blue grass (*Poa pretensis*), rushes, and forbs such as curly dock (*Rumex crispus*). Weedy species, including chicory and knapweed, were also observed.

The riparian forest type is similar to the riparian shrub type, but the overstory consists of a mix of trees and tall shrubs. The dominant tree and shrub species include cottonwoods (*Populus balsamifera* spp. *trichocarpa*) and various willows (*Salix* spp.). In some locations, the trees and shrub understory are very dense, limiting herbaceous growth. This type makes up approximately 1.4 percent of the study area. Animal trails were noted through some of these areas, and these areas probably receive use by livestock and wildlife for shade and water. As with the wet meadows, standard wetland delineations were not conducted in the riparian types for this study.

A small amount of pine forest occurs in the upper elevations of the northern most parcel, making up approximately 0.6 percent of the study area. The dominant species in these forests is Ponderosa pine (*Pinus ponderosa*).

Small areas of open water are scattered throughout the study area; open water comprises approximately 0.5 percent of the study area. This type includes natural ponds, stock ponds, and a portion of the North Branch Canal within the study area.

Developed areas make up 0.3 percent of the study area. These are areas where human activity has removed or altered natural vegetation, such as residential homes, farm buildings, and yards.

The above descriptions characterize the vegetation types observed and mapped within the 5,200-acre study area during 2002 and 2003. Daubenmire (1970) provides a description of generalized vegetation zones and associations of the eastern Washington shrub steppe based on climate, vegetation structure, and floristics. These vegetation zones and associations represent climax communities, which typically develop over time in the absence of anthropogenic disturbance. The study area is within Daubenmire's *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 cattle and horses 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*). 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 is found in the study 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.

Within most of the shrub-steppe region, including the study area, many of the plant communities have been modified due to numerous disturbance factors. Livestock grazing and other agricultural practices have resulted in a shift in plant community composition in the study area from the climax communities described above. Notable in the study area are a low percentage of native grass species and grass cover in general and some non-native species and weedy species throughout much of the study area.

4.5.2 Rare Plant Survey
Review of federal and state lists of rare plant species suggest that twenty-one species could occur in the study area based on the type of habitats found there (Table 13). Eighteen of the species are typically found in shrub steppe or grassland habitats and three occur in riparian or wet meadow habitats. Of the twenty-one rare plant species, one (Ute ladies'-tresses) is a federally-listed threatened species, with a state ranking of endangered. Five are federal 'species of concern', with state rankings of threatened or sensitive. The remaining fifteen are listed at the state level as either sensitive or review species. The WNHP database has records for two state sensitive species in or adjacent to the study area. One historic record (1959) for Piper's daisy includes the western portion of the study area, and one current record (1991) for long-sepal globemallow is located adjacent to the eastern end of the study area.

In the study area, the wet meadows provide potential habitat for the federally-listed Ute ladies'-tresses orchid, which flowers in late summer (late July through early September). The wet meadow habitats in the study area were searched for Ute ladies'-tresses orchid in early September 2002. No Ute ladies'-tresses were found.

Surveys for species that occur in shrub steppe and grassland habitats were focused on areas of likely disturbance from the proposed project. The field surveys did not locate any federal species of concern or state listed plant species that might occur in the study area.

5.0 SUMMARY AND DISCUSSION

5.1 Avian Use and Species Diversity

Avian use varied by season, however, over all seasons, the four most common species based on the fixed-point surveys were European starling (6.46 observations per survey), American robin (3.21), mallard (2.40), and western meadowlark (1.13). Together these four species made up more than one-half (57%) of all birds observed during the fixed-point surveys. The high use estimate by mallard was due primarily to large flocks observed in the winter. European starlings were also frequently observed in large flocks but were only observed in about 16% of the surveys. In contrast, western meadowlarks were observed in more than 38% of the surveys but in smaller group sizes. For avian species groups, passerines were by far the most common group with approximately 16.77 observations per survey on average, followed by waterfowl (2.60), raptors (1.15) and corvids (1.10). While the species vary, these statistics reflect common results from other wind plants and proposed wind plants that have been studied, where passerines account for most of the avian use of a site and raptors and other species groups are a distant second.

Over all seasons, the most abundant raptors observed were red-tailed hawk, rough-legged hawk, American kestrel, and northern harrier, although rough-legged hawks were observed primarily in the winter and early spring. On average approximately one red-tailed hawk was observed every 3 surveys, one rough-legged hawk every 5 surveys, one kestrel every 6 surveys, and one northern harrier every 7 surveys. Raptor use varied by season but was highest in the spring (1.67) and fall (1.16) and dropped in the summer (0.82) and winter (0.96), which is typical of many other wind sites studied and probably due to migrants moving through the area in spring and fall.

Frequency of occurrence provides a relative estimate of the avian diversity of the study area. Species diversity was slightly higher than other wind areas studied in Washington and Oregon with the majority of use scattered among several species as opposed to only one or two. Only one species, western meadowlark (38.89%), was observed in more than one-third (33%) of the surveys. There were several species observed in approximately one-quarter (25%) of the surveys including, black-billed magpie, red-tailed hawk, common raven, American robin, killdeer, and vesper sparrow; and eight others, European starling, horned lark, Brewer's blackbird, rough-legged hawk, American kestrel, northern harrier, American goldfinch, and California quail, observed in more than 10% of the surveys (see Table 4 for percents). The relatively moderate species diversity for the area is likely the result of the mix of vegetation types present (see Figure 4). The survey points were established in a fashion that allowed observation in all habitats present. All of these species are common open-land species typical of habitats in the study area.

5.2 Risk of Turbine Collision

5.2.1 Exposure Index

The species with the highest exposure indices for the site were European starling, mallard, and American robin. European starling was the most abundant species observed, due to numerous large flocks and was observed flying in the zone of risk about two-thirds of the time. Mallards were also observed in numerous large flocks (which related to high use) as well as most flight observations being in the zone of risk. American robins, while observed flying in the zone of risk less than half the time, were one of the most common species on site. Mortality studies at other wind plants have found starlings, mallards, and robins but not in high numbers (see Erickson *et al.* 2001). European starling, a non-native species, is not protected and there is little or no concern over potential fatalities of this species. There has been some waterfowl mortality reported at wind plants, however, it does not appear to be substantial (see Section 5.2.4).

5.2.2 Raptors

Compared to other wind plants that have been studied, raptor use for the site is above average with slightly more than one raptor (1.15) observed each survey. The majority of the raptor sightings were red-tailed hawks during the spring, summer, and fall and rough-legged hawks during the winter. For comparison, raptor use at several existing or proposed wind plants studied with the same methods[2] was generally lower. For example, raptor use (per 30-minute survey) at the Vansycle Wind Plant (OR) was approximately 0.55 raptors; Condon Wind Plant (OR) was approximately 0.49 raptors; at the Stateline Wind Plant (WA/OR) approximately 0.90; at the

[2] Fixed-point surveys were conducted following the same methods at all wind plants but some had variable survey duration. The calculated use at these wind plants was standardized to 30-minute duration surveys under the assumption that raptor observations were uniform across time for each survey period.

Klondike Wind Plant (OR) approximately 0.70; at the Buffalo Ridge Wind Plant (MN) approximately 0.74; and at the Foote Creek Rim Wind Plant (WY) raptor use was approximately 1.10 raptors. Raptor use at two sites in nearby Benton County, Washington, was also slightly lower: the Maiden wind site was approximately 0.56 and the Nine Canyon wind plant was approximately 0.40 raptors per survey. Raptor use at the proposed nearby Kittitas Valley wind project site, was 1.01, however this was for only 20-minute surveys.

Raptor mortality at other newer generation wind plants is very low. The estimate of raptor mortality at the Foote Creek Rim Wind Plant (WY) is approximately 0.03 raptors per turbine per year based on a three-year study of 69 turbines (Young *et al*. 2003). No raptor mortality was observed at the Vansycle Wind Plant (Erickson *et al*. 2000) or the Klondike Wind Plant (Johnson *et al.* 2003) during the first years of study; and 0.001 raptors per turbine per year were found at the Buffalo Ridge Wind Plant (MN) during a four-year study (Erickson *et al*. 2001). Raptor mortality at the Stateline wind project (WA/OR) is one of the highest observed and is approximately 0.05 raptors per turbine per year based on an 18 month study (Erickson et al. 2003).

Considering these mortality results as well as raptor use estimates at these wind plants, it is estimated that potential raptor mortality at the proposed project would be approximately that of the Foote Creek Rim wind plant, or approximately 0.03 raptors per turbine per year. The Foote Creek Rim wind plant is the most similar to the Desert Claim site in terms of raptor use and it also has some similar topographic features. The Foote Creek Rim wind plant is located on a mesa with steep sloping sides. The eastern portion of the Desert Claim site also contains a steep slope feature that may influence raptor use (see Figure 2). Using the Foote Creek Rim raptor mortality rate, a range of approximately 3 to 4 raptor fatalities could occur per year at the Desert Claim wind project if 120 turbines are constructed.

5.2.3 Passerines

Passerines have been the most abundant avian fatality at other wind plants studied (see Johnson *et al.* 2000, Young *et al.* 2003, Erickson *et al.* 2000), 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 on-site, it is expected passerines would make up the largest proportion of fatalities. Common species such as European starling, western meadowlarks, and American robin (all confirmed casualties at other wind plants) would be most at risk. Nocturnal migrating species may also be affected, but would not be expected in large numbers based on data collected at other wind plants [i.e., no large mortality events documented at wind plants (Erickson *et al.* 2001)].

Based on post-construction mortality monitoring at other newer generation wind plants, passerine mortality has been somewhat variable. Projected impacts for the proposed project are primarily based on data collected at the Vansycle Wind Plant (Erickson *et al*. 2000), the Foote Creek Rim Wind Plant (Young *et al*. 2003), the Buffalo Ridge Wind Plant (Johnson *et al.* 2000); and the more recently studied Klondike (Johnson *et al.* 2003) and Stateline (Erickson et al. 2003) Wind Plants where fatality estimates have been made for all birds, including passerines, and adjusted for scavenging and searcher efficiency.

An extensive post-construction study of two wind plants on Buffalo Ridge (MN) with 350 total turbines was conducted from 1996 through 1999. Total annual mortality was estimated to average approximately 2.8 birds per turbine (Johnson *et al*. 2000). Based on a three year study at Foote Creek Rim (WY), the total annual mortality associated with 69 turbines was estimated to be approximately 1.5 birds per turbine per year (Young *et al.* 2003). At the Vansycle Wind Project, only 12 avian fatalities were located during the first year of operation of 38 turbines. Total estimated mortality was 24 birds per year or approximately 0.6 bird per turbine per year (Erickson *et al*. 2000). Estimates from the Klondike Wind Plant were 1.42 birds per turbine per year for all birds (Johnson *et al.* 2003) based on one year of study, and estimates for the Stateline Wind Plant for all birds was 1.7 birds per turbine per year based on the first 18 months of study (Erickson et al. 2003).

Actual levels of mortality that would result from the proposed project are unknown and could be higher or lower depending on patterns of movements through the area. The per turbine mortality rate for all birds for the proposed project is expected to be in the mid range or approximately 1.2 to 1.8 birds per turbine per year. If these estimates are applied to the proposed project, the range of potential bird mortality would be expected to fall between approximately 140 and 220 birds per year if 120 turbines are constructed. Because of the high use and diversity estimates by passerines in the study area, passerine fatalities are expected to comprise the majority of the avian mortality for the project.

Carcass search studies at Foote Creek Rim (WY) have found passerine casualties associated with guyed met towers. Based on searches of five permanent guyed met towers at Foote Creek Rim over a three-year period, it was estimated that these towers resulted in approximately 8.0 avian casualties per tower per year, the vast majority of which were passerines (Young *et al*. 2003). During searches of a free-standing met tower at the Klondike Wind Plant (OR), no avian fatalities were found after one-year of study (Johnson *et al.* 2003). As currently planned, the proposed project would have 4 permanent guyed met towers. Based on the result of the Foote Creek Rim study, these 4 towers could result in up to approximately 30 avian fatalities per year.

5.2.4 Waterfowl

Some waterfowl mortality has been documented at other wind plants. The Klondike wind plant in Oregon had relatively high use by Canada goose and two fatalities were found in the first year of monitoring (Johnson et al. 2003). The Buffalo Ridge wind plant in Minnesota also had relatively high waterfowl use with few mortalities (Johnson et al. 2000a). The most common waterfowl species observed in the project area was mallard although Canada goose and northern pintail were also seen in the winter and a variety of other species were seen incidentally in the study area (see Table 11). While mallards were seen year round, the majority of waterfowl use was during the winter season. Some waterfowl mortality could be expected, however, it would likely be with the most common species, mallard, and is not expected to be substantial. Based on the wind monitoring data from the site, the winter months are the least windy and therefore the turbines would be operating less than in the spring, summer, and fall. For example, on average during the months of December, January, and February, the percent of hours when turbines would be operating at 100% capacity is approximately 14.9%. In contrast, during the months of

June, July, and August the percent of hours of 100% operation would be approximately 45.5%, on average.

5.2.5 Other Groups/Species
Other avian groups (e.g., upland game birds, doves, shorebirds) occur in relatively low numbers within the study area and mortality would be expected to be low. Although common snipe occurred in low numbers as compared to other species, they appear to be abundant on site when compared to other wind sites. This species was often observed flying in the zone of risk yet it is unknown if this species is vulnerable to turbine collision. Other species only observed during migration may be at risk; however, mortality would be expected to be low given the low use estimates by other species.

5.3 Raptor Nesting

The total study area surveyed for raptor nests was approximately 52 square miles (134 km^2). Nest density for buteos (red-tailed hawk) in this area was approximately 0.28 nest/mi^2 (0.11 nest/km^2) and for all raptors (buteos, owls) was approximately 0.34nest/km^2 (0.13 nest/km^2). This index of raptor nest density is within the range of other wind plants that have been studied in the Oregon/Washington region. For example, raptor nest density within a 2-mile buffer around the Stateline Wind Plant (WA/OR) is 0.20 nest/mi^2 (0.08 nest/km^2) (URS and WEST 2001). Nest density within a 5-mile buffer around the proposed Maiden wind farm was approximately 0.16 nest/mi^2 (0.06 nest/km^2) (Young *et al*. 2002a) and nest density around the proposed Combine Hills wind plant (Umatilla County, Oregon) is approximately 0.24 nest/mi^2 (0.09 nest/km^2) (Young *et al.* 2002b).

The good raptor nesting habitat within the project area is along the Wilson Creek riparian corridor east of the site and along the numerous powerlines running through the site. The nests within the site, and therefore in closer proximity to the proposed turbines, may be more likely affected by the project through disturbance or displacement. Once a final project layout is established, the proximity of raptor nests to turbines can be determined.

5.4 Bald Eagles

The Kittitas Valley and Yakima River riparian corridor is wintering habitat for bald eagles. This area may be occupied by as many as 35-50 bald eagles based on the WDFW Priority Habitats and Species database. Winter bald eagle surveys and the winter fixed-point surveys documented bald eagle use in and around the proposed wind project. The primary period of occupation appears to be from approximately February through early April. No large communal roost sites were located during the surveys but it appears as if bald eagle may opportunistically roost in isolated trees near suitable foraging areas and along the Yakima River. Important winter foraging opportunities appear to be carrion (dead cows) from livestock operations in the valley and possibly winter killed big game. In addition, early spring calving operations provide foraging opportunities from the calving by-products (after birth) left in the fields. Most of the winter bald eagle use was concentrated south and east of the project site in areas with a large livestock presence; however, there were some observations in the project area. Currently the project area does not contain good winter foraging opportunities for bald eagles and they are not commonly attracted to the area.

Based on the fixed point surveys, actual winter use estimates for bald eagles were lower than other common raptors (red-tailed hawks, rough-legged hawks), however, they are still at risk of potential collision related fatalities from the wind plant. Since there appears to be little to attract bald eagles to the site, bald eagle exposure is most likely related to eagles passing through the project to adjacent foraging areas and their calculated exposure index was relatively low (see Table 7). In addition, wind speeds and duration at the site are typically lowest during the months of October through February but begin to pick up in March and April. During the early part of the bald eagle occupation period the wind turbines will not be operating as much as during the early spring. The highest wind speeds and duration at the site are during the summer and early fall periods when bald eagles are not present in the area. To date, there have been no reported bald eagle fatalities at wind plants (see Erickson et al. 2001). Potential bald eagle mortality from the project is expected to be very low but there is the possibility that it could occur.

5.5 Big Game Species

Mule deer was the only species of big game that was observed regularly on site. Mule deer were seen year round, however, there was an increase in the number of observations in the winter time. The WDFW maps the area as winter range for mule deer. Additional information from the WDFW, suggests that elk may also use the project area although apparently in very low numbers and an elk migration corridor has been identified which encroaches on the north portion of the project. Only one group of elk was observed northeast of the site during the study period.

There is little information regarding wind plant effects on big game species. The Foote Creek Rim Wind Plant (WY) appeared to have no effect on pronghorn (*Antilocapra americana*) (Johnson *et al.* 2000a). Pronghorn occurred in the area in low numbers and continued to use the wind plant area following construction of the project. It is expected that deer in the project area could potentially be disturbed by project construction and operation and maintenance. Deer that use the site occupy most vegetation types in the area. They were observed in the native grassland and riparian habitats as well as the shrub steppe areas. During the construction period, deer would likely be displaced from the project site due to the influx of humans and heavy construction equipment and associated disturbance. During standard O&M of the facility there may be temporary disturbances from vehicle and human traffic. Individual mule deer would likely seek more remote areas with less disturbance, such as the hills north of the project. Construction-related disturbance and displacement would be temporary in nature; O&M disturbance would also be temporary and for shorter periods of time. Because of the extent of suitable habitat in the region, temporary loss of habitat from project construction is considered a minor effect and once construction is complete it is expected that deer would become habituated to the wind turbines and again occupy and potentially seek un-hunted areas within the wind plant. Should the facility eventually result in a refuge for deer (and elk) due to reduced hunting pressure, seasonal use of the wind plant by big game may increase.

5.6 Vegetation Impacts

Based on a preliminary map showing proposed facility locations, the vegetation types that are expected to be impacted are primarily shrub steppe and grasslands. Most of the turbines would be located in these two habitat types. Associated linear facilities, such as roads and electric lines, are likely to cross other habitat types such as wet meadows and the riparian vegetation types. No facilitates are proposed for the pine forest vegetation type. Once a formal project layout is established, the extent of impacts to vegetation types can be determined.

Due to the absence of known populations within the study area, no project-related impacts are anticipated to any federally endangered, threatened, proposed, or candidate plant species. Likewise, no project-related impacts are predicted for any Washington State endangered, threatened, sensitive, or review plant species.

5.7 Mitigation and Monitoring

As currently proposed the wind project will be constructed in several vegetation types, including grassland, shrub steppe, and hay meadows. Based on the final wind project layout, native steppe vegetation types will be affected by the project. Mitigation and monitoring recommendations are therefore based on impacts to this vegetation type as well as potential avian resources. The following mitigation and monitoring recommendations are based primarily on measures that have been implemented at other newer generation wind plants and in particular those in the Washington and Oregon region.

5.7.1 Technical Advisory Committee

It is recommended that a Technical Advisory Committee (TAC) be formed to implement and evaluate a mitigation and monitoring program and determine the need for further studies or mitigation measures once the project is operational. The TAC should be composed of representatives from Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Kittitas County, landowners, and the project owner/developer. The role of the TAC will be to determine and coordinate appropriate mitigation measures, monitor impacts to wildlife and vegetation, and address issues that arise regarding wildlife impacts during operation of the wind plant.

5.7.2 Mitigation Measures

The primary impacts associated with the project are expected to be loss of shrub steppe habitat, fatalities of birds, and potential displacement effects on mule deer. The following are potential mitigation measures for these impacts:

- Sensitive wildlife areas such as the riparian corridors and raptor nest sites should be mapped, flagged, and/or identified to all contractors working on-site and should be designated as no disturbance zones during the construction phase.

- Measures should be taken to prevent the spread of noxious weeds such as promptly re-seeding all disturbed areas with native plant mixes and using hay bales which are certified as weed free.

- During project construction, best management practices should be employed to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint.

- A site management plan should be developed to, at a minimum, identify sensitive wildlife areas (e.g., raptor nests), provide adequate on-site waste disposal, and establish fire management and erosion control procedures.

- Raptor nests within ½ mile of construction areas should be monitored for activity prior to construction to determine the need for construction timing restrictions around active nests.

- All power and communication lines on-site should be buried underground where feasible.

- All overhead power line poles should be equipped with anti perching devices.

- Permanent met towers on-site should be equipped with Bird Flight Diverters to minimize the potential for avian collisions with guy wires.

- Once the final turbine layout is available, consideration should be given to setting turbine locations back at least 50 meters from the rim edge of steep slopes within the E1/2 of Sections 26 and 35, T19N, R18E.

5.7.3 Monitoring

A post construction monitoring study is recommended for the project to quantify impacts to avian species and assess the need for additional mitigation measures. The post-construction monitoring plan should be developed in coordination with the TAC. The monitoring plan for the project should, at a minimum, contain the following components:

- One year of standardized fatality monitoring involving carcass searches, scavenger removal trials, and searcher efficiency trials.

- A standardized procedure for operations and maintenance personnel for reporting incidental fatalities or injured birds for the life of the project.

The protocol for the fatality monitoring study should be similar to protocols used at other newer generation wind plants in northeastern Oregon and southwestern Washington. In addition, it is also recommended that consideration be given to developing, in cooperation with other industry participants, a focused monitoring study that addresses a specific question regarding impacts from wind plants. For example, the effects of different lighting schemes on turbines, or bird flight diverters on guy wires, on avian mortality has not been experimentally tested. If an operational monitoring study is required, a simple study design alternating treatments on turbines or met towers could address these issues in detail.

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Table 1. Avian species observed during fixed-point surveys (March 22, 2002 – March 13, 2003).

Species/Group	Spring		Summer		Fall		Winter		Total	
	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups
Waterfowl/Waterbirds	**47**	**8**	**5**	**4**	**1**	**1**	**479**	**15**	**532**	**28**
Canada goose	0	0	0	0	0	0	32	2	32	2
mallard	47	8	2	2	0	0	443	12	492	22
northern pintail	0	0	0	0	0	0	4	1	4	1
great blue heron	0	0	3	2	1	1	0	0	4	3
Shorebirds	**54**	**37**	**18**	**14**	**4**	**3**	**8**	**3**	**84**	**57**
killdeer	40	23	12	8	4	3	8	3	64	37
common snipe	14	14	6	6	0	0	0	0	20	20
Corvids	**38**	**29**	**12**	**9**	**33**	**23**	**110**	**53**	**193**	**114**
American crow	1	1	2	2	0	0	5	2	8	5
black-billed magpie	21	15	5	3	19	16	55	24	100	58
common raven	16	13	5	4	14	7	50	27	85	51
Upland Gamebirds	**4**	**3**	**9**	**6**	**31**	**5**	**50**	**7**	**94**	**21**
California quail	0	0	9	6	31	5	44	5	84	16
gray partridge	2	1	0	0	0	0	5	1	7	2
ring-necked pheasant	2	2	0	0	0	0	1	1	3	3
Doves										
mourning dove	0	0	3	2	2	2	0	0	5	4
Raptors	**57**	**55**	**30**	**29**	**39**	**36**	**67**	**65**	**193**	**185**
Accipiters	*1*	*1*	*0*	*0*	*5*	*5*	*3*	*3*	*9*	*9*
sharp-shinned hawk	0	0	0	0	3	3	0	0	3	3
Cooper's hawk	1	1	0	0	2	2	3	3	6	6
Buteos	*33*	*33*	*14*	*13*	*8*	*8*	*41*	*41*	*96*	*95*
red-tailed hawk	19	19	12	11	6	6	23	23	60	59
rough-legged hawk	14	14	0	0	2	2	18	18	34	34
unidentified buteo	0	0	2	2	0	0	0	0	2	2
Eagles	*2*	*2*	*0*	*0*	*0*	*0*	*12*	*10*	*14*	*12*
bald eagle	2	2	0	0	0	0	11	9	13	11
golden eagle	0	0	0	0	0	0	1	1	1	1
Falcons	*9*	*8*	*8*	*8*	*6*	*5*	*3*	*3*	*26*	*24*
American kestrel	9	8	7	7	6	5	1	1	23	21
prairie falcon	0	0	1	1	0	0	2	2	3	3
Other Raptors	*12*	*11*	*8*	*8*	*20*	*18*	*8*	*8*	*48*	*45*
great-horned owl	3	3	0	0	1	1	3	3	7	7
northern harrier	4	3	0	0	14	13	5	5	23	21
turkey vulture	5	5	8	8	5	4	0	0	18	17
Passerines	**500**	**112**	**320**	**122**	**497**	**73**	**1558**	**85**	**2875**	**392**
American goldfinch	0	0	17	6	26	5	84	6	127	17
American pipit	0	0	0	0	11	2	0	0	11	2
American robin	165	7	13	5	132	14	225	17	535	43
bank swallow	4	2	0	0	0	0	0	0	4	2

Table 1. Avian species observed during fixed-point surveys (March 22, 2002 – March 13, 2003).

Species/Group	Spring		Summer		Fall		Winter		Total	
	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups
barn swallow	8	3	10	2	8	1	0	0	26	6
black-capped chickadee	0	0	1	1	4	2	14	5	19	8
Brewer's blackbird	40	9	69	19	0	0	0	0	109	28
Brewer's sparrow	0	0	3	2	0	0	0	0	3	2
Bullock's oriole	4	3	4	4	0	0	0	0	8	7
cedar waxwing	2	1	12	4	13	1	0	0	27	6
chipping sparrow	1	1	0	0	0	0	0	0	1	1
dark-eyed junco	0	0	0	0	11	2	104	7	115	9
eastern kingbird	1	1	4	4	1	1	0	0	6	6
European starling	65	6	76	8	186	6	883	13	1210	33
golden-crowned kinglet	0	0	0	0	4	1	0	0	4	1
gray-crowned rosy finch	0	0	0	0	9	2	0	0	9	2
horned lark	8	3	5	3	21	10	19	9	53	25
house finch	0	0	0	0	0	0	78	2	78	2
house wren	1	1	0	0	0	0	0	0	1	1
lark sparrow	0	0	2	1	0	0	0	0	2	1
Lincoln's sparrow	0	0	0	0	1	1	0	0	1	1
mountain bluebird	2	1	5	3	5	1	1	1	13	6
Nashville Warbler	3	1	0	0	0	0	0	0	3	1
northern shrike	0	0	0	0	2	2	8	8	10	10
orange-crowned warbler	2	1	0	0	0	0	0	0	2	1
red-winged blackbird	44	6	0	0	0	0	5	3	49	9
ruby-crowned kinglet	0	0	0	0	2	1	1	1	3	2
sage thrasher	3	3	10	10	0	0	0	0	13	13
savannah sparrow	0	0	0	0	8	2	0	0	8	2
song sparrow	2	2	1	1	0	0	0	0	3	3
spotted towhee	5	2	1	1	2	1	2	1	10	5
tree swallow	0	0	7	4	0	0	0	0	7	4
unidentified empidonax	2	1	0	0	0	0	0	0	2	1
unidentified finch	0	0	7	1	0	0	120	1	127	2
unidentified passerine	0	0	0	0	0	0	3	1	3	1
unidentified swallow	0	0	3	1	1	1	0	0	4	2
varied thrush	0	0	0	0	0	0	1	1	1	1
vesper sparrow	27	15	29	17	8	3	0	0	64	35
violet-green swallow	2	1	0	0	0	0	0	0	2	1
western kingbird	4	1	7	4	0	0	0	0	11	5
western meadowlark	91	38	31	20	28	10	9	8	159	76
western tanager	1	1	3	1	0	0	0	0	4	2
white-crowned sparrow	0	0	0	0	14	4	0	0	14	4
winter wren	0	0	0	0	0	0	1	1	1	1
yellow-rumped warbler	13	2	0	0	0	0	0	0	13	2
Other	**4**	**4**	**2**	**2**	**1**	**1**	**9**	**8**	**16**	**15**
common nighthawk	0	0	1	1	0	0	0	0	1	1
downy woodpecker	1	1	0	0	0	0	0	0	1	1
northern flicker	3	3	0	0	1	1	9	8	13	12
unid'd. hummingbird	0	0	1	1	0	0	0	0	1	1
Total	**704**	**248**	**399**	**188**	**608**	**144**	**2281**	**236**	**3992**	**816**

Table 2. Estimated mean use (number of observations per 30-minute survey) for species observed within 800m of the survey point for fixed-point surveys (March 22, 2002 – March 13, 2003).

	Spring Use		Summer Use		Fall Use		Winter Use		Overall Use	
Species/Group	mean	st dev	mean	st dev	mean	st dev	mean	st dev	mean	st dev
Waterfowl/Waterbird	**1.306**	**1.853**	**0.156**	**0.297**	**0.031**	**0.088**	**7.321**	**11.61**	**2.605**	**7.047**
Canada goose	0.000	0.000	0.000	0.000	0.000	0.000	0.524	1.173	0.160	0.673
mallard	1.306	1.853	0.063	0.177	0.000	0.000	6.736	10.69	2.399	6.499
northern pintail	0.000	0.000	0.000	0.000	0.000	0.000	0.061	0.201	0.019	0.111
great blue heron	0.000	0.000	0.094	0.265	0.031	0.088	0.000	0.000	0.028	0.131
Shorebirds	**1.537**	**0.659**	**0.573**	**1.072**	**0.125**	**0.231**	**0.121**	**0.270**	**0.576**	**0.842**
killdeer	1.148	0.500	0.385	0.653	0.125	0.231	0.121	0.270	0.438	0.598
common snipe	0.389	0.546	0.188	0.438	0.000	0.000	0.000	0.000	0.139	0.366
Corvids	**1.120**	**0.617**	**0.375**	**0.443**	**1.000**	**1.150**	**1.691**	**0.829**	**1.102**	**0.905**
American crow	0.028	0.083	0.063	0.116	0.000	0.000	0.076	0.251	0.044	0.152
black-billed magpie	0.630	0.415	0.156	0.297	0.563	0.417	0.833	0.569	0.572	0.496
common raven	0.463	0.334	0.156	0.229	0.438	0.853	0.782	0.612	0.487	0.584
Upland Gamebirds	**0.111**	**0.182**	**0.281**	**0.432**	**0.969**	**1.925**	**0.797**	**1.264**	**0.549**	**1.169**
California quail	0.000	0.000	0.281	0.432	0.969	1.925	0.706	1.156	0.494	1.140
gray partridge	0.056	0.167	0.000	0.000	0.000	0.000	0.076	0.251	0.037	0.160
ring-necked pheasant	0.056	0.110	0.000	0.000	0.000	0.000	0.015	0.050	0.019	0.063
Doves										
mourning dove	0.000	0.000	0.094	0.186	0.063	0.116	0.000	0.000	0.035	0.106
Raptors/Vultures	**1.667**	**1.166**	**0.823**	**0.627**	**1.156**	**0.681**	**0.964**	**0.448**	**1.151**	**0.802**
Accipiters	*0.028*	*0.083*	*0.000*	*0.000*	*0.156*	*0.229*	*0.052*	*0.089*	*0.057*	*0.132*
sharp-shinned hawk	0.000	0.000	0.000	0.000	0.094	0.186	0.000	0.000	0.021	0.092
Cooper's hawk	0.028	0.083	0.000	0.000	0.063	0.116	0.052	0.089	0.037	0.084
Buteos	*0.954*	*1.075*	*0.385*	*0.324*	*0.240*	*0.191*	*0.609*	*0.422*	*0.563*	*0.644*
red-tailed hawk	0.565	0.422	0.385	0.324	0.188	0.177	0.333	0.217	0.370	0.315
rough-legged hawk	0.389	0.719	0.000	0.000	0.052	0.099	0.276	0.326	0.193	0.419
Eagles	*0.056*	*0.110*	*0.000*	*0.000*	*0.000*	*0.000*	*0.130*	*0.266*	*0.054*	*0.162*
bald eagle	0.056	0.110	0.000	0.000	0.000	0.000	0.115	0.223	0.049	0.140
golden eagle	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.050	0.005	0.028
Falcons										
American kestrel	0.269	0.246	0.219	0.281	0.188	0.372	0.015	0.050	0.162	0.262
prairie falcon	0.000	0.000	0.031	0.088	0.000	0.000	0.030	0.067	0.016	0.056
Other Raptors										
great-horned owl	0.093	0.141	0.000	0.000	0.031	0.088	0.048	0.083	0.045	0.096
northern harrier	0.130	0.229	0.000	0.000	0.385	0.324	0.079	0.158	0.142	0.244
turkey vulture	0.139	0.182	0.188	0.177	0.156	0.297	0.000	0.000	0.111	0.193
Passerines	**14.898**	**10.41**	**10.28**	**8.747**	**14.87**	**16.21**	**24.41**	**32.31**	**16.774**	**20.51**
American goldfinch	0.000	0.000	0.563	0.637	0.656	0.972	1.279	2.853	0.662	1.682
American pipit	0.000	0.000	0.000	0.000	0.344	0.640	0.000	0.000	0.076	0.321
American robin	4.583	8.544	0.417	0.496	3.760	3.681	3.730	5.016	3.214	5.390
bank swallow	0.148	0.294	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.155
barn swallow	0.269	0.580	0.313	0.637	0.250	0.707	0.000	0.000	0.192	0.525

Table 2. Estimated mean use (number of observations per 30-minute survey) for species observed within 800m of the survey point for fixed-point surveys (March 22, 2002 – March 13, 2003).

	Spring Use		Summer Use		Fall Use		Winter Use		Overall Use	
Species/Group	mean	st dev	mean	st dev	mean	st dev	mean	st dev	mean	st dev
black-capped chickadee	0.000	0.000	0.031	0.088	0.104	0.198	0.218	0.320	0.097	0.216
Brewer's blackbird	1.361	2.154	2.219	2.883	0.000	0.000	0.000	0.000	0.833	1.900
Brewer's sparrow	0.000	0.000	0.094	0.186	0.000	0.000	0.000	0.000	0.021	0.092
Bullock's oriole	0.148	0.444	0.135	0.199	0.000	0.000	0.000	0.000	0.067	0.241
cedar waxwing	0.074	0.222	0.375	0.423	0.406	1.149	0.000	0.000	0.192	0.587
chipping sparrow	0.028	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.042
dark-eyed junco	0.000	0.000	0.000	0.000	0.281	0.525	1.706	2.839	0.584	1.715
eastern kingbird	0.037	0.111	0.125	0.189	0.031	0.088	0.000	0.000	0.044	0.117
European starling	2.130	3.876	2.375	2.961	5.813	11.05	13.45	29.42	6.464	17.35
golden-crowned kinglet	0.000	0.000	0.000	0.000	0.125	0.354	0.000	0.000	0.028	0.167
gray-crowned rosy finch	0.000	0.000	0.000	0.000	0.281	0.795	0.000	0.000	0.063	0.375
horned lark	0.222	0.423	0.167	0.236	0.615	0.611	0.300	0.359	0.321	0.437
house finch	0.000	0.000	0.000	0.000	0.000	0.000	1.409	4.510	0.431	2.499
house wren	0.028	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.042
lark sparrow	0.000	0.000	0.063	0.177	0.000	0.000	0.000	0.000	0.014	0.083
Lincoln's sparrow	0.000	0.000	0.000	0.000	0.031	0.088	0.000	0.000	0.007	0.042
mountain bluebird	0.056	0.167	0.177	0.269	0.156	0.442	0.015	0.050	0.093	0.256
Nashville Warbler	0.083	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.125
northern shrike	0.000	0.000	0.000	0.000	0.052	0.099	0.133	0.125	0.052	0.099
orange-crowned warbler	0.056	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.083
red-winged blackbird	1.222	2.185	0.000	0.000	0.000	0.000	0.076	0.156	0.329	1.172
ruby-crowned kinglet	0.000	0.000	0.000	0.000	0.063	0.177	0.015	0.050	0.019	0.087
sage thrasher	0.083	0.125	0.344	0.297	0.000	0.000	0.000	0.000	0.097	0.201
savannah sparrow	0.000	0.000	0.000	0.000	0.250	0.707	0.000	0.000	0.056	0.333
song sparrow	0.056	0.110	0.031	0.088	0.000	0.000	0.000	0.000	0.021	0.070
spotted towhee	0.139	0.417	0.031	0.088	0.063	0.177	0.030	0.101	0.065	0.229
tree swallow	0.000	0.000	0.240	0.280	0.000	0.000	0.000	0.000	0.053	0.161
unid'd empidonax	0.056	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.083
unidentified finch	0.000	0.000	0.219	0.619	0.000	0.000	1.818	6.030	0.604	3.338
unidentified passerine	0.000	0.000	0.000	0.000	0.000	0.000	0.055	0.181	0.017	0.100
unidentified swallow	0.000	0.000	0.094	0.265	0.031	0.088	0.000	0.000	0.028	0.131
varied thrush	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.060	0.006	0.033
vesper sparrow	0.861	0.847	0.938	0.691	0.250	0.535	0.000	0.000	0.479	0.697
violet-green swallow	0.056	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.083
western kingbird	0.148	0.444	0.219	0.248	0.000	0.000	0.000	0.000	0.086	0.258
western meadowlark	2.657	1.928	1.021	0.950	0.875	1.150	0.136	0.306	1.127	1.500
western tanager	0.037	0.111	0.094	0.265	0.000	0.000	0.000	0.000	0.030	0.181
white-crowned sparrow	0.000	0.000	0.000	0.000	0.438	0.741	0.000	0.000	0.097	0.379
winter wren	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.050	0.005	0.028
yellow-rumped warbler	0.361	1.083	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.542
Other Birds	**0.111**	**0.182**	**0.063**	**0.116**	**0.031**	**0.088**	**0.152**	**0.216**	**0.095**	**0.165**
common nighthawk	0.000	0.000	0.031	0.088	0.000	0.000	0.000	0.000	0.007	0.042
downy woodpecker	0.028	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.042
northern flicker	0.083	0.177	0.000	0.000	0.031	0.088	0.152	0.216	0.074	0.160
unid'd hummingbird	0.000	0.000	0.031	0.088	0.000	0.000	0.000	0.000	0.007	0.042
Overall										

Table 3. Estimated percent composition (mean use divided by total use for all species) for each species observed within 800 m of the survey point (March 22, 2002 – March 13, 2003).

Species/Group	Spring % Comp	Summer % Comp	Fall % Comp	Winter % Comp	Overall % Comp
Waterfowl/Waterbirds	**6.29**	**1.24**	**0.17**	**20.65**	**11.38**
Canada goose	0.00	0.00	0.00	1.48	0.70
mallard	6.29	0.49	0.00	19.00	10.48
northern pintail	0.00	0.00	0.00	0.17	0.08
great blue heron	0.00	0.74	0.17	0.00	0.12
Shorebirds	**7.41**	**4.53**	**0.68**	**0.34**	**2.52**
killdeer	5.53	3.05	0.68	0.34	1.91
common snipe	1.87	1.48	0.00	0.00	0.61
Corvids	**5.40**	**2.97**	**5.48**	**4.77**	**4.82**
American crow	0.13	0.49	0.00	0.21	0.19
black-billed magpie	3.03	1.24	3.08	2.35	2.50
common raven	2.23	1.24	2.40	2.20	2.13
Upland Gamebirds	**0.54**	**2.22**	**5.31**	**2.25**	**2.40**
California quail	0.00	2.22	5.31	1.99	2.16
gray partridge	0.27	0.00	0.00	0.21	0.16
ring-necked pheasant	0.27	0.00	0.00	0.04	0.08
Doves					
mourning dove	0.00	0.74	0.34	0.00	0.15
Raptors	**8.03**	**6.51**	**6.34**	**2.72**	**5.03**
Accipiters	*0.13*	*0.00*	*0.86*	*0.15*	*0.25*
sharp-shinned hawk	0.13	0.00	0.34	0.15	0.16
Cooper’s hawk	0.00	0.00	0.51	0.00	0.09
Buteos	*4.60*	*3.05*	*1.31*	*1.72*	*2.46*
red-tailed hawk	2.72	3.05	1.03	0.94	1.62
rough-legged hawk	1.87	0.00	0.29	0.78	0.84
Eagles	*0.27*	*0.00*	*0.00*	*0.37*	*0.23*
bald eagle	0.27	0.00	0.00	0.32	0.21
golden eagle	0.00	0.00	0.00	0.04	0.02
Falcons					
American kestrel	1.29	1.73	1.03	0.04	0.71
prairie falcon	0.00	0.25	0.00	0.09	0.07
Other Raptors					
great horned owl	0.45	0.00	0.17	0.14	0.20
northern harrier	0.62	0.00	2.11	0.22	0.62
turkey vulture	0.67	1.48	0.86	0.00	0.49
Passerines	**71.80**	**81.30**	**81.51**	**68.85**	**73.29**
American goldfinch	0.00	4.45	3.60	3.61	2.89
American pipit	0.00	0.00	1.88	0.00	0.33
American robin	22.09	3.29	20.61	10.52	14.04
bank swallow	0.71	0.00	0.00	0.00	0.16
barn swallow	1.29	2.47	1.37	0.00	0.84

Table 3. Estimated percent composition (mean use divided by total use for all species) for each species observed within 800 m of the survey point (March 22, 2002 – March 13, 2003).

Species/Group	Spring % Comp	Summer % Comp	Fall % Comp	Winter % Comp	Overall % Comp
black-capped chickadee	0.00	0.25	0.57	0.62	0.42
Brewer's blackbird	6.56	17.55	0.00	0.00	3.64
Brewer's sparrow	0.00	0.74	0.00	0.00	0.09
Bullock's oriole	0.71	1.07	0.00	0.00	0.29
cedar waxwing	0.36	2.97	2.23	0.00	0.84
chipping sparrow	0.13	0.00	0.00	0.00	0.03
dark-eyed junco	0.00	0.00	1.54	4.81	2.55
eastern kingbird	0.18	0.99	0.17	0.00	0.19
European starling	10.26	18.78	31.85	37.95	28.24
golden-crowned kinglet	0.00	0.00	0.68	0.00	0.12
gray-crowned rosy finch	0.00	0.00	1.54	0.00	0.27
horned lark	1.07	1.32	3.37	0.85	1.40
house finch	0.00	0.00	0.00	3.97	1.88
house wren	0.13	0.00	0.00	0.00	0.03
lark sparrow	0.00	0.49	0.00	0.00	0.06
Lincoln's sparrow	0.00	0.00	0.17	0.00	0.03
mountain bluebird	0.27	1.40	0.86	0.04	0.40
Nashville warbler	0.40	0.00	0.00	0.00	0.09
northern shrike	0.00	0.00	0.29	0.38	0.23
orange-crowned warbler	0.27	0.00	0.00	0.00	0.06
red-winged blackbird	5.89	0.00	0.00	0.21	1.44
ruby-crowned kinglet	0.00	0.00	0.34	0.04	0.08
sage thrasher	0.40	2.72	0.00	0.00	0.42
savannah sparrow	0.00	0.00	1.37	0.00	0.24
song sparrow	0.27	0.25	0.00	0.00	0.09
spotted towhee	0.67	0.25	0.34	0.09	0.28
tree swallow	0.00	1.89	0.00	0.00	0.23
unidentified empidonax	0.27	0.00	0.00	0.00	0.06
unidentified finch	0.00	1.73	0.00	5.13	2.64
unidentified passerine	0.00	0.00	0.00	0.15	0.07
unidentified swallow	0.00	0.74	0.17	0.00	0.12
varied thrush	0.00	0.00	0.00	0.05	0.02
vesper sparrow	4.15	7.41	1.37	0.00	2.09
violet-green swallow	0.27	0.00	0.00	0.00	0.06
western kingbird	0.71	1.73	0.00	0.00	0.37
western meadowlark	12.81	8.07	4.79	0.38	4.93
western tanager	0.18	0.74	0.00	0.00	0.13
white-crowned sparrow	0.00	0.00	2.40	0.00	0.42
winter wren	0.00	0.00	0.00	0.04	0.02
yellow-rumped warbler	1.74	0.00	0.00	0.00	0.39
Other Birds	**0.54**	**0.49**	**0.17**	**0.43**	**0.41**
common nighthawk	0.00	0.25	0.00	0.00	0.03
downy woodpecker	0.13	0.00	0.00	0.00	0.03
northern flicker	0.40	0.00	0.17	0.43	0.32
unidentified hummingbird	0.00	0.25	0.00	0.00	0.03

Table 4. **Estimated frequency of occurrence (percent of surveys species/group is recorded) for each species observed within 800 m of the survey point (March 22, 2002 – March 13, 2003).**

Species/Group	Spring Freq.	Summer Freq.	Fall Freq.	Winter Freq.	Overall Freq. Occur.
Waterfowl/Waterbirds	**19.44**	**9.38**	**3.13**	**14.55**	**12.08**
Canada goose	0.00	0.00	0.00	3.33	1.02
mallard	19.44	3.13	0.00	11.21	8.98
northern pintail	0.00	0.00	0.00	1.52	0.46
great blue heron	0.00	6.25	3.13	0.00	2.08
Shorebirds	**61.11**	**19.79**	**6.25**	**4.55**	**22.45**
killdeer	58.33	19.79	6.25	4.55	21.76
common snipe	22.22	15.63	0.00	0.00	9.03
Corvids	**58.33**	**21.88**	**50.00**	**52.42**	**46.57**
American crow	2.78	6.25	0.00	3.03	3.01
black-billed magpie	40.74	9.38	37.50	31.82	30.32
common raven	29.63	9.38	18.75	37.88	25.23
Upland Gamebirds	**8.33**	**18.75**	**15.63**	**10.91**	**13.06**
California quail	0.00	18.75	15.63	7.88	10.05
gray partridge	2.78	0.00	0.00	1.52	1.16
ring-necked pheasant	5.56	0.00	0.00	1.52	1.85
Doves					
mourning dove	0.00	6.25	6.25	0.00	2.78
Raptors	**72.22**	**47.92**	**60.42**	**53.94**	**58.61**
Accipiters	*2.78*	*0.00*	*12.50*	*5.15*	*5.05*
sharp-shinned hawk	2.78	0.00	6.25	5.15	3.66
Cooper's hawk	0.00	0.00	6.25	0.00	1.39
Buteos	**52.78**	**29.17**	**20.83**	**39.39**	**36.34**
red-tailed hawk	47.22	29.17	15.63	25.45	29.54
rough-legged hawk	25.00	0.00	5.21	20.00	13.52
Eagles	*5.56*	*0.00*	*0.00*	*6.67*	*3.43*
bald eagle	5.56	0.00	0.00	6.67	3.43
golden eagle	0.00	0.00	0.00	1.52	0.46
Falcons					
American kestrel	20.37	18.75	12.50	1.52	12.50
prairie falcon	0.00	3.13	0.00	3.03	1.62
Other Raptors					
great horned owl	9.26	0.00	3.13	4.85	4.49
northern harrier	9.26	0.00	30.21	7.88	11.44
turkey vulture	11.11	18.75	9.38	0.00	9.03
Passerines	**91.67**	**84.38**	**79.17**	**65.15**	**79.17**
American goldfinch	0.00	19.79	14.58	9.39	10.51
American pipit	0.00	0.00	6.25	0.00	1.39
American robin	19.44	16.67	31.25	23.64	22.73
bank swallow	7.41	0.00	0.00	0.00	1.85
barn swallow	10.19	6.25	3.13	0.00	4.63

Table 4. Estimated frequency of occurrence (percent of surveys species/group is recorded) for each species observed within 800 m of the survey point (March 22, 2002 – March 13, 2003).

Species/Group	Spring Freq.	Summer Freq.	Fall Freq.	Winter Freq.	Overall Freq. Occur.
black-capped chickadee	0.00	3.13	5.21	7.88	4.26
Brewer's blackbird	21.30	39.58	0.00	0.00	14.12
Brewer's sparrow	0.00	6.25	0.00	0.00	1.39
Bullock's oriole	7.41	13.54	0.00	0.00	4.86
cedar waxwing	3.70	12.50	3.13	0.00	4.40
chipping sparrow	2.78	0.00	0.00	0.00	0.69
dark-eyed junco	0.00	0.00	5.21	10.00	4.21
eastern kingbird	3.70	12.50	3.13	0.00	4.40
European starling	15.74	15.63	12.50	19.09	16.02
golden-crowned kinglet	0.00	0.00	3.13	0.00	0.69
gray-crowned rosy finch	0.00	0.00	6.25	0.00	1.39
horned lark	8.33	10.42	29.17	12.42	14.68
house finch	0.00	0.00	0.00	3.33	1.02
house wren	2.78	0.00	0.00	0.00	0.69
lark sparrow	0.00	3.13	0.00	0.00	0.69
Lincoln's sparrow	0.00	0.00	3.13	0.00	0.69
mountain bluebird	2.78	10.42	3.13	1.52	4.17
Nashville warbler	2.78	0.00	0.00	0.00	0.69
northern shrike	0.00	0.00	5.21	13.33	5.23
orange-crowned warbler	2.78	0.00	0.00	0.00	0.69
red-winged blackbird	13.89	0.00	0.00	4.55	4.86
ruby-crowned kinglet	0.00	0.00	3.13	1.52	1.16
sage thrasher	8.33	27.08	0.00	0.00	8.10
savannah sparrow	0.00	0.00	6.25	0.00	1.39
song sparrow	5.56	3.13	0.00	0.00	2.08
spotted towhee	5.56	3.13	3.13	1.52	3.24
tree swallow	0.00	13.54	0.00	0.00	3.01
unidentified empidonax	2.78	0.00	0.00	0.00	0.69
unidentified finch	0.00	3.13	0.00	1.52	1.16
unidentified passerine	0.00	0.00	0.00	1.82	0.56
unidentified swallow	0.00	3.13	3.13	0.00	1.39
varied thrush	0.00	0.00	0.00	1.82	0.56
vesper sparrow	40.74	39.58	6.25	0.00	20.37
violet-green swallow	2.78	0.00	0.00	0.00	0.69
western kingbird	3.70	12.50	0.00	0.00	3.70
western meadowlark	80.56	46.88	25.00	9.09	38.89
western tanager	3.70	3.13	0.00	0.00	1.66
white-crowned sparrow	0.00	0.00	9.38	0.00	2.08
winter wren	0.00	0.00	0.00	1.52	0.46
yellow-rumped warbler	5.56	0.00	0.00	0.00	1.39
Other Birds	**11.11**	**6.25**	**3.13**	**13.64**	**9.03**
common nighthawk	0.00	3.13	0.00	0.00	0.69
downy woodpecker	2.78	0.00	0.00	0.00	0.69
northern flicker	8.33	0.00	3.13	13.64	6.94
unidentified hummingbird	0.00	3.13	0.00	0.00	0.69

Table 5. Flight characteristics of bird species observed during fixed-point surveys.

Species/Group	Number groups flying	Number birds flying	Percent of birds flying	<25 m	25-125 m	> 125 m
American pipit	2	11	100.00	0.00	100.00	0.00
gray-crowned rosy finch	2	9	100.00	0.00	100.00	0.00
northern pintail	1	4	100.00	0.00	100.00	0.00
unidentified passerine	1	3	100.00	0.00	100.00	0.00
violet-green swallow	1	2	100.00	0.00	100.00	0.00
common nighthawk	1	1	100.00	0.00	100.00	0.00
golden eagle	1	1	100.00	0.00	100.00	0.00
common snipe	14	14	70.00	0.00	100.00	0.00
Canada goose	1	13	40.63	0.00	100.00	0.00
unidentified finch	2	127	100.00	5.51	94.49	0.00
mallard	19	483	98.17	6.83	93.17	0.00
western kingbird	4	7	63.64	14.29	85.71	0.00
bald eagle	8	9	69.23	11.11	77.78	11.11
unidentified swallow	2	4	100.00	25.00	75.00	0.00
red-tailed hawk	47	48	80.00	22.92	72.92	4.17
European starling	26	1059	87.52	32.29	67.71	0.00
prairie falcon	3	3	100.00	33.33	66.67	0.00
sharp-shinned hawk	3	3	100.00	33.33	66.67	0.00
turkey vulture	17	18	100.00	33.33	61.11	5.56
rough-legged hawk	24	24	75.00	45.83	54.17	0.00
bank swallow	2	4	100.00	50.00	50.00	0.00
great blue heron	3	4	100.00	50.00	50.00	0.00
unidentified buteo	2	2	100.00	50.00	50.00	0.00
American robin	28	462	86.36	51.73	48.27	0.00
Cooper's hawk	5	5	83.33	60.00	40.00	0.00
common raven	38	67	78.82	47.76	38.81	13.43
American kestrel	19	21	91.30	66.67	33.33	0.00
barn swallow	6	26	100.00	69.23	30.77	0.00
American goldfinch	11	49	38.58	71.43	28.57	0.00
killdeer	24	49	76.56	73.47	26.53	0.00
red-winged blackbird	3	13	26.53	76.92	23.08	0.00
cedar waxwing	5	23	85.19	78.26	21.74	0.00
Brewer's blackbird	23	96	88.07	80.21	19.79	0.00
eastern kingbird	6	6	100.00	83.33	16.67	0.00
horned lark	8	24	45.28	83.33	16.67	0.00
black-billed magpie	43	74	74.00	85.14	14.86	0.00
northern harrier	19	21	91.30	85.71	14.29	0.00
western meadowlark	21	43	27.74	97.67	2.33	0.00
house finch	2	78	100.00	100.0	0.00	0.00
savannah sparrow	2	8	100.00	100.0	0.00	0.00
mourning dove	4	5	100.00	100.0	0.00	0.00
lark sparrow	1	2	100.00	100.0	0.00	0.00
Lincoln's sparrow	1	1	100.00	100.0	0.00	0.00
downy woodpecker	1	1	100.00	100.0	0.00	0.00
unid'd hummingbird	1	1	100.00	100.0	0.00	0.00
Bullock's oriole	6	7	87.50	100.0	0.00	0.00
mountain bluebird	5	11	84.62	100.0	0.00	0.00

Table 5. Flight characteristics of bird species observed during fixed-point surveys.

Species/Group	Number groups flying	Number birds flying	Percent of birds flying	<25 m	25-125 m	> 125 m
western tanager	1	3	75.00	100.0	0.00	0.00
gray partridge	1	5	71.43	100.0	0.00	0.00
tree swallow	3	5	71.43	100.0	0.00	0.00
northern shrike	7	7	70.00	100.0	0.00	0.00
dark-eyed junco	3	60	52.17	100.0	0.00	0.00
American crow	2	4	50.00	100.0	0.00	0.00
spotted towhee	2	4	40.00	100.0	0.00	0.00
yellow-rumped warbler	1	5	38.46	100.0	0.00	0.00
sage thrasher	4	4	33.33	100.0	0.00	0.00
northern flicker	3	4	30.77	100.0	0.00	0.00
white-crowned sparrow	2	4	28.57	100.0	0.00	0.00
vesper sparrow	7	14	21.88	100.0	0.00	0.00
black-capped chickadee	1	2	10.53	100.0	0.00	0.00
Brewer's sparrow	0	0	0.00	N/A	N/A	N/A
California quail	0	0	0.00	N/A	N/A	N/A
Nashville warbler	0	0	0.00	N/A	N/A	N/A
chipping sparrow	0	0	0.00	N/A	N/A	N/A
golden-crowned kinglet	0	0	0.00	N/A	N/A	N/A
great-horned owl	0	0	0.00	N/A	N/A	N/A
house wren	0	0	0.00	N/A	N/A	N/A
orange-crowned warbler	0	0	0.00	N/A	N/A	N/A
ring-necked pheasant	0	0	0.00	N/A	N/A	N/A
ruby-crowned kinglet	0	0	0.00	N/A	N/A	N/A
song sparrow	0	0	0.00	N/A	N/A	N/A
unid'd empidonax	0	0	0.00	N/A	N/A	N/A
varied thrush	0	0	0.00	N/A	N/A	N/A
winter wren	0	0	0.00	N/A	N/A	N/A
Overall	505	3067	76.83	41.90	57.68	0.42

Table 6. Flight characteristics of avian groups observed during the fixed-point surveys.

Species/Group	Number groups flying	Number birds flying	Percent of birds flying	<25 m	25-125 m	> 125 m
Waterfowl/Waterbirds	24	504	94.74	6.94	93.06	0.00
Shorebirds	38	63	75.00	57.14	42.86	0.00
Raptor	148	155	80.31	43.23	54.19	2.58
Accipiters	8	8	88.89	50.00	50.00	0.00
Buteos	73	74	77.08	31.08	66.22	2.70
Northern harrier	19	21	91.30	85.71	14.29	0.00
Eagles	9	10	71.43	10.00	80.00	10.00
Small Falcons	19	21	91.30	66.67	33.33	0.00
Large Falcons	3	3	100.00	33.33	66.67	0.00
Owls	0	0	0.00	N/A	N/A	N/A
Vultures	17	18	100.00	33.33	61.11	5.56
Corvids	83	145	75.13	68.28	25.52	6.21
Passerines	201	2183	75.93	47.27	52.73	0.00
Upland gamebirds	1	5	5.32	100.0	0.00	0.00
Dove	4	5	100.00	100.0	0.00	0.00
Other Birds	6	7	43.75	85.71	14.29	0.00
Overall	505	3067	76.83	41.90	57.68	0.42

Table 7. Exposure indices calculated for species observed during fixed-point surveys.

Species/Group	Mean use	Percent flying	Percent flying within RSA	Exposure Index
European starling	6.464	87.52	67.71	3.830
mallard	2.399	98.17	93.17	2.194
American robin	3.214	86.36	48.27	1.340
unidentified finch	0.604	100.00	94.49	0.571
red-tailed hawk	0.370	80.00	72.92	0.216
common raven	0.487	78.82	38.81	0.149
Brewer's blackbird	0.833	88.07	19.79	0.145
common snipe	0.139	70.00	100.00	0.097
killdeer	0.438	76.56	26.53	0.089
rough-legged hawk	0.193	75.00	54.17	0.078
American pipit	0.076	100.00	100.00	0.076
American goldfinch	0.662	38.58	28.57	0.073
turkey vulture	0.111	100.00	61.11	0.068
Canada goose	0.160	40.63	100.00	0.065
black-billed magpie	0.572	74.00	14.86	0.063
gray-crowned rosy finch	0.063	100.00	100.00	0.063
barn swallow	0.192	100.00	30.77	0.059
American kestrel	0.162	91.30	33.33	0.049
western kingbird	0.086	63.64	85.71	0.047
cedar waxwing	0.192	85.19	21.74	0.036
bald eagle	0.049	69.23	77.78	0.026
horned lark	0.321	45.28	16.67	0.024
unidentified swallow	0.028	100.00	75.00	0.021
red-winged blackbird	0.329	26.53	23.08	0.020
northern harrier	0.142	91.30	14.29	0.019
bank swallow	0.037	100.00	50.00	0.019
northern pintail	0.019	100.00	100.00	0.019
unidentified passerine	0.017	100.00	100.00	0.017
great blue heron	0.028	100.00	50.00	0.014
sharp-shinned hawk	0.021	100.00	66.67	0.014
violet-green swallow	0.014	100.00	100.00	0.014
Cooper's hawk	0.037	83.33	40.00	0.012
prairie falcon	0.016	100.00	66.67	0.011
eastern kingbird	0.044	100.00	16.67	0.007
western meadowlark	1.127	27.74	2.33	0.007
common nighthawk	0.007	100.00	100.00	0.007
golden eagle	0.005	100.00	100.00	0.005
dark-eyed junco	0.584	52.17	0.00	0.000
California quail	0.494	0.00	N/A	N/A
vesper sparrow	0.479	21.88	0.00	0.000
house finch	0.431	100.00	0.00	0.000
sage thrasher	0.097	33.33	0.00	0.000
white-crowned sparrow	0.097	28.57	0.00	0.000
black-capped chickadee	0.097	10.53	0.00	0.000

Table 7. Exposure indices calculated for species observed during fixed-point surveys.

Species/Group	Mean use	Percent flying	Percent flying within RSA	Exposure Index
mountain bluebird	0.093	84.62	0.00	0.000
yellow-rumped warbler	0.090	38.46	0.00	0.000
northern flicker	0.074	30.77	0.00	0.000
Bullock's oriole	0.067	87.50	0.00	0.000
spotted towhee	0.065	40.00	0.00	0.000
western tanager	0.060	75.00	0.00	0.000
savannah sparrow	0.056	100.00	0.00	0.000
tree swallow	0.053	71.43	0.00	0.000
northern shrike	0.052	70.00	0.00	0.000
great-horned owl	0.045	0.00	N/A	N/A
American crow	0.044	50.00	0.00	0.000
gray partridge	0.037	71.43	0.00	0.000
mourning dove	0.035	100.00	0.00	0.000
golden-crowned kinglet	0.028	0.00	N/A	N/A
Brewer's sparrow	0.021	0.00	N/A	N/A
Nashville warbler	0.021	0.00	N/A	N/A
song sparrow	0.021	0.00	N/A	N/A
ring-necked pheasant	0.019	0.00	N/A	N/A
ruby-crowned kinglet	0.019	0.00	N/A	N/A
lark sparrow	0.014	100.00	0.00	0.000
orange-crowned warbler	0.014	0.00	N/A	N/A
unidentified empidonax	0.014	0.00	N/A	N/A
Lincoln's sparrow	0.007	100.00	0.00	0.000
downy woodpecker	0.007	100.00	0.00	0.000
unidentified hummingbird	0.007	100.00	0.00	0.000
chipping sparrow	0.007	0.00	N/A	N/A
house wren	0.007	0.00	N/A	N/A
varied thrush	0.006	0.00	N/A	N/A
winter wren	0.005	0.00	N/A	N/A
unidentified buteo	N/A	100.00	50.00	N/A

Table 8. Big game species observed during fixed-point surveys (March 26, 2002 – March 13, 2003).

Species/Group	Spring		Summer		Fall		Winter		Total	
	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups
Big Game Species										
Rocky Mountain elk	0	0	0	0	0	0	0	0	0	0
mule deer	8	2	4	2	9	6	37	7	58	17
Total	8	2	4	2	9	6	37	7	58	17

Table 9. Raptor and large bird nests located in the raptor nest survey area (study area plus area within a two-mile radius buffer).

Species	Number Active Nests[a]	Number of Nests Which Produced Young[b]	Total Young Observed (young per successful nest)
Red-tailed hawk	12	8	18 (2.25)
Unknown buteo	3	0	unk
Great horned owl	3	2	7 (2.3)
Inactive nests	11	N/A	N/A

[a] based on May 5 survey
[b] based on June 5 survey

Table 10. Results of winter roadside bald eagle surveys in the project vicinity.

	Number of Eagle Observations								
	Route					Age Classification			
	Reecer		Wilson						
Date	Groups	Obs	Groups	Obs	Total	AD[a]	SA[b]	JUV[c]	Unk
03/01/2002	0	0	7	18	18	9	0	9	0
03/12/2002	3	3	1	1	4	2	0	2	0
03/22/2002	0	0	1	1	1	0	1	0	0
03/28/2002[d]	0	0	0	0	0	0	0	0	0
04/05/2002	0	0	0	0	0	0	0	0	0
04/12/2002	0	0	0	0	0	0	0	0	0
12/13/2002	0	0	0	0	0	0	0	0	0
12/20/2002	0	0	0	0	0	0	0	0	0
12/27/2002	0	0	0	0	0	0	0	0	0
01/15/2003	0	0	0	0	0	0	0	0	0
01/24/2003	0	0	0	0	0	0	0	0	0
02/07/2003	2	3	0	0	3	3	0	0	0
02/13/2003	0	0	5	5	5	2	0	3	0
02/27/2003	0	0	2	3	3	3	0	0	0
03/12/2003	1	1	1	1	2	1	1	0	0
03/27/2003	0	0	1	2	2	0	0	0	2
04/01/2003	0	0	1	1	1	1	0	0	0
04/12/2003	0	0	0	0	0	0	0	0	0
Total	6	7	19	32	39	21	2	14	2
#/survey		0.39		1.78	2.17				

[a] Adults (>3 years old)
[b] Subadults (1-3 years old)
[c] Juveniles (<1 year old)
[d] Wilson Creek route surveyed on 03/28/2002; Reecer Creek route surveyed on 03/30/2002.

Table 11. Number of groups and the total number of individuals of avian species of interest, mammals, and reptiles observed incidentally on or near the site.

Species	Number of Groups	Number of Individuals
Birds		
mallard	7	292
bald eagle	31	54
red-tailed hawk	52	74
rough-legged hawk	32	51
Canada goose	3	28
common goldeneye	4	20
American kestrel	11	18
northern pintail	2	6
northern harrier	3	4
bufflehead	2	4
ring-necked duck	1	4
Cooper's hawk	3	3
gray partridge	1	3
common raven	2	2
loggerhead shrike	2	2
ring-necked pheasant	1	2
barn owl	1	1
common snipe	1	1
long-billed curlew	1	1
great blue heron	1	1
northern goshawk	1	1
northern shoveler	1	1
prairie falcon	1	1
sharp-shinned hawk	1	1
spotted sandpiper	1	1
turkey vulture	1	1
Mammals		
mule deer	2	42
coyote	2	2
porcupine	1	1
elk	1	11
raccoon	1	1
long-tailed weasel	1	1
yellow-bellied marmot	3	3
least chipmunk	NR	NR
Reptiles		
short-horned lizard	1	1

NR = not recorded but commonly observed.

Table 12. Vegetation types in the study area.

Vegetation Type	Approx. Acres	Percent of Study Area	General Habitat Description
Agricultural	252.3	4.8	For this project, agricultural areas are those sites used for irrigated hay meadows that are periodically mowed. While other habitats (e.g., shrub steppe and grasslands) are used for agricultural purposes, these areas are not considered "Agricultural" because they consist primarily of native vegetation.
Developed	16.5	0.3	Areas where human activity has removed or altered natural vegetation, such as residential homes and farm buildings and yards.
Grassland	1,578.7	30.2	Areas dominated by grass species, primarily bunchgrasses bluebunch wheatgrass, Sandberg's bluegrass, cheatgrass, and bulbous bluegrass. Grasslands are primarily used for cattle grazing.
Grassland/ Lithosol	199.8	3.8	A subset of the grassland habitat type found on exposed ridges in shallow soils (lithosol) in the northern-most parcel. Sparse grasses (Sandberg's bluegrass) dominate, along with scattered forbs and occasional shrubs.
Open Water	23.4	0.5	Areas of open water including natural ponds, stock ponds, and the irrigation canal.
Pine Forest	33.4	0.6	Pine forest dominated by Ponderosa pine found in the higher elevations of the northern most parcel.
Riparian Forest	70.5	1.4	Riparian zones dominated by trees and tall shrubs, typically located in narrow drainages with perennial or intermittent streams. The dominant tree and shrub species include cottonwoods and various willows. In some locations, the shrub understory is very dense, limiting herbaceous growth. These areas probably receive some use by cattle and wildlife for shade and water.
Riparian Shrub	108.6	2.1	Riparian areas adjacent to streams or irrigation ditches where shrubs are common, but often scattered. Common shrub species include black hawthorn and coyote willow. Various herbaceous species are present in the understory. Weedy species, including and knapweed were often observed.
Shrub Steppe	2,794.5	53.4	Upland areas dominated by shrubs, primarily bitterbrush and rigid sagebrush, with an understory of mixed grasses and forbs. Livestock grazing is the primary land use in most of the shrub steppe. A few weedy species, such as cheatgrass and knapweed, were observed, but weedy species in general were not found over large extents of the area.
Wet Meadow	149.6	2.9	Areas dominated by hydrophytic vegetation, including various sedges, grasses, and rushes and other herbaceous species. These areas appear to be saturated or inundated most of the year, either from leakage from the irrigation canal or stockponds, or due to high groundwater in low spots and swales. Evidence of cattle use was observed in most wet meadows. Weeds were observed in some of the wet meadows, primarily chicory.
Total	5,227.3	100	

Table 13. Rare plants potentially occurring in the project area based on range and habitat requirements.

Species	Federal Status	State Status	Known Locations	General Habitat	Flowering 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
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
Piper's daisy *Erigeron piperianus*		S	Historic record from 1959 – includes western portion of study area	Dry, open places, often with sagebrush	May-June
Longsepal globemallow *Iliamna longisepala*		S	Record from 1991 just east of study area	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
Hedgehog cactus *Pediocactus simpsonii* var. *robustior*		R1		Desert valleys and low mountains	May-July

Table 13. Rare plants potentially occurring in the project area based on range and habitat requirements.

Species	Federal Status	State Status	Known Locations	General Habitat	Flowering Period
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
Sticky goldenweed *Pyrrocoma hirta* var. *sonchifolia*		R1		Meadows and open or sparsely wooded slopes	July-August
Ute ladies'-tresses Spiranthes 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 – early September
Hoover's tauschia Tauschia hooveri	SOC	T		Basalt lithosols within sagebrush-steppe	March-mid April

Federal Status
SC = Species of Concern: A taxon whose conservation standing is of concern but for which status information is still needed. Species of concern lists are not published in the Federal Register.

State Status
E = Endangered: Any taxon in danger of becoming extinct or extirpated from Washington within the foreseeable future if factors contributing to its decline continue. Populations of these taxa are at critically low levels or their habitats have been degraded or depleted to a significant degree.
T = Threatened: Any taxon likely to become Endangered in Washington within the foreseeable future if factors contributing to its population decline or habitat degradation or loss continue.
S = Sensitive: Any taxon that is vulnerable or declining and could become Endangered or Threatened in the state without active management or removal of threats.

Figure 1. Proposed Desert Claim Wind Power Project location.

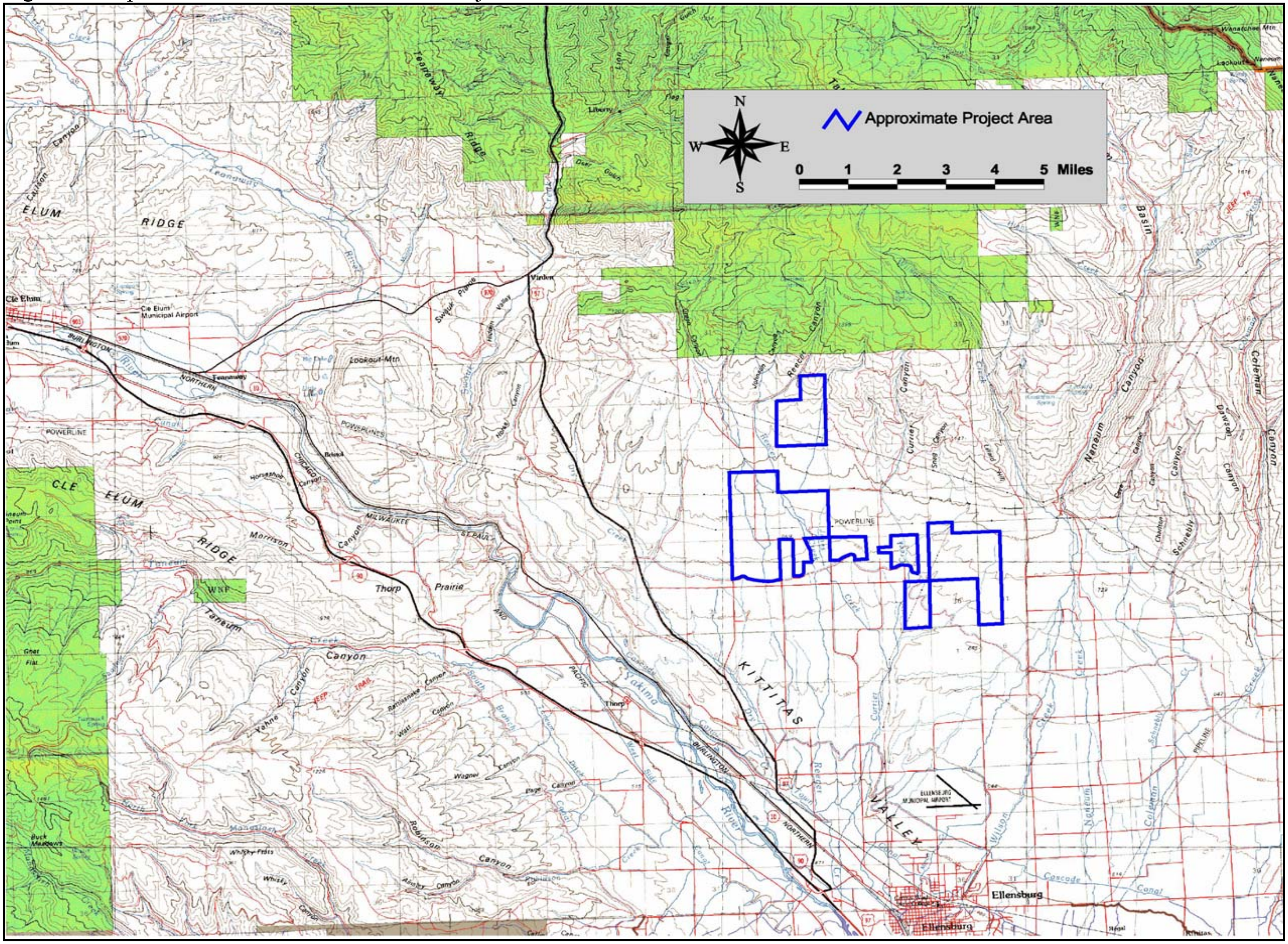


Figure 2. Fixed-point survey plots with 800 m buffer and bald eagle survey routes.

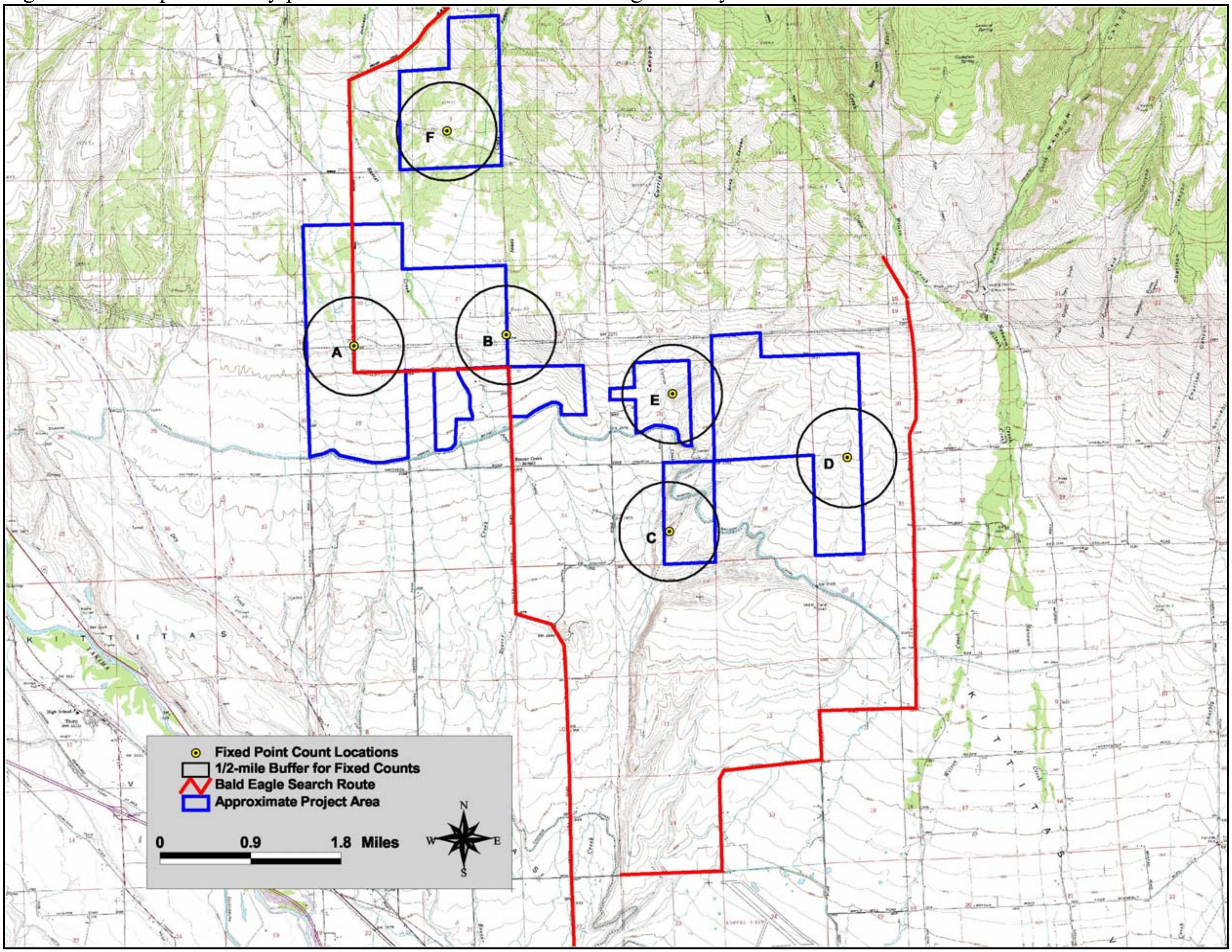


Figure 3. Raptor nest survey area and nests located.

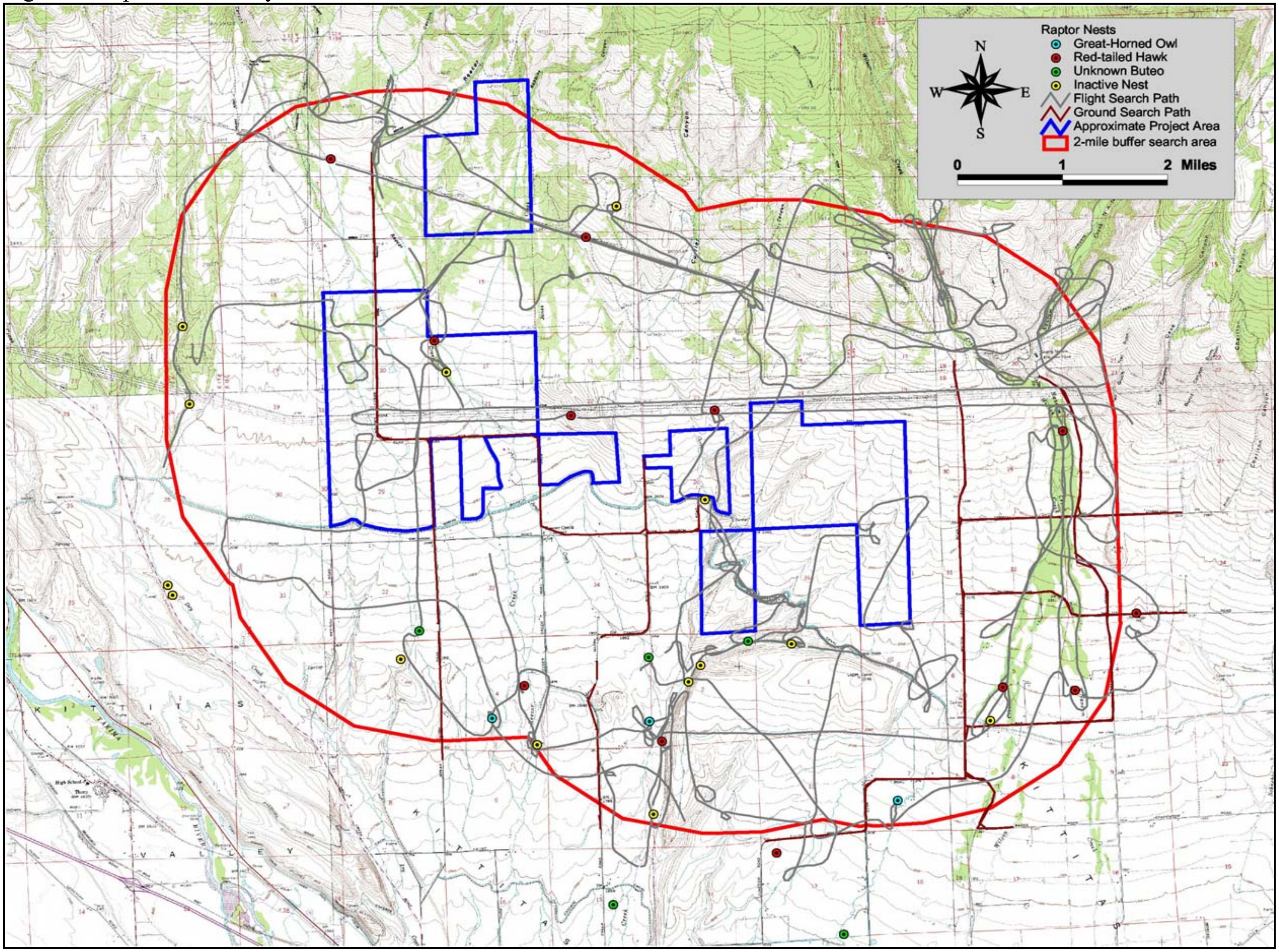


Figure 4. Vegetation type mapping for the study area.

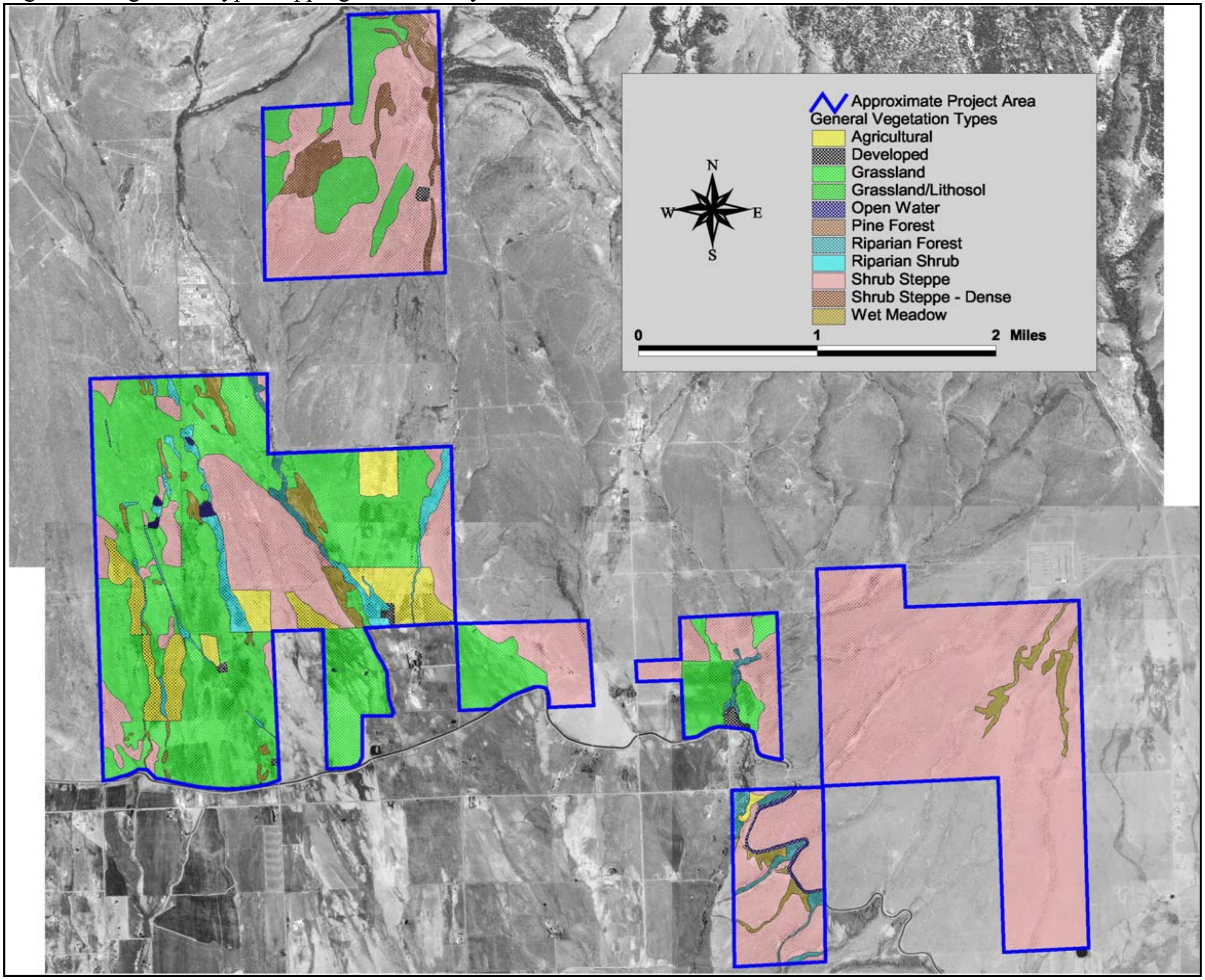
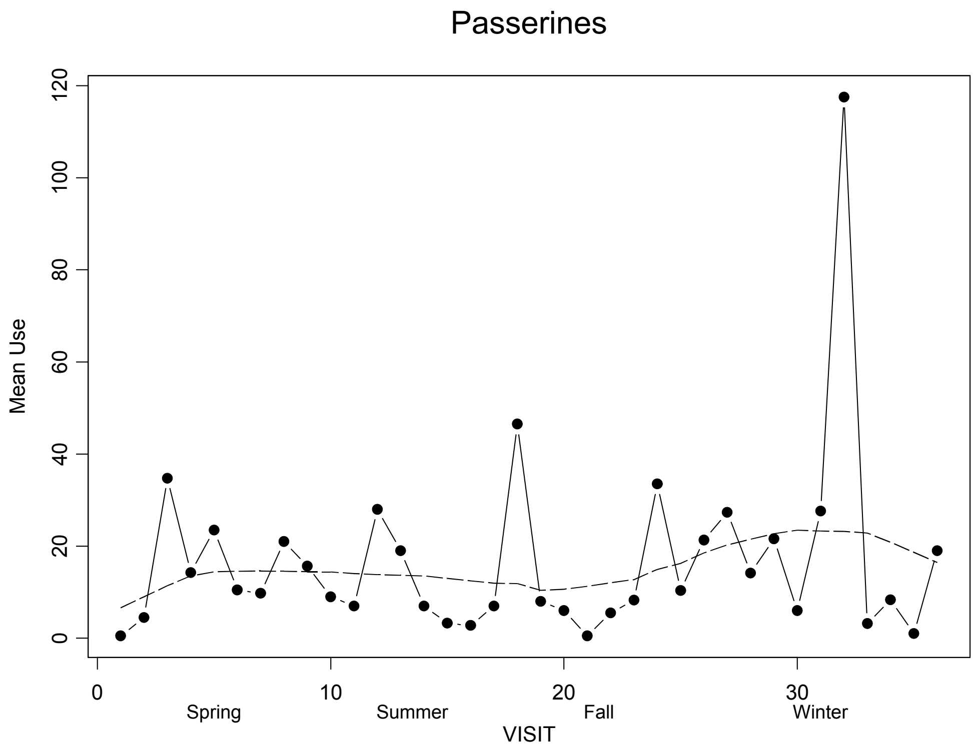


Figure 5. Mean use and frequency of occurrence for avian groups by survey period (dashed line represents a smoothed estimate).



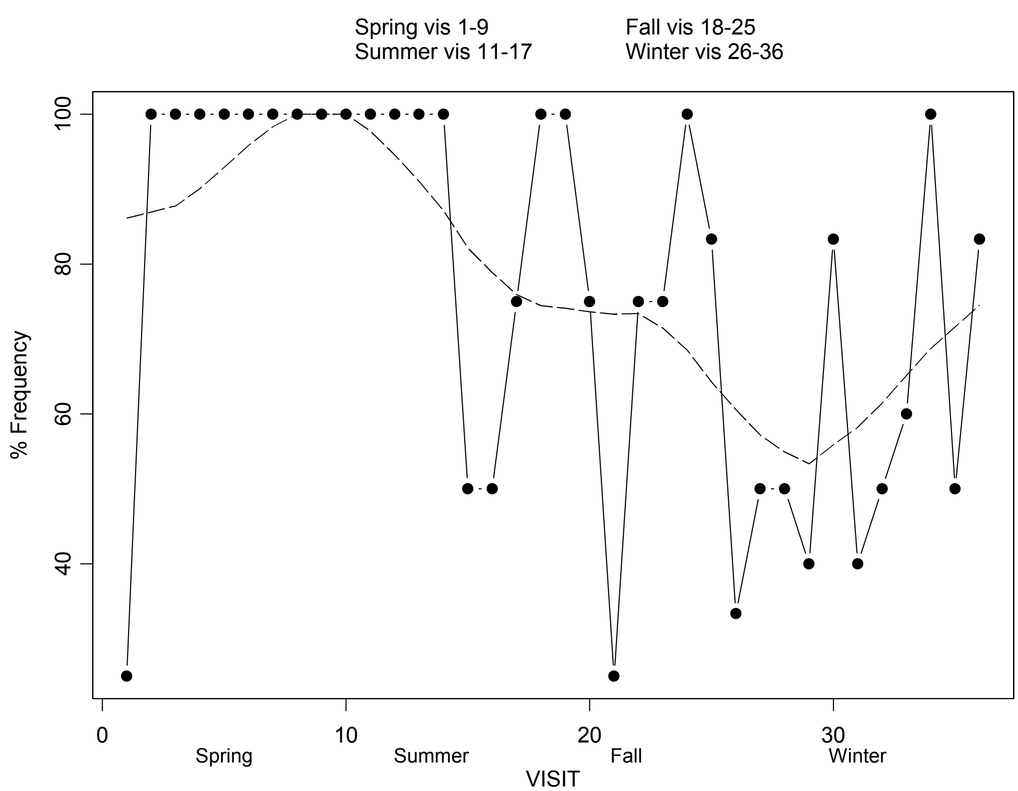
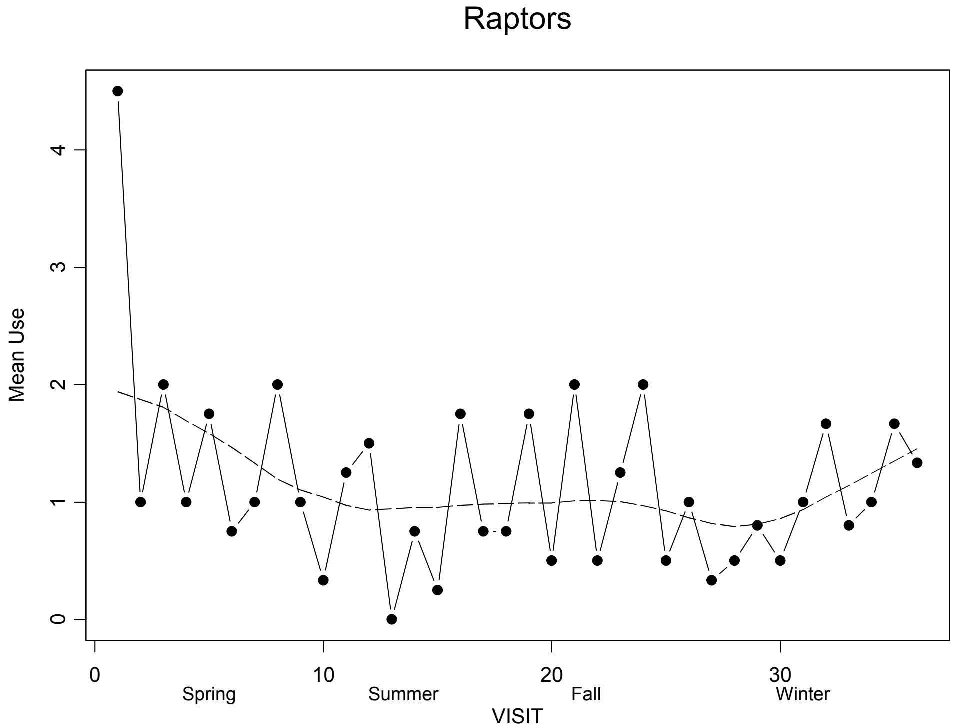


Figure 5. (continued).



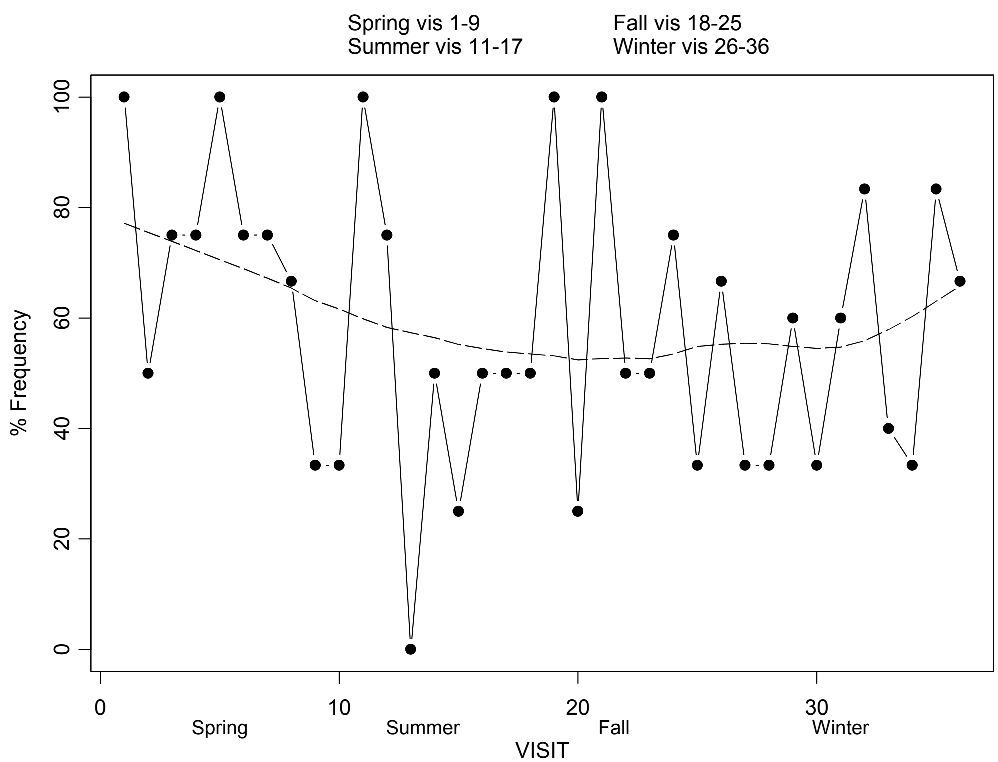
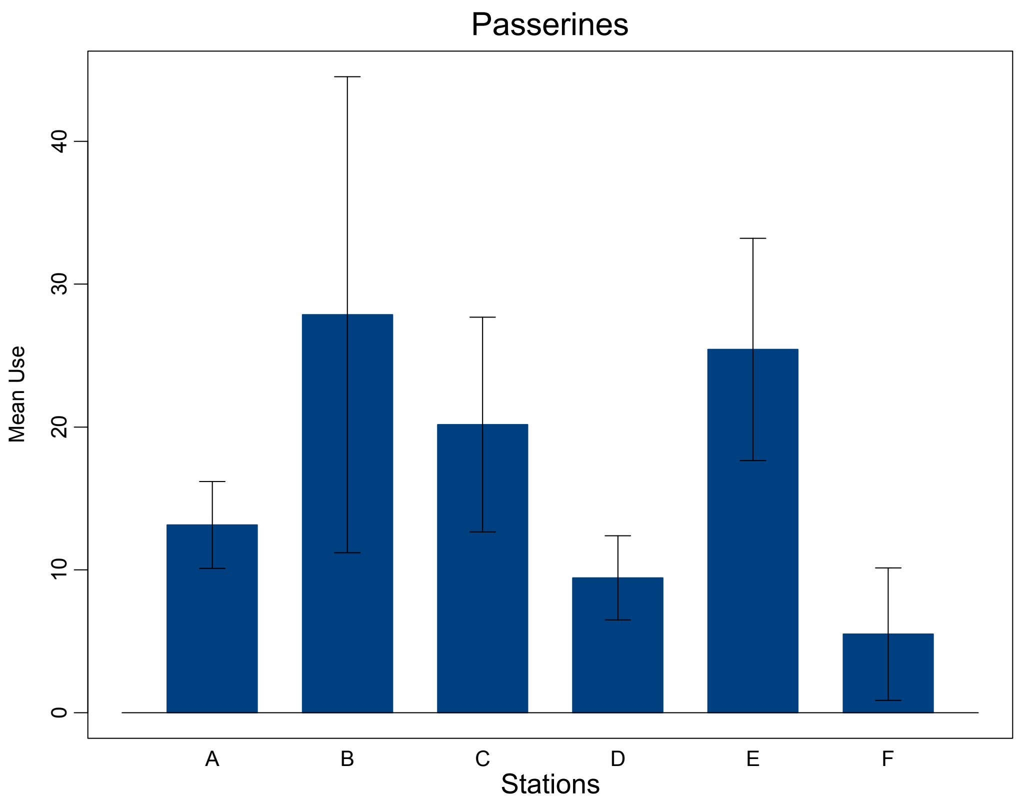


Figure 6. Mean use and frequency of occurrence for avian groups by survey station (bar represents ±1 standard error).



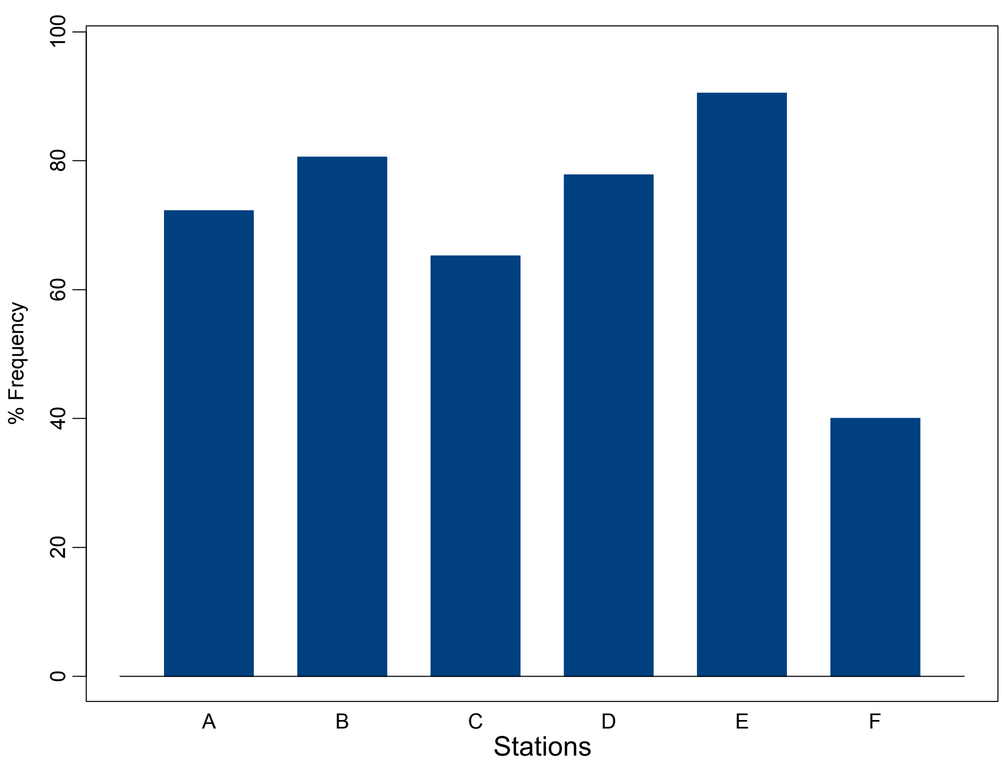
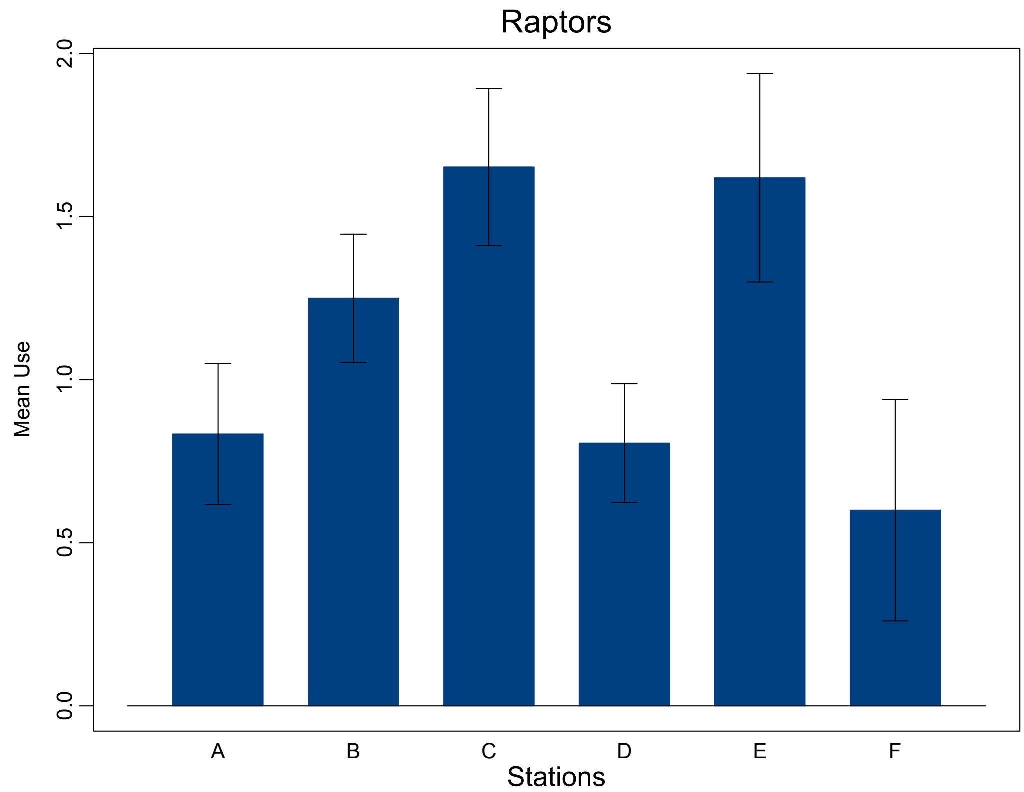


Figure 6. (continued).



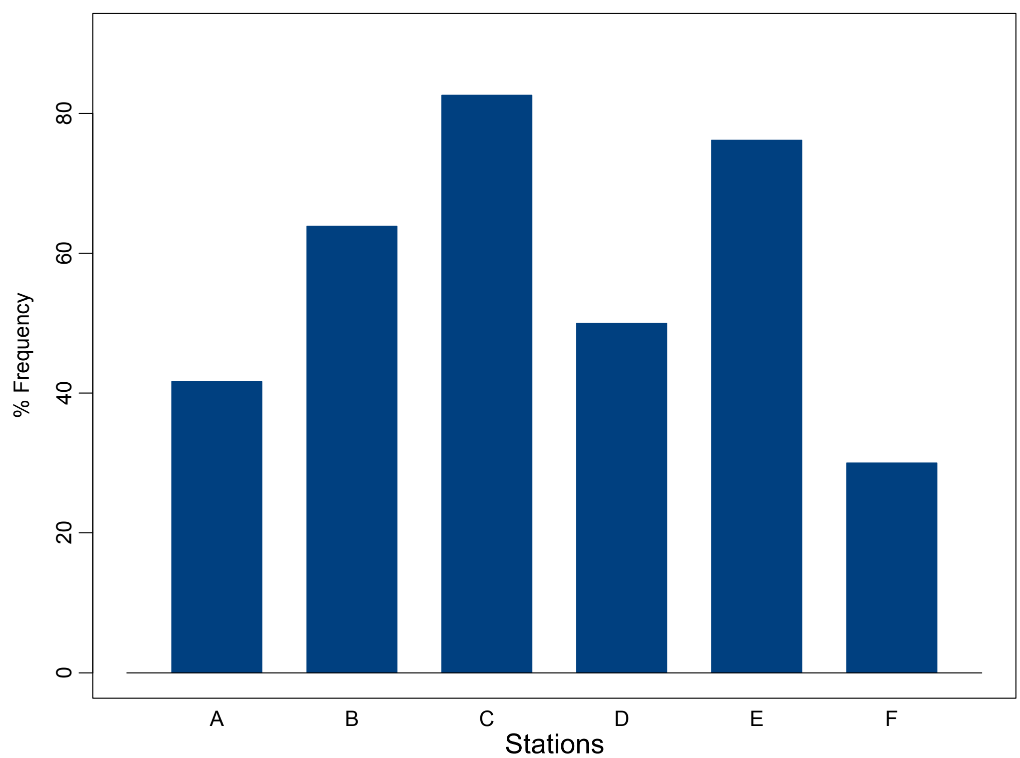


Figure 7. Mean number of species per survey (dashed line represents a smoothed estimate).

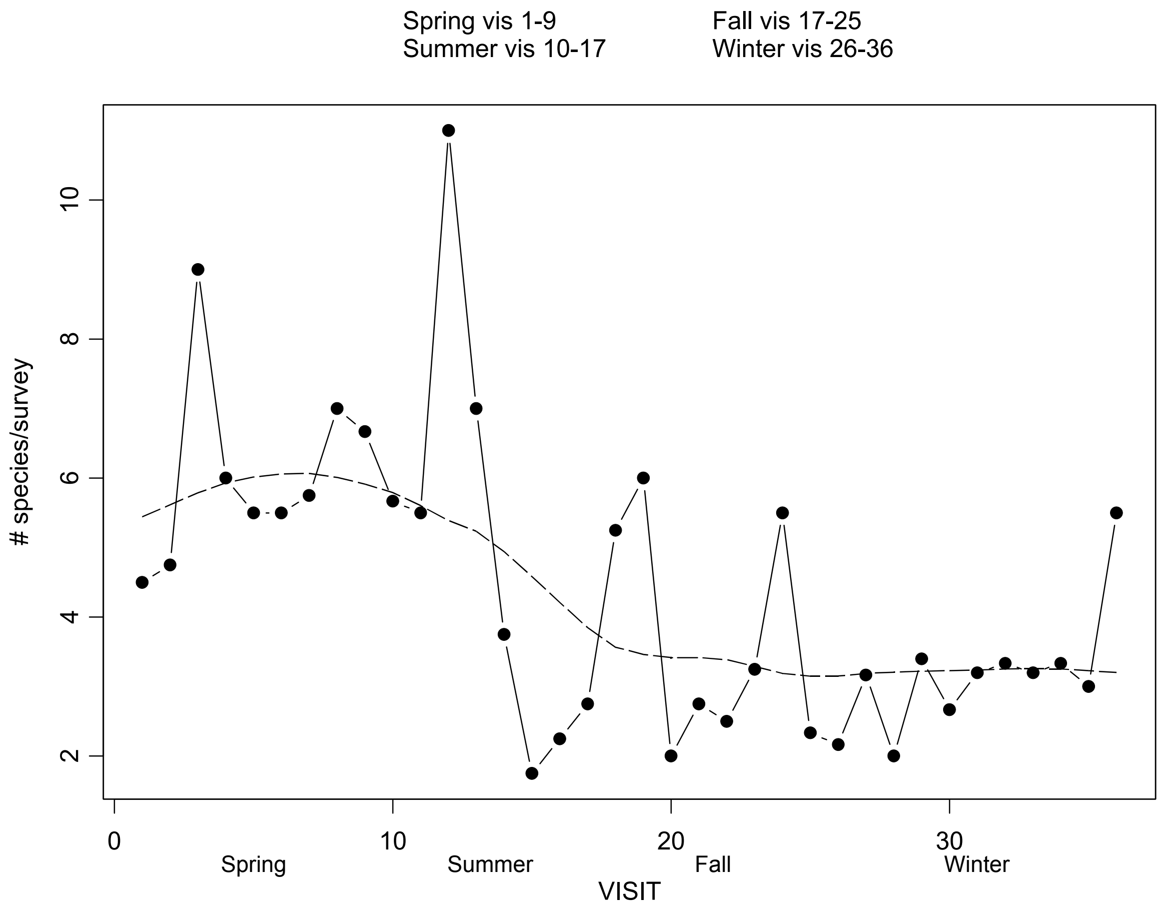


Figure 8. Buteo flight paths and perch locations recorded during fixed-point surveys and incidentally in the study area.

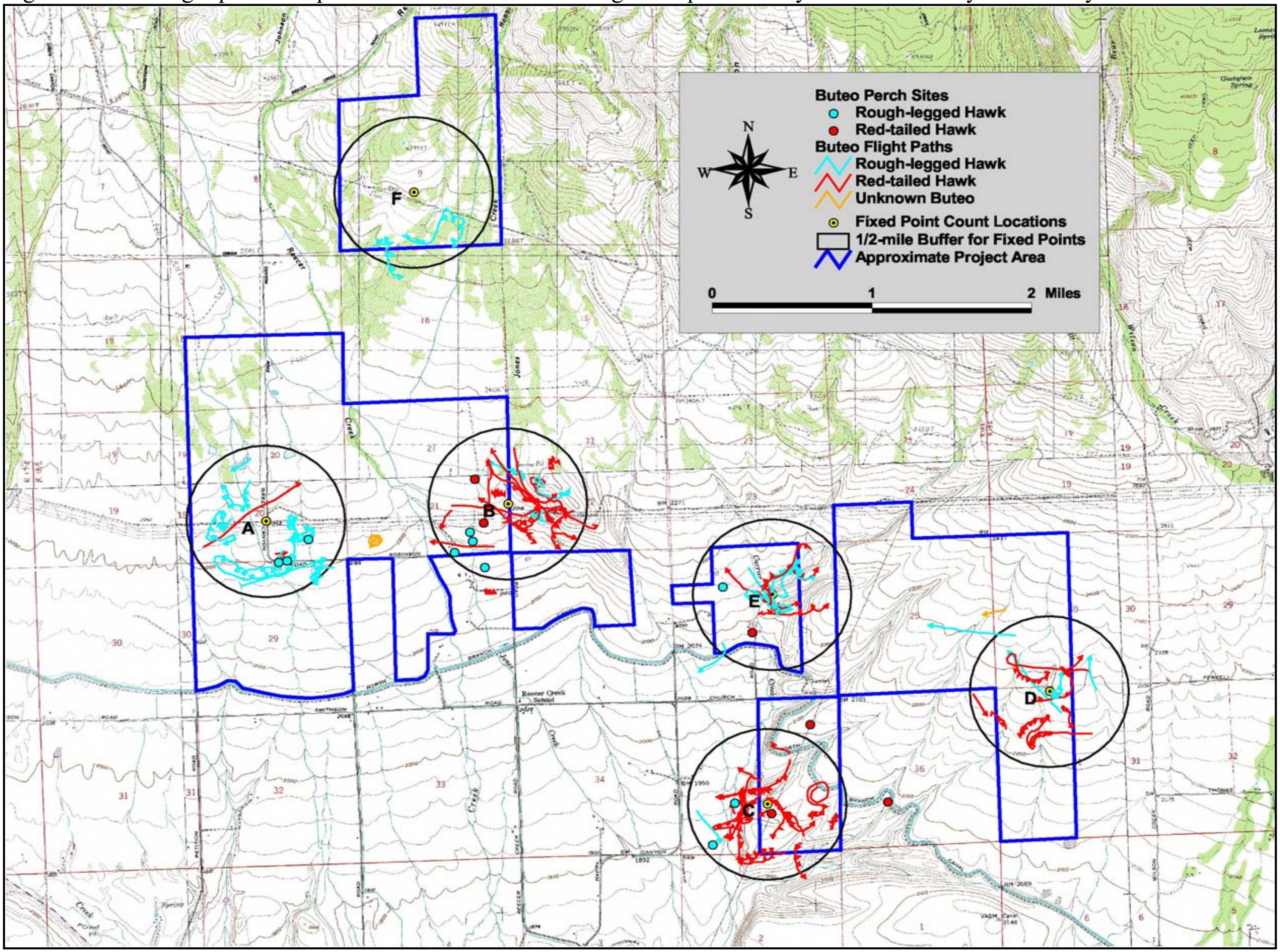


Figure 9. Accipiter and falcon flight paths and perch locations recorded during fixed-point surveys and incidentally in the study area.

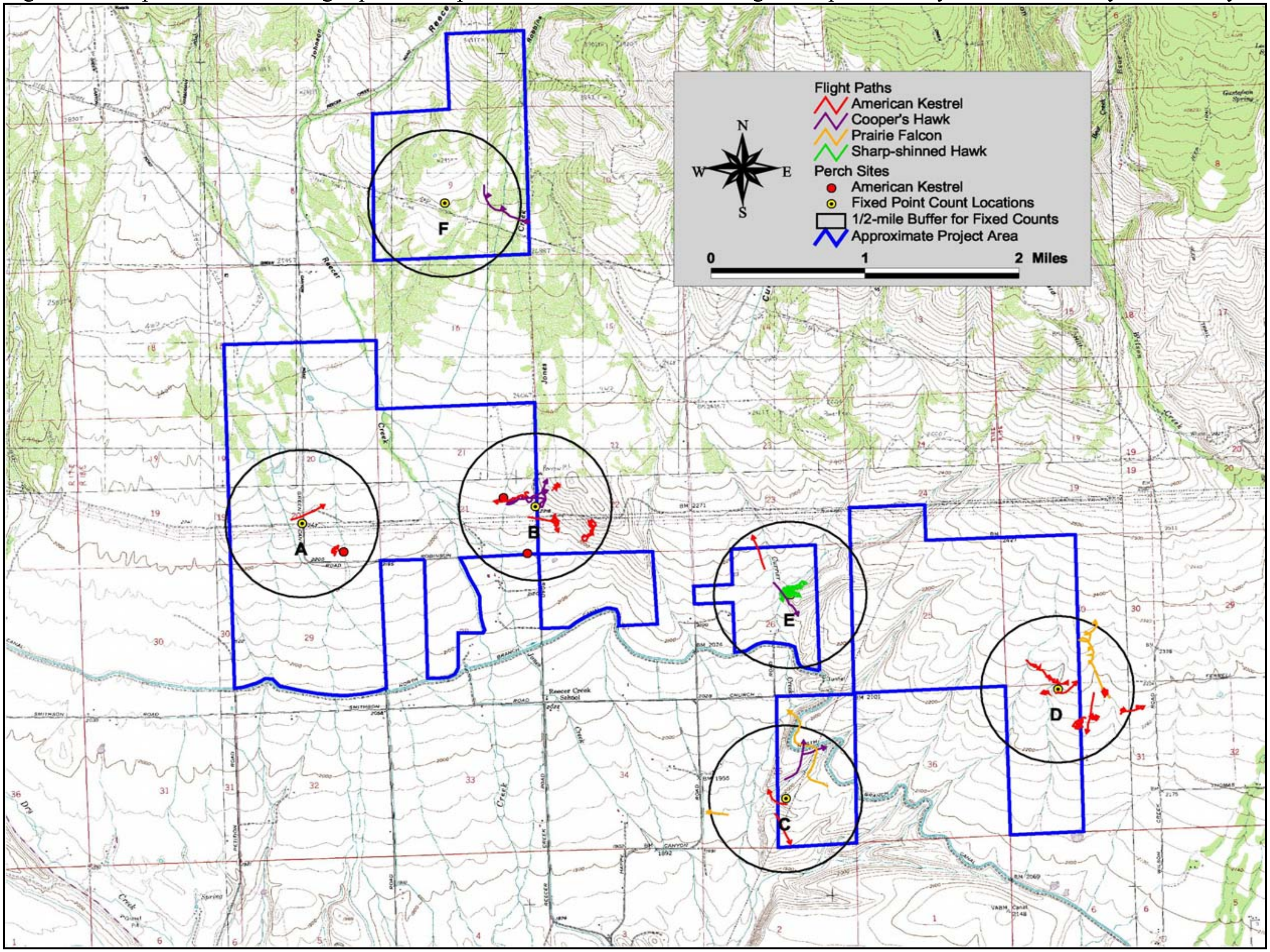


Figure 10. Other raptor flight paths and perch locations recorded during fixed-point surveys and incidentally in the study area.

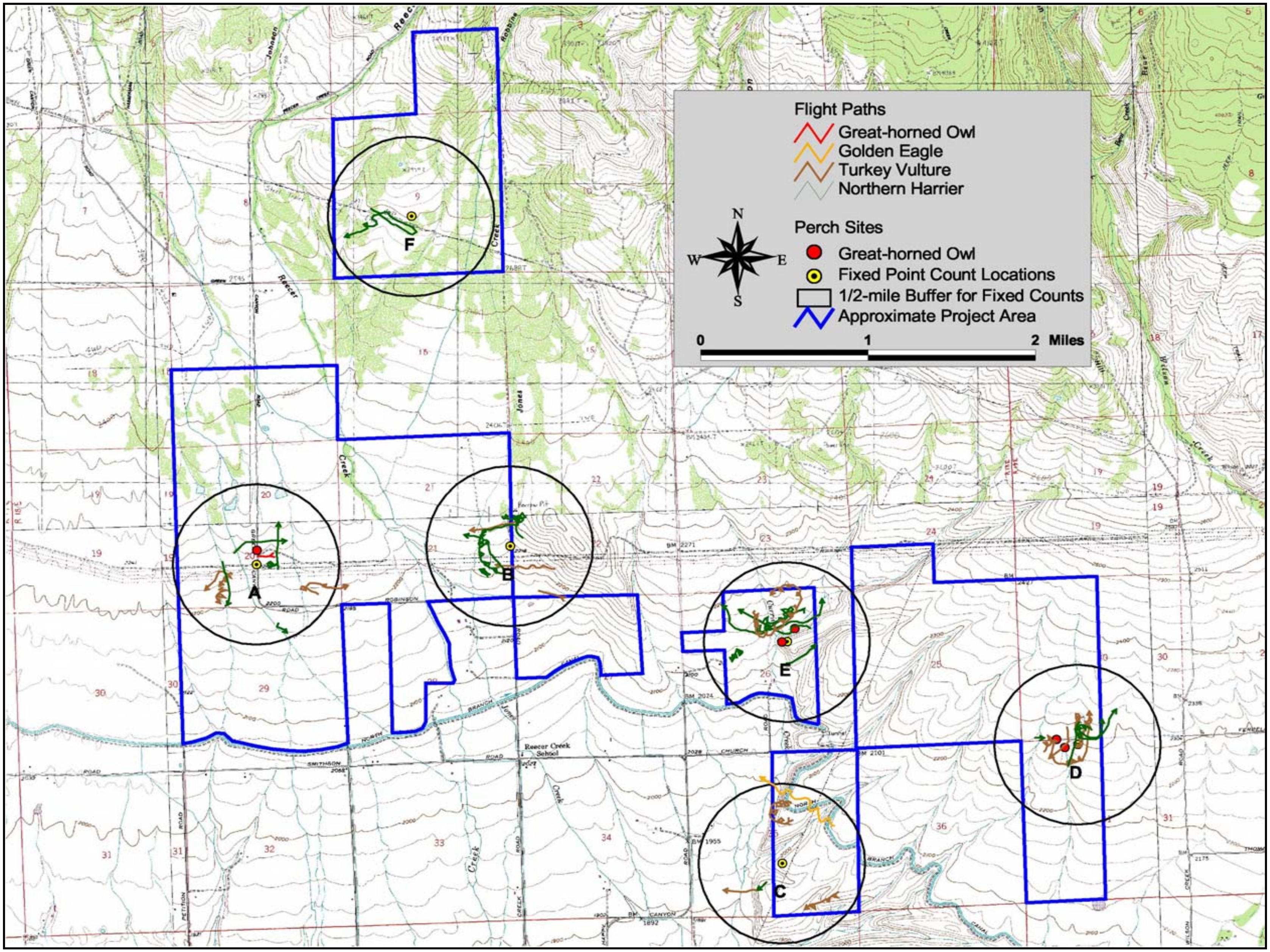


Figure 11. Big game species observations recorded during the fixed-point surveys and incidentally in the study area.

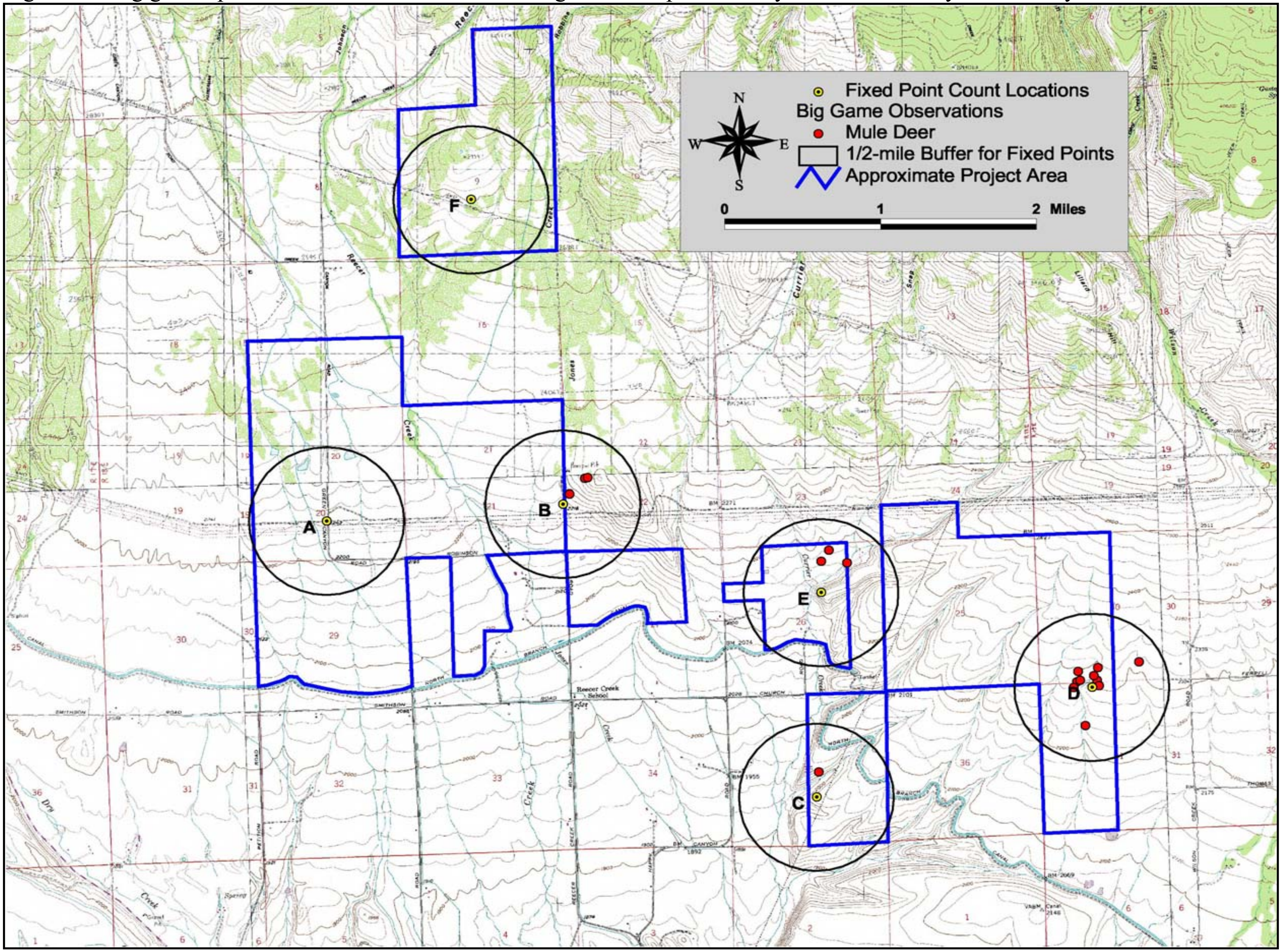
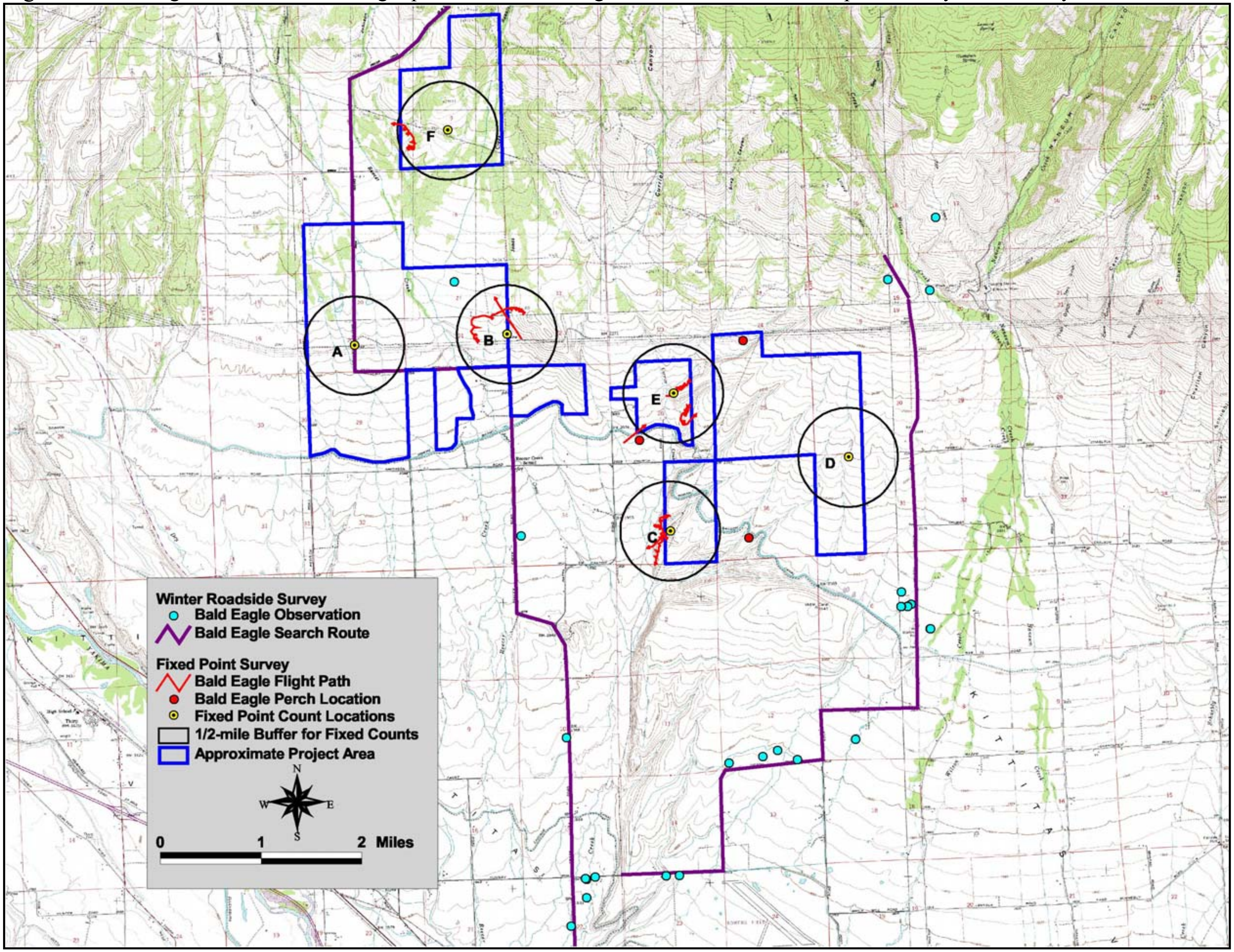


Figure 12 Bald eagle observations and flight paths recorded during winter roadside and fixed-point surveys in the study area.



APPENDIX A

EXAMPLE
FIXED-POINT SURVEY FIELD DATA SHEET

AVIAN OBSERVATION DATA SHEET: FIXED POINT **KITTITAS VALLEY WIND SITE** **STATION A** ________

DATE: _________ OBSERVER _____ START TIME _______ END TIME _______ PAGE_____ OF_____

WEATHER: VISIBILITY(CIRCLE ONE) good fair poor CLOUD COVER(%) _____ TEMP(^{O}C) _____

WIND DIRECTION (CIRCLE ONE) N NE E SE S SW W NW n/a SPEED(KPH) Low: _____ High: _____

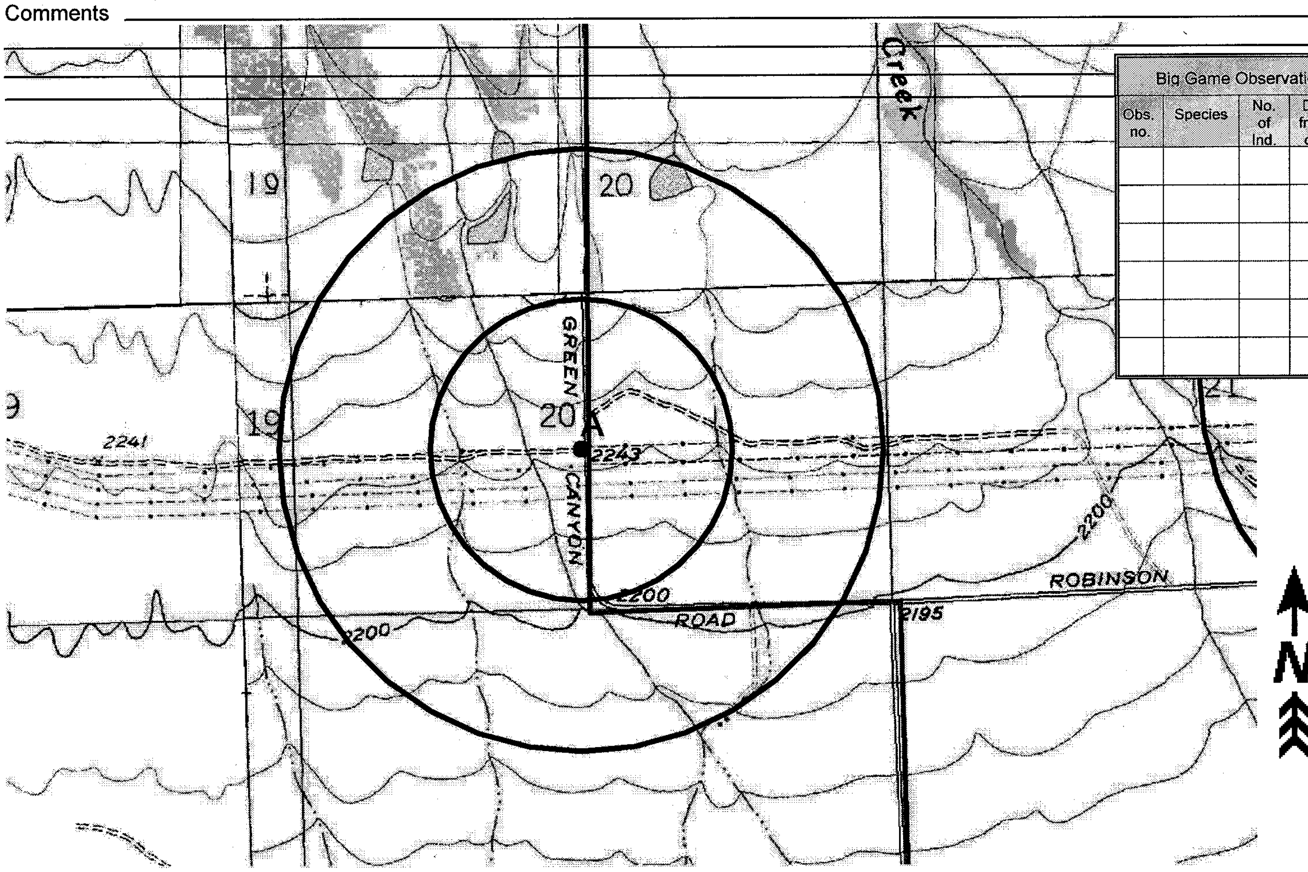
PRECIPITATION(CIRCLE ONE) none light rain rain light snow snow sleet hail other_____

HABITAT w/in 800 m of point: 1st ____ ___% 2nd ____ ___% 3rd ____ ___% 4th ____ ___% 5th ____ ___% 6th ____ ___%

Obs. No.	Species	Sex	Age	# Inds.	Distance (m) from observer		Activity	Flight Characteristics				Habitat	Instantaneous Count (Height/Distance)				A[a]	10 min incr.
								Flight Height (m)			Dir.							
					1st	closest		1st	low	high			1	2	3	4		
1							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
2							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
3							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
4							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
5							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
6							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
7							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
8							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
9							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						
10							PE SO FL FH CS HO ST OT					GS CF DT CR WW DS SS RK RI OT						

[a] check if Auditory only

Comments ____



Big Game Observations

Obs. no.	Species	No. of Ind.	Distance from (m) observer

APPENDIX B

PLANT SPECIES LIST FROM THE STUDY AREA

Vascular Plant Species
Desert Claim Wind Power Project – Kittitas County, Washington
Survey Dates September 5 - 6, 2002 and April 28 and May 15, 2003

Botanical nomenclature follows Hitchcock & Cronquist 1973; other commonly accepted names in parenthesis, where applicable.

Note: This is not a complete list of vascular plants in the project area – only those identifiable during the survey periods
** = introduced species*

Family	Scientific Name	Common Name
BERBERIDACEAE	*Berberis (Mahonia) repens*	Oregon grape
BETULACEAE	*Alnus incana*	Mountain alder
BORAGINACEAE	*Amsinckia lycopsoides*	Tarweed fiddleneck
	Lithospermum ruderale	Columbia puccoon
	Myosotis sp.	Forget-me-not
CAPRIFOLICAEAE	*Symphoricarpos albus*	Common snowberry
COMPOSITAE	*Achillea millefolium*	Common yarrow
(ASTERACEAE)	*Ambrosia psilostachya*	Common ragweed
	Antennaria sp.	Pussytoes
	Artemisia rigida	Stiff sagebrush
	Artemisia tridentata	Big sagebrush
	Balsamorhiza hookeri	Hooker's balsamroot
	Balsamorhiza saggitata	Arrowleaf balsamroot
	Centaurea sp.	Knapweed
	Chrysothamnus vicidiflorus	Green rabbitbrush
	*Cichorium intybus**	Chicory
	Cirsium sp.	Thistle
	Erigeron poliospermus	Cushion fleabane
	Haplopappus hirtus	Sticky goldenweed
	Senecio sp.	Groundsel
	Taraxacum officinale	Common dandelion
	Tragopogon dubius	Yellow salsify
CRUCIFERAE	*Arabis divaricarpa*	Rockcress
(BRASSICACEAE)	*Chorispora tenalla**	Blue mustard
	Phoenicaulis cheiranthoides	Daggerpod
	Physaria sp.	Twinpod
	*Sisymbrium altissimum**	Tumble mustard
CYPERACEAE	*Carex nebraskensis*	Nebraska sedge
	Eleocharis palustris	Common spikerush

Family	Scientific Name	Common Name
GERANIACEAE	*Erodium cicutarium**	Filaree
GRAMINEAE (POACEAE)	*Agropyron cristatum*	Crested wheatgrass
	Agropyron spicatum (Pseudoroegneria spicata)	Bluebunch wheatgrass
	Alopecurus pratensis	Meadow foxtail
	*Bromus tectorum**	Cheat grass
	Elymus (Leymus) cinereus	Giant wildrye
	Festuca idahoensis	Idaho fescue
	Poa bulbosa	Bulbous bluegrass
	Poa pratensis	Kentucky bluegrass
	Poa sandbergii (secunda)	Sandberg's bluegrass
	Sitanion hystrix	Squirreltail
GROSSULARIACEAE	*Ribes aureum*	Golden current
HYDROPHYLLACEAE	*Hydrophyllum capitatum*	Ballhead waterleaf
	Phacelia sp.	Phacelia
IRIDACEAE	*Iris*	Iris
JUNCACEAE	*Juncus balticus*	Baltic rush
LEGUMINOSAE (FABACEAE)	*Lupinus sericeus*	Silky lupine
	Lupinus sp.	Lupine
	Trifolium macrcephalum	Big-head clover
LILIACEAE	*Allium sp.*	Onion
	Brodiaea howellii (Triteleia gndiflora var. howellii)	Howell's brodiaea
	Camassia quamash	Common camas
	Zigadenus venenosus	Death camas
OROBANCHACEAE	*Orobanche sp.*	Broomrape
PINACEAE	*Pinus ponderosa*	Ponderosa pine
PLANTAGINACEAE	*Plantago lanceolata**	Plantain
POLEMONIACEAE	*Phlox hoodii*	Hood's phlox
	Phlox longifolia	Long-leaf phlox
POLYGONACEAE	*Eriogonum ovalifolium*	Cushion buckwheat
	Eriogonum sphaerocephalum	Round-headed desert buckwheat
	Eriogonum thymoides	Thyme-leaved eriogonum
	*Polygonum lapathifolium**	Ladysthumb

Family	Scientific Name	Common Name
	Rumex sp.	Dock
PORTULACEAE	*Lewisia rediviva*	Bitterroot
PRIMULACEAE	*Dodecatheon puchellum*	Shooting star
RANUNCULACEAE	*Delphinium nuttallianum*	Larkspur
	Ranunculus glaberrimus	Sagebrush buttercup
ROSACEAE	*Amelanchier alnifolia*	Western serviceberry
	Crataegus douglasii	Black hawthorn
	Potentilla sp.	Cinquefoil
	Prunus virginiana	Chokecherry
	Purshia tridentata	Bitter-brush
	Rosa woodsii	Wood's rose
RUBIACEAE	*Galium boreale*	Northern bedstraw
SALICACEAE	*Populus trichocarpa*	Black cottonwood
	Salix exigua	Sandbar willow
SAXIFRAGACEAE	*Lithophragma bulbifera*	Prairie star
	Lithophragma parviflora	Small flower fringecup
SCROPHULARIACEAE	*Collinsia parviflora*	Small-flowered blue-eyed Mary
	Mimulus guttatus	Yellow monkey flower
	Veronica sp.	Speedwell
UMBELLIFERAE	*Lomatium canbyi*	Canby's lomatium
(APIACEAE)	*Lomatium dissectum*	Fern-leaved lomatium
	Lomatium grayii	Gray's lomatium
	Lomatium naudicaule	Barestem lomatium
	Lomatium macrocarpum	Large-fruited lomatium
	Lomatium triternatum	Nine-leaf lomatium
VIOLACEAE	*Viola nuttallii*	Violet
	Viola trinervata	Desert pansy

APPENDIX D

Cultural Resources

DRAFT

CULTURAL RESOURCES SURVEY FOR THE DESERT CLAIM WIND POWER PROJECT KITTITAS COUNTY, WASHINGTON

October 30, 2003

NORTHWEST ARCHAEOLOGICAL ASSOCIATES, INC
SEATTLE, WASHINGTON

DRAFT

CULTURAL RESOURCES SURVEY
FOR THE
DESERT CLAIM WIND POWER PROJECT
KITTITAS COUNTY, WASHINGTON

Report prepared for

Huckell-Weinman Associates
Kirkland, Washington

by Charles M. Hodges
Christian Miss
and
Johonna Shea

October 30, 2003

NWAA Report Number WA03-39

Northwest Archaeological Associates, Inc.
5418 - 20th Avenue NW, Suite 200
Seattle, Washington 98107

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1. INTRODUCTION

Desert Claim Wind Power LLC., is proposing to construct and maintain a wind energy facility in Kittitas County, Washington, approximately 8 miles north of the town of Ellensburg. Northwest Archaeological Associates, Inc. (NWAA) was retained by Huckell-Weinman Associates on behalf of Desert Claim Wind Power to conduct a cultural resources assessment of the project area as part of the SEPA review process. This report is provided in support of the SEPA application and provides documentation for information requested under SEPA checklist item *Historic and Cultural Preservation*. The work performed by NWAA was designed to address three areas of concern outlined under this checklist item:

13a. Identify places or objects on or adjacent to the project that are listed or proposed for listing on a historic register;

13b. Identify places or objects on or adjacent to the project that are of archaeological, scientific, or cultural importance, and;

13c. Indicate appropriate mitigation measures for historic or cultural resources.

In the course of providing information relating to the cultural resources of the project area, NWAA conducted prefield archival research that identified the locations of previously known prehistoric and historic cultural properties within the project boundaries and within a one-mile radius beyond the project boundaries. The prefield research was followed by an archaeological field survey that found and documented previously unknown cultural resources within the project area. The field survey also visited previously recorded sites within the project area to update site records and to assess current conditions.

The archaeological investigations were carried out in two phases. Phase I consisted of archival research, tribal coordination, and field study. Phase II was the analysis of results, site form preparation and preparation of this technical report. The last includes evaluations regarding the significance of the documented cultural resources within the project area. This report contains sensitive information regarding prehistoric and historic cultural resources and caution should be exercised regarding general access to the contents of this report.

1.1 Location and Description of Project

1.1.1 Location

The project is located approximately eight miles north of the City of Ellensburg in Kittitas County, Washington (Figure 1.1). The area of the proposed project encompasses 5237 acres located in the west halves of Sections 30 and 31 in T. 19 N., R. 19 E.; Sections 9, 20, 21, and 25, and portions of Sections 4, 17, 24, 26, 27, 28, and 29 in T. 19 N., R. 18 E.

1.1.2 Scope of Project

Project activities proposed by the proponent include placement and construction of up to 120 wind turbine generators, cabling, access road construction, and possible construction of support structures or substations. Ground disturbance destroys the relationships among artifacts and

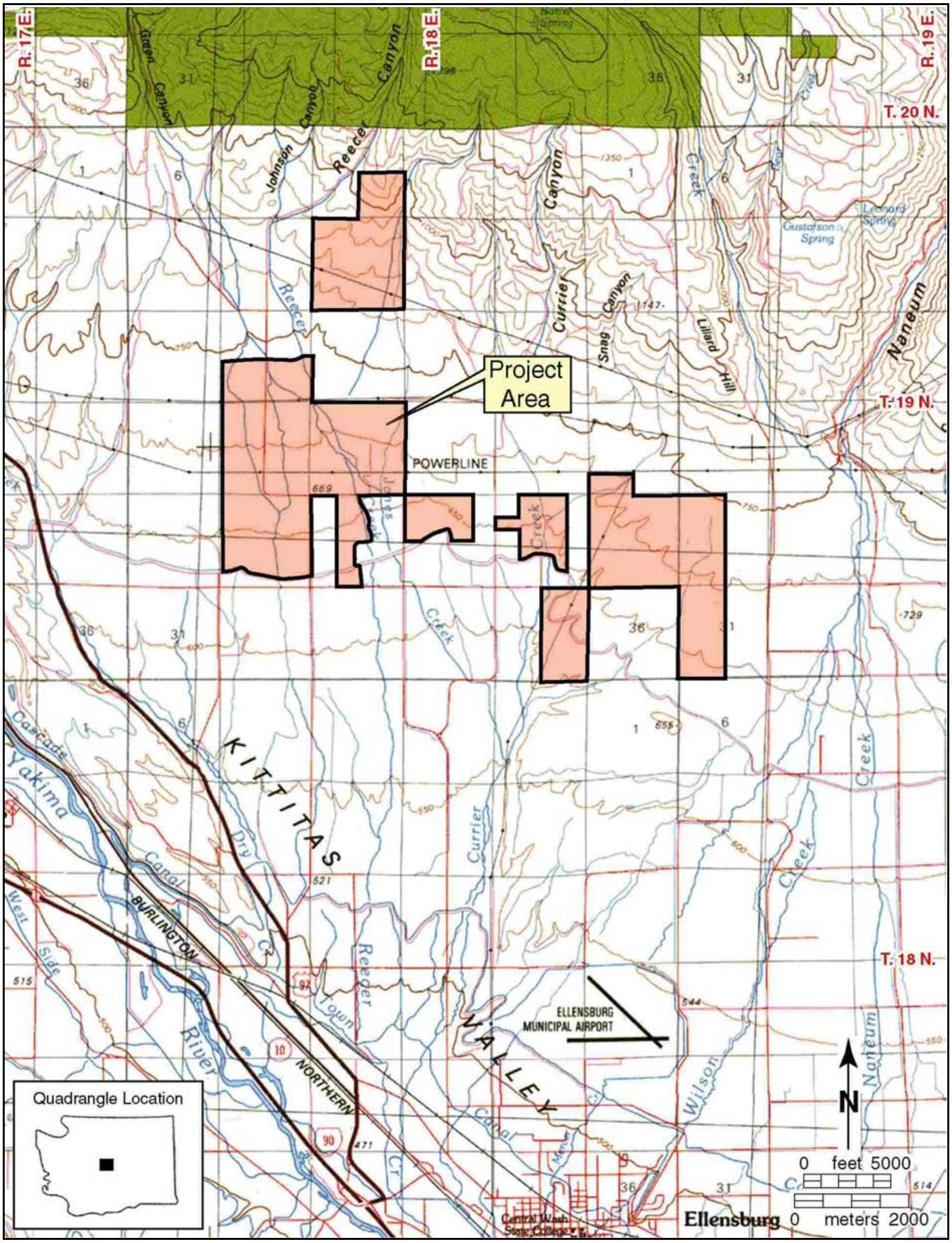

Figure 1.1 Project location (USGS Wenatchee, Wash., 1:100,000 scale, 1975).

features and their contexts and could cause the destruction of historic structures or buildings. Ground-disturbing activities will occur at most stages of infrastructure development, e.g., roads and tower foundations (including staging areas and work zones), the power collection system and substation, the interconnection system, meteorological towers, and the operations and maintenance facility. Depending on site conditions, construction of turbine foundations will create areas of surface and subsurface disturbance to a depth of from 8 to 35 feet deep and from 18 to 42 feet in diameter. The power collection system will also disturb surface and subsurface sediments. Installation of underground cable by trenching would require excavating an open trench 2 to 4 feet deep, laying cables in the trench, and then backfilling the trench; installation by plowing involves directly plowing the cable into the ground. Overhead connection cables and the construction of the transmission line require construction along a corridor 8 to 12 feet wide plus temporary laydown and work areas around the base of each pole. The poles would be placed in holes drilled by an auger. The extent of disturbance associated with the construction of the transmission line is currently not known, but construction procedures would entail drilling holes for the transmission structures, construction of the structures on site, and preparation of staging and work areas. The substation requires approximately 2 acres that will have to be cleared and graded. If the Operation and Management facility is located next to the substation, an additional 2 acres would be cleared and graded.

1.2 Report Structure

The following report presents the results of studies undertaken to identify and evaluate historic properties that might be affected by construction of various Desert Claim Wind Power structures, utilities, and facilities. The report is divided into six chapters that present the results of archival and background research about the natural and cultural setting, develop expectations, describe field methods and results, and conclude with recommendations.

The first two chapters, including this one, provide background information on the project regarding the natural and cultural history of the project area. Sections in these chapters summarize the region's geology, geomorphology, soils, climate, and vegetation and present an overview of the prehistory and history of the region. Chapter 2 also includes a summary of archaeological researches that have been conducted in the region. The cultural background includes a summary of the cultural history sequence used to organize the human prehistory of the south-central Columbia Plateau culture area and summarizes the ethnography, ethnohistory, and history pertaining to groups living in the vicinity of the project. Chapter 3 discusses expectations of finding historic and prehistoric archaeological materials and presents the conceptual framework used to organize the fieldwork. The methods employed to discover potential cultural resources are described in Chapter 4 and Chapter 5 summarizes the results of the archival research and field survey. The final Chapter 6 discusses the significance of the cultural resources identified within the Project boundaries and presents recommendations for their treatment.

2. NATURAL AND CULTURAL SETTING

2.1 Natural Setting

The Desert Claim Wind Power project is located in Kittitas Valley at the western margin of the Columbia Basin physiographic province in northwest Kittitas County (Waitt and Swanson 1987). The valley is located in the upper Yakima River basin near the western limits of the Columbia River Basalt Group (CRBG) and is bounded to the north and west by the Wenatchee Mountains and the Cascades Range, respectively. To the south is the Yakima River and Manastash Ridge farther south; to the east is the Columbia River. Local outcrops of basalt belong to the flows of the Grande Ronde Member of the CRBG extruded during the Miocene between 17.0 and 15.5 million years ago. The valley is the topographic expression of a broad syncline formed by downwarped rocks and sediments of the CRBG and the Ellensburg Formation. (The Ellensburg Formation is conformably intercalated with flows of the Grande Ronde Basalt and consists of volcaniclastic sedimentary rocks that range from siltstone to cobble conglomerate composed of silicic to intermediate volcanic clasts.) The syncline is flanked by the Wenatchee Mountains to the north and Manastash Ridge south of the Yakima River. These two ridges are located at the northern end of a set of generally east-west-trending anticlines, known as the Yakima Fold Belt, that ranges along the west side of the Columbia Basin (Reidel et al. 1994; Waitt 1979; Walsh et al. 1987).

The surface geology of the Kittitas Valley is composed of Pliocene and Pleistocene gravels underlying alluvial fans and terraces fringing the base of the Wenatchee Mountains. Small outcrops of the underlying Grande Ronde basalt rise up through these alluvial gravels and the older gravels have been prograded by younger fans and colluvium; Holocene fans overlie all the terraces (Waitt 1979; Walsh et al. 1987).

In the western Columbia Plateau, the Yakima River and its tributaries deposited the Pliocene Thorp Gravel that unconformably overlies the Ellensburg Formation in the Kittitas Basin (Fecht et al. 1987). The Thorp gravel ranges in age from 3.8 to 4.4 million years ago and consists of main stream alluvial deposits and tributary deposits. The tributary deposits typically form terraces that grade to the main stem terraces but tributary alluvial fans occasionally spread over main stream surface during periods of aggradation. Like the surface of the main stream terrace, there is no evidence that the Thorp tributary terraces have ever been buried by anything but a veneer of incidental loess and tephra (Waitt 1979).

The Pleistocene Epoch began about 1.8 million years ago and persisted to the beginning of the Holocene about 10,000 years ago. The period is characterized by major environmental changes accompanying long periods of major accumulations of global ice in the form of continental ice sheets; at their maximum extent, these ice sheets covered up to 30% of the earth's surface. During the Late Pleistocene, 130,000 to 10,000 years ago, the Cordilleran ice sheet (the western and smaller of the two North American ice sheets) advanced and retreated several times; during the latest glacial maximum the ice sheet began advancing about 17,000-18,000 years ago and retreated abruptly with the onset of climatic warming about 14,000 years ago (Easterbrook 1993). The ice sheet was formed by the coalescence of valley glaciers in the mountains of British Columbia and flowed south overriding low mountain ranges in northern Washington, northern Idaho, and northwestern Montana. In north-central Washington the ice surface sloped from over 7000 feet (2135 m) elevation near the international border, where the ice was about 6000 feet (1830 m) thick, to about 1300 feet (400 m) elevation some 75 miles (120 km) to the south where the ice terminated.

The Cordilleran ice sheet advanced southward as lobes along trunk valleys but only the Okanogan lobe advanced far out onto the Columbia basin. The last-glacial Okanogan lobe scoured the basalt surface, built a large terminal moraine during its maximum stand, and formed many moraines, eskers, and other depositional forms during ice recession (Waitt and Swanson 1987:413). During the Pleistocene, glaciers temporarily plugged drainages, diverted the Columbia River to more southern courses, and impounded meltwaters in glacial lakes but had minimal and temporary effects on the drainage system in the Kittitas Valley. Instead, till and outwash accumulated as numerous small Cascades alpine glaciers descended as far as elevations of 2700 to 3000 feet into the Yakima and Naches River basins. Most glacial sediment accumulated during three Cascadian alpine glacial events: the Lookout Mountain Ranch Drift (older than the Kittitas Drift), Kittitas Drift (about 130,000-140,000 years old) and the Lakedale Drift (about 10,000-20,000 years old). Glaciers originating near Snoqualmie Pass advanced eastward through the upper Yakima River basin to about seven miles beyond Cle Elum, scouring the valley and deepening the Yakima River Canyon (Waitt 1979). Both nonglacial alluvium and glacial outwash were spread downvalley from Cascades moraines and consist of moderately to well-sorted sandy gravel comprising rounded stones of diverse volcanic, metamorphic, plutonic, and sedimentary rock types derived mostly upstream of the Kittitas Valley. Tributary alluvium is graded to the level of the deposits ranged along the syncline axis and is easily distinguishable by its consistent content of subrounded to subangular basaltic gravel. The tributary fans head along the mountain front at the mouths of canyons, but on interfluves merge upslope with steep fans of angular basaltic colluvium. Sand and silt layers, which probably represent fluvial overbank deposits, and loess occur mainly as minor beds (Waitt 1979).

Patterned ground occurs in the vicinity of the project area in the form of mounds and stone stripes. Mounds (also known as “biscuits” or “mima mounds”) are isolated, spatially well-bounded, circular piles of almost gravel-free loam that were observed in a few places on interfluvial flats in the project area. Stone stripes, elongate patterns of surficially exposed rock usually aligned with the direction of slope, were observed on the foothill slopes just north of the project area. Patterned ground features like these are characteristic of, but not necessarily confined to, mantles subject to intensive frost action (Kaatz 1959; Washburn 1956). The major theories of patterned-ground formation emerging from studies on the Columbia Plateau are: (1) they are the result of normal water erosion, (2) they are the product of burrowing animals (Cox and Scheffer 1991), (3) they reflect weathering controlled by the jointing pattern in the basalt bedrock, or (4) they are the consequence of intensive frost action under a periglacial climate (Kaatz 1959). (For another summary of patterned ground and its origin, see Washburn 1988.) Kaatz’s research on mounds on the south slopes of Manastash Ridge indicates an apparent correlation between the occurrence of mounds and the distribution of shallow eolian deposits. Sorted stone features, however, not only occur in conjunction with shallow eolian deposits but are also found on recent lava flows (Kaatz 1959). Kaatz observed patterned-ground features on 1) basalt bedrock, 2) dissected surfaces underlain by sedimentary conglomerates and sandstones of the Ellensburg Formation, and 3) on the moraine of the valley glacier which extended farthest east into Kittitas County. Mounds usually did not occur where the soil mantle is more than six feet deep over the weathered basalt surface. The ground between mounds are sorted stone nets and polygons and in early spring the surface between the mounds is a “sticky mass of clay and slippery rock fragments, and vehicles will become mired. During the summer the same surface will assume the character of a firm rocky roadbed” (Kaatz 1959:150).

The mounds may represent remnants of formerly uninterrupted aeolian deposits that were subsequently eroded. The material removed may have contributed to the loessial mantle now found at the east end of the Columbia Basin in the Palouse area. Grain-size analysis of aeolian deposits across the basin show that the sand content of the loess decreases with distance eastward from Quincy, suggesting that the Quincy Basin was a significant source area for the loess, along with the Pasco and Umatilla Basins. Lesser amounts of sediment were probably contributed by the Yakima and Walla Walla Valleys. Paleontological sites containing mammal bones indicate the main body of loess in the Palouse is Pleistocene in age with most of the loess predating the latest Missoula floods. Mount St. Helens tephras incorporated in the loess indicate minimum times of deposition ranging from 36,000 to 37,600 years ago. Busacca (1991) hypothesizes that earlier Pleistocene cataclysmic floods are ultimately responsible for the formation of the Palouse by making available large amounts of freshly deposited sediment available to the prevailing winds so that each flood triggered a new cycle of loess deposition.

The surface in the project area is underlain by gravels from the Kittitas Drift and the Thorp Gravels. A distinct break in surface topography marks the boundary between the eastern area of the project underlain by the Thorp Gravels and the surface underlain by the younger Kittitas Drift in the west portion of the project (Figure 2.1). Although vegetation cover and local relief do not differ markedly between the two surfaces, soils are often sensitive to changes in substrate conditions (Jenny 1991[1941]). The distribution of soil bodies on the soil map accompanying the 1945 soil survey shows the spatial extent of the two surfaces underlain by the Thorp Gravels and the Kittitas Drift (Figure 2.2).

Figure 2.1. View southeast from Katie Lane showing scarp between Thorp Gravels and Kittitas Drift (foreground)

Overall topography in the project area is relatively flat and open and exhibits a gradual north-south elevation drop of about 1000 feet over a distance of approximately five miles. Relatively low-gradient streams flow generally north to south across the Project and form shallow linear depressions in the otherwise relatively flat landscape (Figure 2.3).

2.2 Climate, Vegetation, and Soils

The Kittitas Valley is one of the driest regions in the Pacific Northwest due to the blockage of eastward moving marine air masses by the Cascades Range west of the valley. Moisture levels deteriorate rapidly on the eastern slope of the mountains within a few miles of the Cascades crest so that most of the land east of the Cascades is dry with a short growing season and low summer precipitation. Some marine incursions occasionally do occur, but a continental-type arid to semiarid climate prevails that is characterized by low levels of precipitation, warm-to-hot dry summers, and relatively cold winters. Annual precipitation at elevations between 2000 and 4000 feet averages 22 inches, with much of it falling as snow; in Ellensburg, the average annual precipitation is 8.5 inches and occurs mostly as snow between November and February.

Native vegetation in the project area lies within the area of the Columbia Basin occupied by the big sage/bluebunch wheatgrass zonal association. The vegetation communities in this association occupy the central driest part of the Columbia Basin and extend west to the foothills of the Cascade Range. The vegetation dominants are shrubs such as big sagebrush, stiff sagebrush, low sagebrush, and shadscale accompanied by large perennial grasses including bluebunch wheatgrass, Idaho fescue, giant wildrye, and Thurber needlegrass. The big sage/bunchgrass association is the most extensive element in the steppe mosaic of eastern Washington with essentially identical communities widely distributed in British Columbia, central Oregon, and southern Idaho and Montana (Franklin and Dyrness 1973).

Successional changes are most often associated with grazing, fire, or cultivation. Grazing most seriously affects the larger perennial grasses since they are preferred by livestock but are not adapted to withstand heavy grazing pressure. Big sage is the only vegetation dominant in the zone that is seriously affected by fire. Big sage is often completely killed by range fires, and although the other remaining vegetation dominants are able to regenerate from parts that survive underground, big sage must reoccupy the site by invasion and gradual expansion. Fire and overgrazing can result in development of an annual rangeland dominated by the exotic cheatgrass (*Bromus*). In prehistoric times, sagebrush was probably not as abundant as it is now because of fires.

Primary productivity in the big sage/bunchgrass zone is limited because most of the precipitation in the region falls during the fall and winter so that little moisture is available to plants during the growing season. As a result, carrying capacity for herbivores in this environment is limited and is expected to be lower than in the forested areas that border the western margins of the Basin. The abundance of animal biomass probably increases directly with precipitation (and elevation) up to the margins of the closed forest within the Basin.

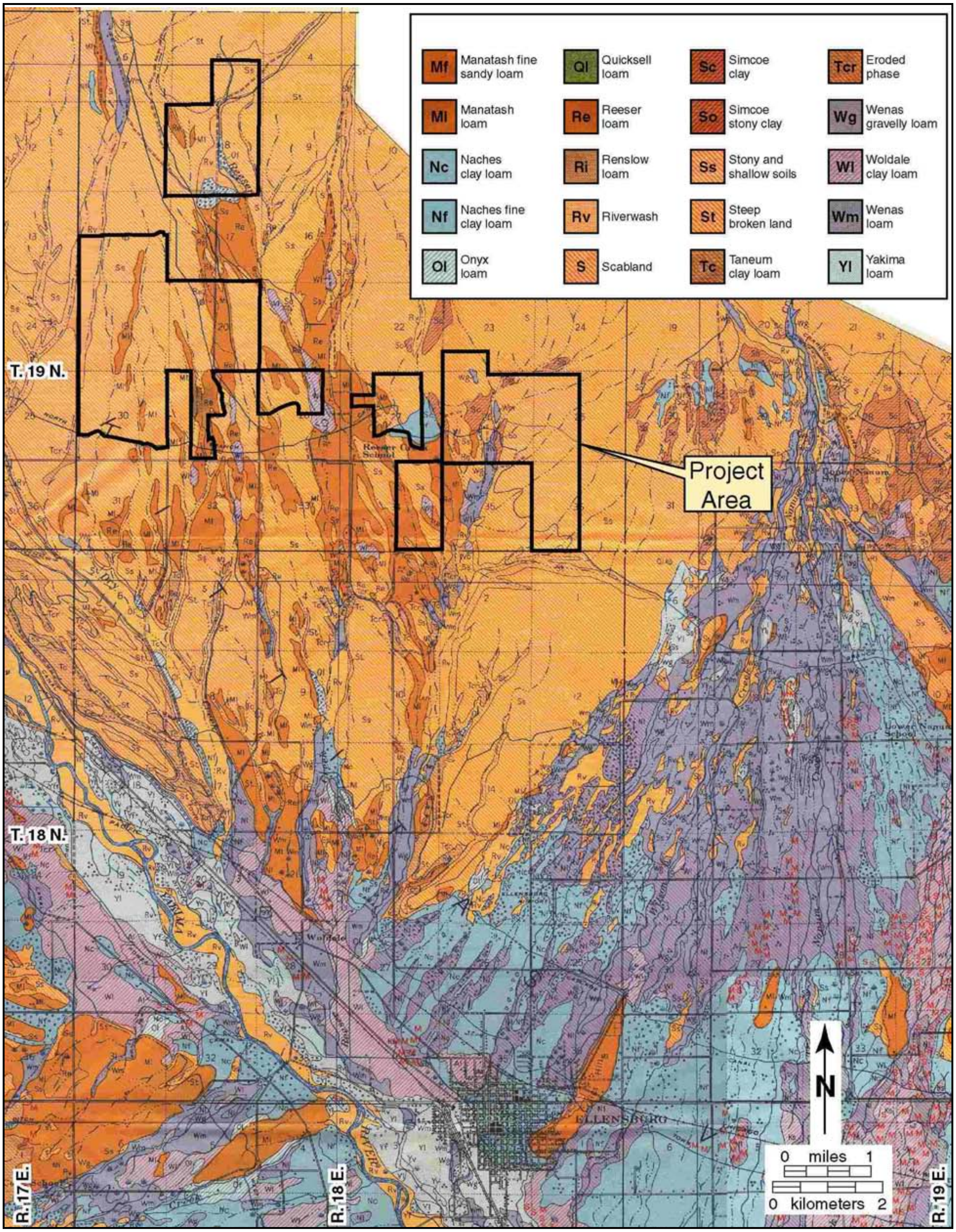

Figure 2.2. 1945 Soil Map of Kittitas County. Soil bodies are elongated in direction of major distributary channels on fans in vicinity of project area.

Figure 2.3. View south from T. 19 N., R. 19 E., Section 30, NW¼, showing topography of surface of Thorp Gravels.

The last official county soil survey was published in 1945 on the basis of fieldwork completed in the late 1930s. Soils in the project area belong to the Manastash, Woldale, Reeser, Naches, and the Simcoe series, with the bulk of the project area given over to shallow stony soils locally called Scabland (Smith et al. 1945). The shallow stony soils typically consist of a thin clayey layer overlying cemented gravels of the Kittias Drift or the Thorp Gravels.

2.3 Fauna

Steelhead trout and salmon were once numerous in the Yakima River and its tributaries. Chinook, coho, and sockeye salmon traveled up the Yakima and Naches rivers to spawn, and sockeye spawned in Cle Elum, Kachess, and Keechelus Lakes near the headwaters of the Yakima River, and in Bumping Lake in the Naches River watershed. Above the mouth of the Yakima River the total quantity of potentially exploitable fish diminishes with distance up the Columbia River and the number of spawning tributaries entering downstream. Resident fish, including Dolly Varden and rainbow trout, whitefish, and lampreys, also live in streams and lakes of the area (Schalk 1982).

Mule deer, antelope, mountain sheep, and bison probably constituted the principal large herbivores of importance in the prehistoric economies of this region. Mountain sheep require rock faces in their habitat and may have been restricted to scabland tracts and rugged basalt faces along the Columbia River and the major canyon systems tributary to it within the central Plateau. The hunting of ungulates in upland forests during the fall generally is assumed to be a part of the “ethnographic pattern” in the Plateau but earlier uses of upland environments are still poorly understood archaeologically (Schalk 1982:7).

Bison remains have been recovered from archaeological contexts in the southern Columbia Basin that have been dated through most of the Holocene Epoch, though it is generally believed that they were always present in relatively limited numbers (Schalk 1982). Shroedl notes an apparent increase in abundance between 4000 and 1500 B.P. It is expected that bison, like several other herbivores, would be more abundant during wetter intervals in the past, and the suggested increase in their frequency in post-Altithermal sites may reflect such a climatic episode (Schroedl 1973).

2.4 Paleoenvironments

The retreat of the Cordilleran ice sheet saw the establishment of pioneer tundra-like vegetation associations on the newly exposed terrain. Pollen data retrieved from Bonaparte Meadows in the Okanagan Valley (Mack et al.) to the north indicates that the initial species to arrive in the newly deglaciated terrain were dominated by non-arboreal plants such as *Artemisia* (sagebrush) and Gramineae (grasses) accompanied by low amounts of pollen from trees such as whitebark pine (*pinus albicaulis*) and western white pine (*pinus monticola*). Mack et al. (1979) surmised that the area around Bonaparte Meadows was characterized by open vegetation in which trees were a minor constituent. The presence of pollen from whitebark and western white pine indicate the climate was cooler and moister than today.

In the southwestern Columbia Basin, pollen retrieved from Carp Lake shows that the southwestern basin during the last glacial maximum (about 23,500 to 10,000 years ago) was characterized by periglacial steppe or tundra vegetation with climate conditions too cold to support forests at low altitudes. Besides the absence of temperate aquatic taxa, high amounts of spruce pollen imply that subalpine communities grew closer to the site than today but pine or spruce parkland was probably not widespread in the Basin because cold and dry conditions would have limited tree growth (Barnosky 1985). A marsh developed at the lake around 13,500 B.P. and was soon followed by the arrival of temperate riparian taxa. Modern steppe is inferred to have developed by 10,000 B.P. with the onset of warmer conditions (Barnosky 1985).

The pollen records from the Okanogan highlands show that warming was delayed until after 10,000 B.P.; as late as 9000 B.P. cool humid conditions persisted in some valleys along the northern tier of the basin. Pollen data from the northeastern Basin indicate cool conditions prior to 9500 B.P. Mesic conditions obtaining just south of the ice sheet apparently did not extend to the southwestern part of the Basin and the central Columbia Basin is inferred to have been a dry open landscape (Barnosky 1985).

Following the early colonization of the newly deglaciated terrain, a period of warming ensued and reached its maximum in the early Holocene between 12,000 and 6,000 years ago (Whitlock 1992). Beginning about 10,000 years ago and persisting to about 6900 B.P., the early vegetation assemblages that had colonized the area around Bonaparte Meadows in the Okanogan Highlands were replaced by sagebrush, grasses, and lodgepole and ponderosa pine, with sagebrush the dominant vegetation. The presence of these species suggest the development of a sagebrush steppe under a climate regime characterized by conditions that were warmer and drier than at present. Mack et al. (1979) also noted an erosional hiatus of about 1000 years between about 8300 B.P. and 7000 B.P. that may indicate a period of severe drought in the vicinity of Bonaparte Meadows. The record at Simpson Flats also parallels trends at Bonaparte Meadows during the early part of this period, but the rest of the pollen record is interrupted by a poorly age-bracketed erosional hiatus that may correlate with the gap observed at Bonaparte Meadows (Mack et al. 1979).

The sudden increase in pine pollen around 8500 B.P. at Carp Lake in the southwestern portion of the basin suggests that forests developed around the lake as the forest/steppe ecotone moved downslope to its present position south and east of the lake. However, this phase of postglacial cooling is not well supported by pollen data from other localities. For example, from 6900 B.P. to 4800 B.P. Bonaparte Meadows to the north saw continued and increasing warming climate indicated by abundant sagebrush and grass pollen accompanied by few (rare) conifer pollen. Pines were probably located much further upslope than they are today and alluvial bottoms and stream channels below about 3281 feet (1000 m) elevation were probably dominated by sagebrush (Mack et al. 1979). During this period, the northern frontier of the Columbia Basin sagebrush-dominated steppe was probably between 30 miles (50 km) to 60 miles (100 km) beyond its modern limit (Mehringer 1985; Whitlock 1992). Continued warming is also indicated in the pollen record at Simpsons Flat, but the local vegetation appears to have been dominated by Ponderosa pine with a grass understory, similar to the composition of the modern *Pinus ponderosa* Zone (Franklin and Dyrness 1973).

Climate conditions changed rapidly in the Pacific Northwest beginning about 5000 years ago and is recorded by sharp increases of fir and spruce pollen suggesting conditions had quickly become cooler and moister. About 4800 B.P. swift climate change at Bonaparte Meadows in the Okanogan Valley is indicated by a rapid drop in the amount of sagebrush pollen (sagebrush representation drops almost completely out of the record) while lodgepole and ponderosa pine pollen, and possibly Douglas fir, shows dramatic increases. Mack et al. (1979) believe these changes represent the formation of the modern Douglas fir forest in the Okanogan valley and signals a change to less-warm and dry conditions; however, there is no evidence for a short-term reversal to slightly cooler and moister conditions coincidental with neoglaciation observed at other localities in the Pacific Northwest (see also (Mehringer 1985, Whitlock 1992). At Simpsons Flat (Mack et al. 1978) a brief reversal in climate to slightly cooler moister conditions between about 4500 and 3100 B.P. is denoted by increases in fir and spruce pollen (probably from grand fir and engelmann spruce). This brief period of cooler climate is probably coincidental with the onset of neoglaciation.

2.5 Cultural Setting

2.5.1 Prehistory

The culture-historical syntheses that have been developed for the Columbia Plateau in general, and the mid-Columbia region in particular, are derived primarily from data retrieved during excavations in deeply stratified archaeological sites in alluvial settings along the Columbia and Snake Rivers. The focus on excavation of sites in riverine settings was due to the need to establish a chronological framework for understanding culture change in the Plateau and by the fact that most of the fieldwork conducted under the auspices of professional archaeological research in the Columbia Basin was carried out as “salvage” prior to imminent inundation by large hydroelectric public works projects (Galm et al. 1981). Much of the contemporary understanding of the archaeological record is still couched in terms of these early historical sequences. Several of these have been published (see Galm et al. 1981 for a detailed discussion of these schemes) but the sequence developed for the Vantage region will be followed in the following discussion of the major cultural changes on the Plateau in the last 10,000 years.

The earliest inhabitants of North America, known as Paleoindians, are believed to have arrived between 13,000 and 12,000 years ago. Their presence is marked by the appearance of a distinctive fluted spear point known as Clovis. The earliest radiocarbon ages associated with these types of points across the West date to about 11,500 years ago. The closest known occurrence of Clovis points is north of the project area near the town of Wenatchee where Clovis points were found in direct association with Glacier Peak volcanic ash dating to 11,250 B.P. (Mehringer 1989). The Clovis people are believed to have been highly mobile hunters whose economy was primarily focused on hunting mega-fauna species (such as the mammoth) that became extinct soon after the end of the last glaciation. Other projectile points, such as large stemmed, shouldered, and lanceolate styles, also are found in western North America and closely follow, or are contemporaneous with, the fluted points. In the Plateau, stemmed and lanceolate projectile points known as Windust or Western-stemmed have been found in sites and dated between 11,000 and 8000 years ago.

The early Windust phase of occupation in the Plateau has been documented by components ranging in age from 11,000 to 8000 B.P. at Windust Caves, Marmes Rockshelter, Granite Point, and Lind Coulee. Artifact assemblages considered typical of this phase include lanceolate and oval knives, a distinctive shouldered point known as Windust, large scraper planes, and utilized flakes. Edge-ground cobbles, bone awls, needles and atlatl spurs, and antler and shell artifacts are often found in the assemblages.

The Vantage phase is a Plateau-wide phenomenon that dates from about 8000 to 4500 B.P. and is considered to correspond to the Cascade phase defined on the lower Snake River by Leonhardy and Rice (1970). Artifact assemblages associated with this time period include the lanceolate “Cascade” style project point, lanceolate and triangular knives, scrapers, edge-ground cobbles, atlatl weights, bone awls, needles, and atlatl spurs. Few Vantage phase sites have been found in upland settings, suggesting that the major economic focus of people living during the Vantage phase was on the major river valleys. The time span of the phase coincides with the warmer Altithermal climatic period which may have made the uplands drier and a less productive hunting and gathering ground. Cascade-style projectile points have been found by private collectors around the shores of Lake Keechelus and Kachess (DePuydt 1990).

The Frenchman Springs phase persisted from about 4500 to 2500 B.P. and is characterized by an apparent increase in population, the proliferation of pithouses, and greater utilization of upland environments compared to the prior Vantage phase. Such apparent cultural shifts may be a response to increased mesic conditions following the early postglacial warming trend. Housepit sites are found along the Columbia River and its tributaries as well as on terraces of small streams, at comparatively high elevations, and out in the middle of the basin. Other sites and isolated artifacts are found on all the major landforms and ecological zones of the southern Plateau. The presence of large, nonportable plant processing mortars in upland sites indicate a more intensive use of upland environments. Artifact assemblages include greater proportions of crypto-crystalline (CCS) material as toolstone and include greater numbers of groundstone and cobble tools. Stemmed and corner-notched points predominate and hopper mortars and pestles become much more common. Net sinkers indicate greater emphasis on fishing than in the preceding phase. These traits are considered to represent the early emergence of the Plateau cultural pattern which continued until the historic period (Ames et al. 1998; Galm et al. 1981).

The Cayuse phase begins around 1000 B.P. with the appearance of small, corner-, basal-, and side-notched projectile points. This phase is marked by an increase in population indicated by a shift to larger, semipermanent, nucleated villages along the Columbia and Snake Rivers, an increased emphasis on fishing, and the continued exploitation of upland resources. This is considered to represent the full development of the ethnographic pattern that persisted up until the arrival of the horse (Ames and Marshall 1980-1981). Cayuse Phase sites have been found in a broad array of environmental settings and landforms such as ridgelines, natural springs, mountain benches, and small tributary streams in the Cascades Range. A number of specialized functions and seasonality have been ascribed to these sites including root gathering, hunting, fishing, and lithic quarrying. Artifact assemblages consist of end scrapers, lanceolate and pentagonal knives, net weights, pestles, grinding stones, hopper mortar bases, and cobble implements. Wood shafts, cordage, and mats have also been recovered along with bone shafts, bone beads, bone points, and shell (DePuydt 1990).

The horse was introduced about 200 years ago at the end of the Cayuse phase bringing in its wake new technology and tools, and a greater degree of mobility that allowed groups such as the Yakama to travel west down the Columbia River to Fort Vancouver and east to the Plains. Prior to direct contact with whites, European and American trade goods such as metal knives and brass bells made their way to central Washington from the Pacific coast and the Plains through native trade networks. Along with the horse and trade goods, disease also entered the Columbia Basin with devastating effects. The earliest smallpox epidemic probably spread westward from the Missouri River in 1775; a measles epidemic in Yakama territory in 1852-1853 killed two out every five Yakama. Between 1805 and 1853, the Yakama population declined from an estimated 7000 people to 2000 (Campbell 1989; Schuster 1990:43-51).

2.5.2 Ethnohistory and Ethnography

The project falls within an area known as the Plateau culture area (Walker 1998) which is broadly defined as the area drained by the Columbia and Fraser Rivers. The region is bordered on the south by the Great Basin culture area, the Northwest Coast to the west, the Subarctic to the north, and the Plains on the east. The Plateau encompasses several large linguistic groups – the Interior Salish and the Sahaptin include the most members, but other smaller groups are represented by the Athapaskans, Kootenai, and Cayuse. Elements of Plateau cultural patterns include linear settlement patterns in riverine settings, reliance on a diverse resource base that incorporated anadramous fish and extensive game and root resources, a complex fishing technology similar to the one employed on the Northwest Coast, mutual cross-utilization of subsistence resources among the various groups comprising the populations of the area, extension of trade networks through institutionalized trading partnerships and regional trade fairs, limited political integration, and relatively uniform mythology, art styles, and religious beliefs (Walker 1998).

The Yakama, Kittitas, Klikitat, Taitnapam, and Wanapam were closely related Sahaptin speakers but politically independent bands and villages of families who once occupied contiguous territories in the south-central part of the state of Washington. The project area falls within the traditional use area of the Kittitas who occupied a number of villages along the upper Yakima River near the project area. Four of these villages are located near the project area (Table 2.1). The largest settlement was about one mile upriver from the present town of Thorp across from the mouth of Taneum Creek. Four miles below Thorp was a village of about 400 people and another of approximately the same size was located about seven miles northeast of Ellensburg. Another major village was near the mouth of Teanaway Creek. Two miles below Ellensburg on the west side of the Yakima River was Kittitas, which was a favorite summer gathering place (Ray 1936; Schuster 1998:327-328; Spier 1936).

Table 2.1 Nineteenth Century Kittitas Villages in the Vicinity of the Desert Claim Wind Power Project.

VILLAGE NAME	DESCRIPTION
na′ nam	About 400 people located on Naneum Creek approximately 7 miles northeast of Ellensburg.
yum*i* ′c	About 400 people located about 4 miles below Thorp on the east side of the Yakima River.
kla ′la	About 500 people located about 1 mile above Thorp opposite the mouth of Taneum Creek.
tia ′naw*i*ns	About 50 people located at mouth of Teanaway Creek.

There is some uncertainty regarding the distribution and identity of peoples occupying the upper Yakima River basin during the 19th century in part due to the position of the Kittitas Valley on the boundary between the two major linguistic groups of the Interior Salish speakers to the north and Sahaptin speakers to the south. As a result, the Sahapatin-speaking Kittitas are considered most closely related linguistically to the Yakima to the south but maintained close relations with the Interior Salish-speaking Wentachi to the north.

Evidence introduced at the Indian Claims Commission hearings (Chalfant 1974) based on fieldwork by Teit was used to propose that most of the area north and west of the Columbia River was occupied by Salish speakers during the early and mid-19th century. When disease decimated their population these people were subsequently gradually displaced or absorbed by Sahaptin speakers. Early observers in the area generally designated these groups by the name *Pisquows* and the term was used to refer to all people living along the Columbia River from about the Methow River south to Priest Rapids. Later usage tended to be restricted to a single group living on the Wenatchi River. It appears that there were originally six bands of *Pisquows*, four who lived south of the Wenatchee Mountains and two on the east side of the Columbia River. The four groups who lived south of the Wenatchee Mountains were found by Lewis and Clark on the Klictitat River and were subsequently observed on the upper Yakima River between Selah Creek and Kachess Lake; the principal group was the *Pcwanwapam* who were centered around Ellensburg(Chalfant 1974). Chalfant (1974) proposed that these groups be called the *Pisquows proper* for the period of the early 19th century. Their gradual assimilation into the Sahaptin stocks, and their more recent identity as Kittitas or *Pcwanwapam*, as well as their inclusion in the Yakima Treaty under the term *Pisquows* distinguishes them from the Wenatchi proper and other Salish bands on the Wenatchee, Entiat, and Chelan Rivers. Their distinction from Wenatchi is further seen in the 1855 treaty itself, in which the *Wenatshapam* and *Pisquouse* are named separately, although the terms are often applied to the same group (Chalfant 1974:331).

Winter villages were usually located along the Columbia River and its major tributaries and tended to be located near the confluences of larger tributaries because of milder winter temperatures and availability of firewood. In the Yakima Valley, villages followed this same trend and were usually located where tributaries joined the river. Villages were rarely moved and, though the number of people living in them varied from year-to-year and season-to-season, villages tended to be characterized by stable populations over the long run. The number of inhabitants in a village varied throughout the year depending on locally available resources. For example, some villages near important root-digging grounds, such as Kittitas, were most populous in May-June. Another village near the south end of Lake Cle Elum was an important summer camp where people congregated in June and July to fish for salmon (DePuydt 1990).

The annual round in the Columbia Basin during the ethnographic period was organized around the winter village and summer stays at various resource locations. In the spring groups who had wintered together dispersed and headed to root gathering, hunting, and fishing locations. During the earliest part of the spring season, root collecting was the primary focus and people living in the Kittitas Valley would have been able to find root plants such as *Lomatium* on rocky slopes and bitterroot in the hills to the south, north, and east of the valley. Camas was available in meadows where more moisture was available (Ray 1936). The fishing season began when the spring chinook salmon run started and fish, including chinook, sockeye, and summer steelhead, were harvested through the summer. Other food items gathered during the summer were golden currant, gooseberry, dogwood, serviceberry, and chokecherry. During the fall hunting forays to the uplands were organized (DePuydt 1990). Food gathered and processed for storage was brought back to the winter village and stored.

The Kittitas, Lower Yakima, Priest Rapids Wanapum, Wenatchi, and the Columbia would gather at the villages of *N'camca'mcin* and *Cilaxan* near the present town of Kittitas to gather camas, trade, dance, and race horses. After meeting at these camas grounds, the Kittitas would either move to Wenatchapam on the Wenatchee River near Leavenworth for the second major run of salmon or to various spots along the Yakima River and at the mouths of Keechelus, Kachess, and Cle Elum Lakes. The outlet of Cle Elum Lake was the most popular of the upper Yakima River fishing locations with as many as 1000 people congregating in July (DePuydt 1990; Ray 1936).

Except for the fishing camps, summer (or temporary) camps were located in the uplands or open prairie areas. The preferred shelter used in these camps was the conical mat house constructed as a tipi-like framework of poles covered with tule mats. The conical mat house was used during the spring, summer, and fall harvesting periods.

The effect of White contact upon the Indians of Washington was, of course, tremendous. Villages were decimated by newly introduced diseases, food resources were destroyed or reduced so materially by hunters and settlers that tribes frequently starved, and their best land was taken by homesteaders (Smith 1953).

By the 1850s Yakama political influence had coalesced around two groups separated by Wenas Creek as a response to threats of white encroachment. South of the creek lived the Lower Yakama, led by Kamiakin and his brothers. To the north were the Upper Yakama, or Kittitas, led by Teias and Owhi (Schuster 1990). Such consolidation of influence probably contributed to the shape of the treaty negotiations with Isaac Stevens during the Walla Walla Council at Camp Stevens in 1855. The result of the treaty was the new Yakama Nation comprised of 14 formerly independent bands or tribes which were thereafter treated as if they were a single political entity (Schuster 1990).

According to the treaty's terms, the people of the Yakama Nation ceded 29,000 square miles to the U.S. government and retained a tract of about 2,000 square miles for their "exclusive use and benefit". The government promised to establish two schools as well as two blacksmith shops, a gunsmith shop, a carpenter's shop, a wagonmaker and plowwright's shop, a sawmill, and a flour mill. A doctor and a hospital were also provided (Schuster 1990).

2.5.3 History

Settlement began gradually in the Kittitas Valley during the mid-nineteenth century, encouraged somewhat by passage of the Donation Land Act of 1850 and the Homestead Act of 1862 but mostly by mining booms in Idaho and southern British Columbia. The first real influx of settlers into Kittitas Valley was in 1869 following discovery of gold in Swauk Creek in 1867. By 1875 claims were being worked along the Yakima and Cle Elum Rivers and Ellensburg began to take shape as a major supply center for mines in the region during the 1870s and 1880s.

2.5.3.1 Stock Raising

Mining activity in the early 1860s stimulated the livestock business in the Pacific Northwest, and during the late 1860s and the early 1870s there was a steady movement of cattle from western Oregon to the grass lands of eastern Oregon and eastern Washington. However, cattle prices started to drop in 1872 and low prices persisted until the end of the 1870s; at the same time, sheepmen and farmers were arriving in the region and successfully agitating against large cattle herds running on open range. By 1880 free range in eastern Washington had virtually disappeared.

Cattle were first brought into Yakima Valley in 1861, and between 1861 and 1869 cattle drives passed through the Kittitas Valley to the Cariboo mines on the Fraser River. Beginning in 1869 and persisting until 1879, Yakima cattle were summer grazed in the Kittitas Valley and then driven over Snoqualmie Pass in the fall to Puget Sound markets. No hay was put up for winter feed and subsequently heavy losses were experienced during the severe winter of 1880-1881 (Whitley 1949). During the period 1861-1881, the typical farmstead consisted of a cabin, a corral, and an orchard. Gardens and small grain fields were planted but the practice of storing hay for winter feed did not become general until after the disastrous winter of 1880-1881 (Whitley 1949:24).

The devastation wreaked on the cattle herds during the winter of 1880-1881 spelled the end of the open range. In the Kittitas Valley, stockmen began to irrigate alfalfa and clover to put up winter feed for the cattle. As the markets in the mining districts dried up, cattle were increasingly driven to Puget Sound or to the Willamette Valley. Some cattle were also shipped to Montana to stock the growing cattle industry in eastern Montana (Oliphant 1932). Moving cattle out of the valley to other markets was made much easier when the Northern Pacific mainline was constructed through the valley in 1886 on its way to Tacoma. Ellensburg was made the headquarters for the Cascade Division of the NP and the region experienced another influx of, mostly urban, population. The Chicago, Milwaukee, St. Paul and Pacific railroad completed its transcontinental line through the valley and over Snoqualmie Pass in 1909.

Stock driveways were established to uplands along ridgelines and other easily traveled routes to move livestock from winter feed areas to summer pasturage. Due to overgrazing by cattle, sheep became more common on degraded rangeland and eventually became more important than cattle as they fared better in the mountains and were more efficient grazers.

As late as the turn of the century the winter range of grazing lands in the basins draining the eastern Cascades slopes were still considered to be in poor condition. The better portions were fenced, but the rest had been grazed to a point where it was almost impossible for cattle to make a living, and sheep could find only a few weeks of grazing. Improvement in range conditions from 1903 to 1952 was instigated by ownership and control of the range through fencing, mechanized farming, and land conservation practices. The most influential of these three factors was the reduction of grazing pressure as horses were replaced following the introduction of mechanized farming (Chohlis 1952).

2.5.3.2 Agriculture

It took some time for early arrivals in Kittitas Valley to adapt to the fact that the valley is, in fact, arid. Some of the earlier farmers, being from the Willamette, Walla Walla, or Klictitat areas, tried to raise wheat and other crops more suited to those areas (Nesbit and Gates 1946) but by 1905, acres planted in wheat had diminished dramatically and were replaced with high-quality timothy hay which was in great demand in the Puget Sound area. Orchard trees were also discovered to do well in the valley if water could be supplied so that apples, pears, and other temperate fruits and vegetables were planted (Figure 2.4).

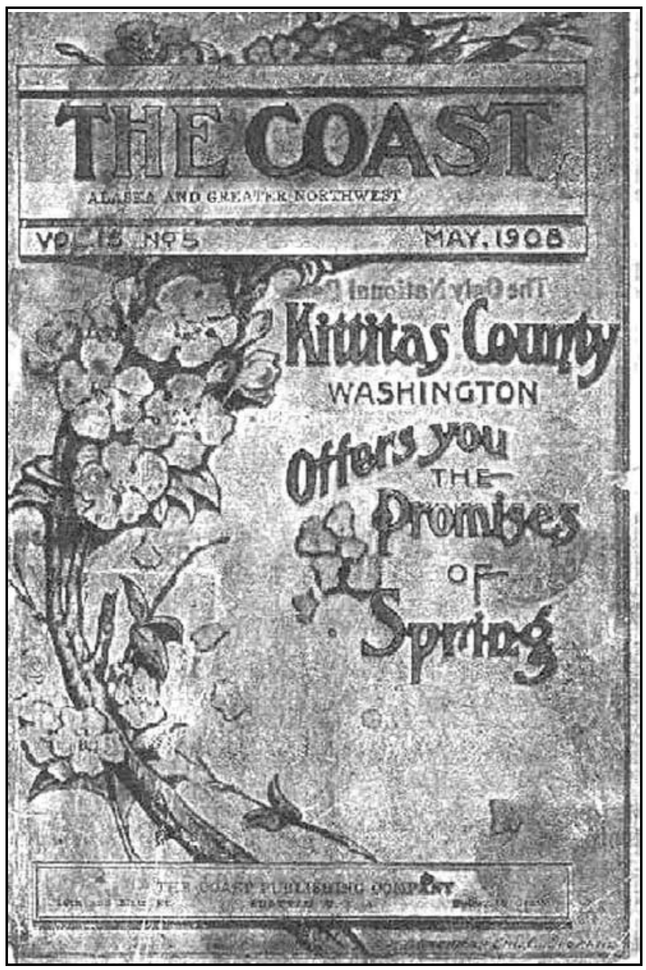

Figure 2.4. A 1908 magazine cover advertising Kittitas Valley.

Partially irrigated land in the valley derives from creek rights, but the water from this source gives out usually by the middle of June and it was quickly observed that the major stumbling block to the development of agriculture was the lack of moisture during the late summer drought. Early irrigation systems were simply diversion of creeks into private or partnership ditches but as more complex and expensive projects were required to respond to the demand for more irrigated acreage, private irrigation companies were organized by local farmers and bankers. Prior to involvement of the Bureau of Reclamation in the irrigation projects, the irrigation of Kittitas Valley was by private means. The early irrigation networks tended to be small and irrigated modest patches of land but were soon followed by larger, more complex projects. The Town Canal in Ellensburg was built in 1885 by the City of Ellensburg and was capable of irrigating 12,000 acres. The West Kittitas Canal was built in 1889 and could irrigate 10,000 acres. Finally, the Cascade Canal was built in 1903-04 and was planned to irrigate 25,000 acres. Several other small ditches, irrigating an aggregate of 7000 acres, were also operating during the time of the larger ditches (Whitley 1949). The years 1890 to 1910 marked the formative period in reclamation history in Washington. By 1909 the number of irrigated farms in the region had risen to 5716, up from 2316 in 1899 and 714 in 1890 (Nesbit and Gates 1946).

The greatest development in the irrigation networks occurred when the Bureau of Reclamation (BOR) was established under the National Reclamation Act in 1902. The BOR began topographic surveys in 1905 for a high line (eventually the North Branch and South Branch Canals) to irrigate lands above the privately irrigated lands but the project was considered too expensive at the time and was deferred until later. Work on the North Branch Canal started in 1928 (Morrison-Knudson was the contractor) and was completed in 1929. Water was first turned into the canal in 1931, but actual water deliveries were delayed until 1932 because of a break in the Yakima River tunnel (Figure 2.5).

Irrigation substantially increased land values which made farms in reclamation projects some of the most expensive in the state. In Kittitas County the value of irrigated land ranged between 100 and 150 dollars per acre so that farming on irrigated land placed a high premium on commercialized, highly capitalized agriculture utilizing intensive methods and crops that brought relatively high returns. The average size of an irrigated farm in Kittitas County in 1910 was about 108 acres. Kittitas County's farmers accounted for three-fourths of the irrigated timothy hay produced in the state in 1910 and three-fifths of the irrigated clover (Nesbit and Gates 1946).

Before World War I the principal market for agricultural products from Kittitas County was the expanding urban market in Puget Sound. These urban markets also encouraged the development near the cities of small, intensely cultivated tracts on which a wide variety of fruits and vegetables were grown to supply luxury foods to urban markets (Nesbit and Gates 1946).

Irrigation and the completion of the Northern Pacific and the Great Northern Railways to Puget Sound during the 1880s and 1890s brought striking changes in eastern Washington and the West in general. The effect of the railroads on the interior areas of Washington transformed agriculture from a small-holder subsistence enterprise to a capitalistic, commercial enterprise (Nesbit and Gates 1946).

By the mid-twentieth century the Project area was characterized by a well-developed mixed-farming complex with hay growing and grazing, along with some grain production, the dominant activity. Ranches were located on the fans and slopes above the North Branch canal where the poorer soils were located and where there was easy access to good rangeland in the Wenatchee Mountains. Whitley in 1949 observed that many of the farm buildings were of cheap construction and in poor repair. He also comments that this area was the least desirable part of the valley and utilized only for pasturage and even that was of very poor quality. Soils were considered so shallow and stony that they would have been of little value if water were pumped to the area (Whitley 1949).

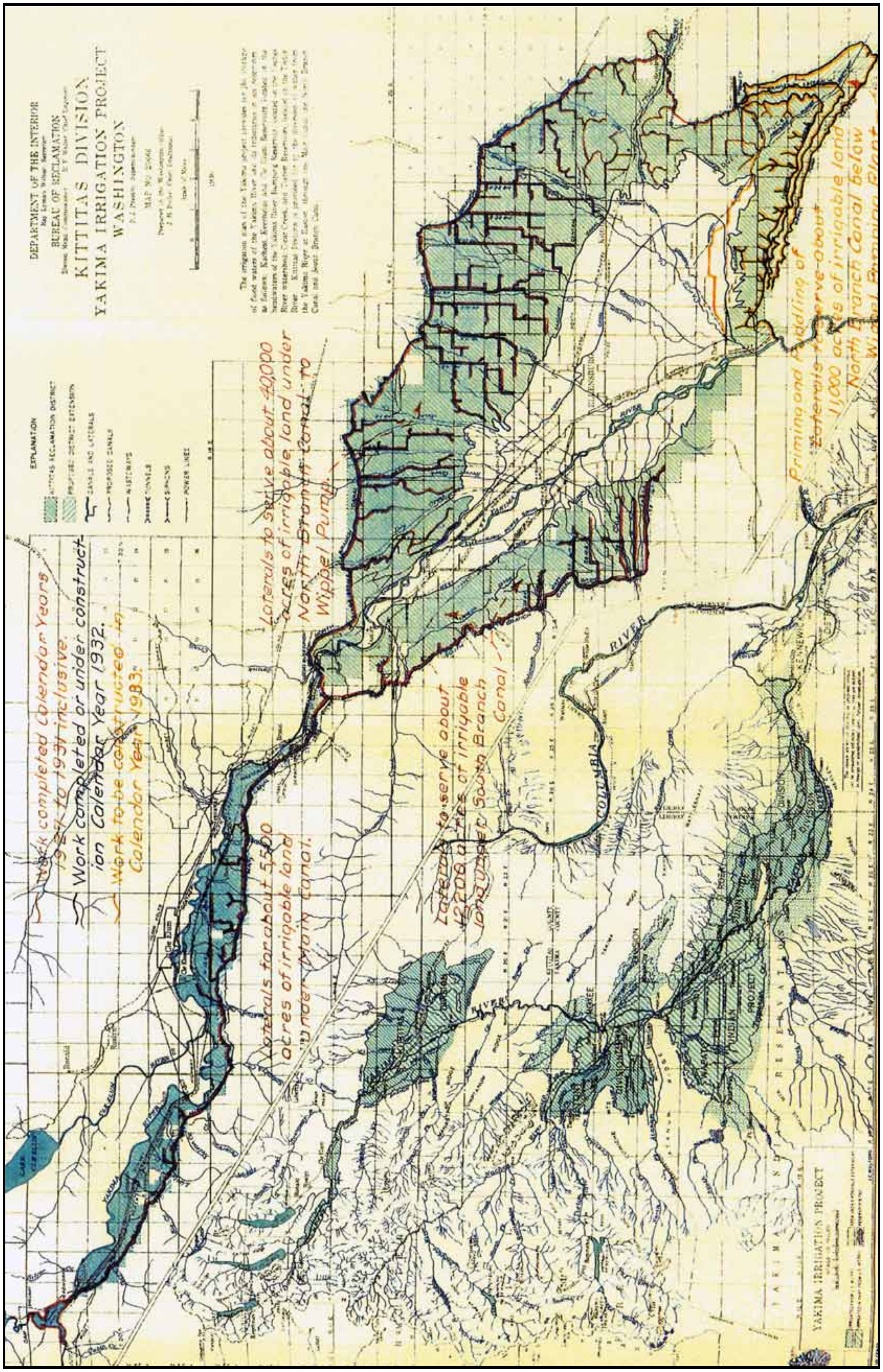

Figure 2.5. Map of the Kittitas Division, Yakima Irrigation Project, in 1930 (Pfaff 2002:Figure 12).

2.5.4 Previous Archaeological Research

Prehistoric archaeological materials have been found in Caribou and Little Caribou Creeks draining the foothills north of Kittitas Valley, in the Trail Creek system in the foothills to the northeast, and at Grissom's Ranch within the valley proper (Hollenbeck and Carter 1986). The limited amount of excavation in the upper Yakima River valley currently precludes a complete understanding of prehistoric land use patterning in the valley, but a Clovis point found near Lake Cle Elum and later-period Cascade-like points (Vantage phase) found in the Keechelus-Cle Elum area indicate the upper Yakima basin was visited beginning soon after deglaciation and used to at least the mid-Holocene (summarized in DePuydt 1990). Cultural resources investigations for fiber optic and power transmission lines passing through the valley have identified other archaeological and historical sites related to settlement, mining in the Cle Elum vicinity, stock raising, logging, railroads, and the development of irrigation.

Twelve cultural resources projects have been wholly or partially located within one mile of the project area (Table 2.2).

Table 2.2 Previously Completed Cultural Resources Projects Within One Mile of the Desert Claim Wind Power Project Area.

AUTHOR(S)	DATE	REPORT TITLE	RESULTS (Sites recorded within one mile)
Archaeological Frontiers, Inc.	2002	Cultural Resources Survey of the Proposed BPA Schultz-Hanford Area Transmission Line Right-Of-Way, Kittitas, Grant, and Benton Counties, Washington.	-
Bicchieri, Barbara	1994	Reecer Canyon Quadrangle Random Survey: A Report to the Archaeological and Cultural Task Group of the Yakima Resources Management Cooperative.	+
Chapman, Judith S., and John L. Fagan	1999	Cultural Resources Survey of Irrigation Features Within the Proposed Level 3 Fiber Optic Line in Kittitas and Yakima Counties, Washington.	-
DePuydt, Raymond	1990	A Cultural Resources Survey Along Puget Sound Power and Light's Proposed Upgrade of the Wanapum-Hyak Electrical Transmission Line.	-
Historical Research Associates, Inc., and Dames & Moore, Inc.	1996	Results of a Cultural Resources Assessment for Olympic Pipe Line Company's Proposed Cross Cascades Petroleum Products Pipeline, Washington.	-
Madden, Shan	1999	Johnson Thin Cultural Resource Inventory #06-17-03/99-02	+
Miller, Fennelle de Forest	2000	"Lillard Hill Lithics": Archaeological Field Testing of Site 45KT1718, Kittitas County, Washington.	+
Miller, Fennelle de Forest and Morris Ubelacker	1994	Archaeological and Cultural Resources Management Cooperative Interim Report 1993, With Revised Workplan 1994.	-
Ozbun, Terry L. and John L. Fagan	2000	Archaeological Monitoring, Level 3 Fiber Optic Project, Washington Segment of Seattle to Boise City Pair	-
Ozbun, Terry L., Julie Schablitsky, Judith S. Chapman, and John L. Fagan	2000	Cultural Resources Survey of Route Modifications and Shovel Testing of Sites for Level 3's Proposed Fiber Optic Line from Seattle to Boise, Central Washington Reroutes Addendum 2.	-
Pinyerd, David	2002	Cultural resources survey of the US Cellular Ellensburg II Site #388320.	+
Thompson, Gail	1998	Archaeological Survey of Selected Areas Along the Proposed BPA Seattle-to-Spokane Fiber Optic Cable Project in King, Kittitas, Douglas, and Grant Counties, Washington.	-

Thirty-four prehistoric and historic sites have been recorded within the project area or within one mile of the project boundaries (Table 2.3). Of these, 23 sites are prehistoric lithic scatters (n =

7) or isolated artifacts (n = 16) recorded on the Wenatchee National Forest in the foothills just to the north (Madden 1999; Bicchieri 1994). The ten previously recorded historic cultural resources include two sites that are within the boundaries of the project: the Springfield Farm, recorded in 1976, and the North Branch Canal, previously inventoried (Pinyerd 2002) but recorded on Washington State Inventory forms during this project. Six other historic buildings also have been inventoried. Four of the buildings (OAHP 19-863 through -866) are part of the Green Canyon farm/ranch complex and the other two are a single-family residence and an agricultural building on Smithson Road, respectively. Two historic sites have been recorded in the foothills and include a possible sheepherders camp (FS 1898) and a cairn with associated fencing debris (45KT1049h).

Table 2.3 Previously Recorded Cultural Resources Within the Project Area and Within a One Mile Radius Around the Project Boundaries.

SMITH-SONIAN (45KT-)	OTHER NUMBERS[a]	DESCRIPTION	LANDFORM	REFERENCE
513h		Robbins Homestead/Springfield Farm; within project boundary.	Fan	Lentz 1976
1032		Lithic scatter: flakes and a core	Foothills	Bicchieri 1994
1035		Isolate: Biface midsection	Foothills	Bicchieri 1994
1036		Isolate: CCS interior flake	Foothills	Bicchieri 1994
1037		Isolate: CCS interior flake	Foothills	Bicchieri 1994
1038		Two chert exterior flakes	Foothills	Bicchieri 1994
1039		Isolate: CCS biface fragment	Foothills	Bicchieri 1994
1040		Isolate: CCS flake	Foothills	Bicchieri 1994
1041		Isolate: CCS interior flake	Foothills	Bicchieri 1994
1042		Isolate: CCS biface tip	Foothills	Bicchieri 1994
1043		Isolate: CCS interior flake	Foothills	Bicchieri 1994
1044		Isolate: CCS interior flake	Foothills	Bicchieri 1994
1045		Isolate: CCS chunk	Foothills	Bicchieri 1994
1046		Isolate: CCS exterior flake	Foothills	Bicchieri 1994
1047		Isolate: CCS flake	Foothills	Bicchieri 1994
1048		Isolate: CCS interior flake	Foothills	Bicchieri 1994
1049h		Rock cairn and historic fencing debris	Foothills	Bicchieri 1994
1053		Isolate: CCS chunk	Foothills	Bicchieri 1994
1054		Lithic scatter	Foothills	Bicchieri 1994
1718		Lithic scatter	Foothills	Miller 2000
-	FS 1873	Lithic scatter	Foothills	Madden 1999
-	FS 1895	Lithic scatter	Foothills	Madden 1999
-	FS 1898	Historic camp, possibly sheepherders camp	Foothills	Madden 1999
-	FS 1899	Logging sled runner	Foothills	Madden 1999
-	FS 1900	Lithic scatter	Foothills	Madden 1999
-	FS 2001	Isolate: CCS tertiary flake	Foothills	Madden 1999
-	OAHP 19-862	Single-family house	Fan	Pinyerd 2002
-	OAHP 19-863 to -866	Green Canyon Ranch complex	Fan	Pinyerd 2002
-	OAHP 19-867	North Branch Canal	Fan	Pinyerd 2002
-	OAHP 19-868	Agricultural storage building	Fan	Pinyerd 2002

[a] FS: Numbers assigned by the Wentachee National Forest; OAHP: Historic structure inventory number.

3. RESEARCH PERSPECTIVES (EXPECTATIONS)

Expectations for the discovery of cultural resources within the Project were developed from information about known sites in the general area and immediate vicinity, ethnohistoric sites and subsistence practices, historic period activities, and landform characteristics.

3.1 Prehistoric Expectations

The Project is located on the surface of a large alluvial fan complex that connects the forested uplands of the Wenatchee Mountains with the riverine environment of the Yakima River flood plain. In general, sites located in the non-riverine portions of the valley probably represent a very narrow range of activities. If the fan surface was used as a transit way between the valley bottom and the uplands, then sites would be expected to be small dispersed lithic scatters that may include hunting weapons or expedient tools left behind after field processing of resources that were encountered in transit. Long-term residential sites are not expected and lithic toolstone procurement areas are expected to be higher in elevation above the Project and located near fanhead trenches of streams emerging from the mountains. The areas between sites would be expected to be characterized by a light-density scatter of isolated flakes and discarded tools that represent foraging localities or discarded tools and tool manufacture debris. Sites are expected to be found in well-drained areas close to active channels, but site locations are expected to shift as channels laterally swept across the fan surface.

A few sites may be found representing longer-term stays for groups who maintained a base camp on the fan during periods of wetter-than-normal spring seasons. These sites may have been formed as people pursued ungulate species lingering at lower elevations due to availability of palatable browse or harvested edible roots from patches that expanded in response to increased moisture.

3.2 Historic Expectations

Historic sites associated with the development of the Kittitas Valley are expected to be related to settlement, stock raising, and agriculture. Early settlers would be expected to have small farmsteads with perhaps only a few buildings and structures until the development of irrigation and improved transportation networks granted farmers and ranchers in the valley access to more markets and greater participation in the national economy. As a result, larger site complexes such as ranches would be expected as small-holders expanded or were bought out by better capitalized farmers and ranchers. Artifacts and sites associated with construction of the North Branch Canal are expected in the southern portion of the Project, and debris scatters may be found along the routes of possible stock driveways to the Wenatchee Mountains that passed through the project area.

Specific historic archaeological remains may be found such as foundations, changes in vegetation, and surface remains which may provide information about the ways the land has been used. Standing buildings and structures, canals and other irrigation features, stock driveways, and debris piles are likely to be found indicating previous uses of the land. The spatial distribution of features and surface disturbances may also be found to yield information about the evolution and past uses of the land. Small-scale elements also likely to be found may be fruit trees, individual beverage and food cans, abandoned machinery, and fenceposts; these would mark the location of historic activities, but lack significance or integrity as archaeological sites.

4. METHODS

Prefield research involved a search of records at the NWAA offices, and research conducted among materials housed at the Washington Office of Archaeology and Historic Preservation (OAHP). NWAA also contacted the Yakama Nation to provide information about the project and to solicit information regarding concerns the tribes may have had about cultural resources in the Desert Claim Wind Power Project area (Appendix A). The results of historical research are presented in Appendix B. The field survey employed transects with crew members spaced at 30-meter intervals. Most transects were oriented east-west or north-south because the gentleness of the terrain and the abundance of local landmarks (roads and fences) made it easy to maintain transects and to locate starting and ending points for the transects. Maps depicting the locations and orientation of the transects are collected in Appendix C; project maps are located in Appendix D.

Sites were defined as 5 or more objects within a 30-meter area unless two or more artifact classes were represented among the artifacts. If two artifact classes were represented within the 30-meter area, then that locality was recorded as a site even if the total artifact counts were less than 5 items. Isolates were places where there were less than five objects within a 30-meter area. Complex objects such as machines, cars, stoves, stockponds, and piles of various types (fence jacks, field clearing piles, and wood piles) were counted as discrete single objects.

Prehistoric and historic sites were recorded using Washington State Archaeological Inventory (WASI) forms; completed forms are attached as Appendix E. Prehistoric and historic isolates were recorded using forms specifically developed for the project by NWAA and are also attached to the site records in Appendix E. Site recording procedures included description of site location and local physical context, a summary of the site contents, partial inventory of artifacts, and descriptions of features comprising the site contents. Site overviews and selected artifacts were photographed using print film or digital formats; photographs are included with the site records and archived at NWAA offices. For each site a scaled sketch map was drawn showing the site boundaries, local landmarks, and the distribution of features, artifact concentrations, and selected artifacts. Isolate records include a brief description of the artifact accompanied by a brief description of its location and setting and a photograph of the item.

Sites and isolates were located with reference to U.S.G.S. topgraphic 7.5 minute series maps and by reference to the UTM grid. The UTM grid locations were collected in the field using a hand-held Garmin 12 XL (with an announced maximum horizontal error of about 30 feet; actual error is considerably less due to high-quality satellite reception during the field work). The location data collected by the GPS unit was digitally stored and the coordinates were also transferred to the field forms; location data acquired during field work are presented in Appendix F. At the end of each day, the day's data points were downloaded and sent to NWAA's Seattle office. The digital format photos were also downloaded daily and stored electronically. Digital photos are identified by a number that indicates the day the photo was taken (the "roll" number) and the frame number for that day.

Separate numbering systems were employed in the field to readily distinguish sites from isolates. The sites were designated with the prefix DC-03 followed by the number of the site in the order that the site was recorded. Sites, both historic and prehistoric, are designated as DC-03-1 through DC-03-31. The isolates were numbered in the same fashion but the suffix "ISO" was attached to the number to indicate that the number referred to an isolate. Isolates were recorded on standard NWAA forms which included location information and a brief description of the item and its context of discovery. Photographs of all isolates were recorded and are archived at the NWAA main office. (Isolate forms are attached as part of Appendix E). Finally, after analyzing all the forms, the sites and isolates were renumbered to the same numbering system.

5. RESULTS

Thirty-one archaeological prehistoric and historic sites were recorded during the course of fieldwork (Figures 5.1 and 5.2; Table 5.1). Three dual component sites (DC-03-5, -06, and -22) were found during the survey. One previously recorded site (45KT513) was relocated and the site record updated. Seventy-five prehistoric and historic artifact isolates were also newly recorded (Figure 5.3). Additionally, 51 rockpiles, categorized as field-clearing piles or fencejacks were noted but not recorded (Figure 5.4). Figure 5.2 also shows channels and irrigation ditches that distribute water from the natural streams in the area north of North Branch Canal.
The following brief descriptions summarize the salient properties of each site and are divided into prehistoric and historic sections. Descriptions for sites that contain both historic and prehistoric archaeological materials (dual component) are repeated in each section.

5.1 Prehistoric Resources

DC-03-05: Prehistoric Lithic Scatter and Historic Bridge

This site is a dual component site containing prehistoric and historic cultural material at the confluence of Currier Creek and an unnamed intermittent drainage. The prehistoric component consisted of 38 pieces of debitage, a core, and a projectile point covering an area measuring 60 meters north-south by 45 meters east-west. Except for one flake of petrified wood, all the cultural materials were composed of CCS. The projectile point was found atop a bulldozed mound of dirt and rocks indicating the point had been displaced from its original context. The projectile point is a small side-notched point that dates to within the last 2,000 years.

Historic archaeological materials were sparse and limited to a shell cartridge and a wooden bridge spanning the seasonal channel.

DC-03-06: Prehistoric Lithic Scatter and Historic Debris Scatter

The site is a low-density scatter of seven CCS prehistoric artifacts dispersed among two stock ponds and an associated scatter of historic artifacts. The flakes were found northeast of the larger stock pond.

DC-03-08: Prehistoric Lithic Scatter

The site is a dispersed moderate-density prehistoric lithic scatter on a gently sloping interfluve overlooking the junction of two intermittent drainages. A total of 32 lithic artifacts were found in an area measuring 70 meters north-south by 20 meters east-west. Among the artifacts observed onsite were 14 flakes, 15 pieces of shatter, one utilized flake, one retouched flake, and a core. All of the shatter was andesite and the rest of the archaeological materials were composed of andesite or CCS.

Figure 5.1 Withheld from Publication

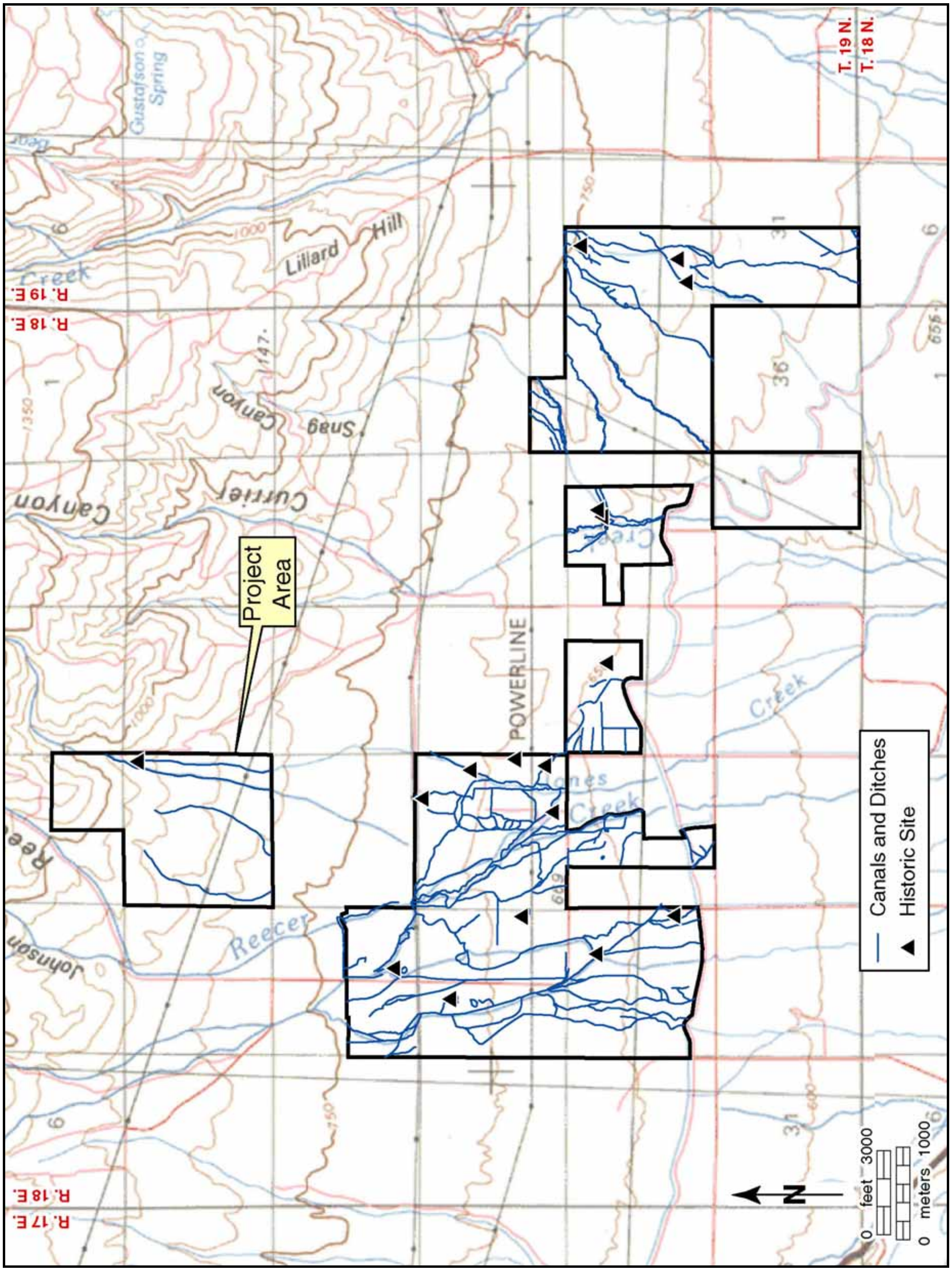

Figure 5.2. General locations of historic sites in relation to canals and irrigation ditches that distribute stream flow (USGS Wenatchee, Wash., 1:100,000 scale, 1975; canal locations courtesy of Ecology and Environment Inc.).

Table 5.1. Summary Properties of Cultural Resources Newly Recorded or Updated During Archaeological Field Investigations, Desert Claim Wind Power Project, Kittitas County, Washington.

FIELD NO. (DC-03-_)	COM-PONENT	DESCRIPTION	AGE	THEME
Sites:				
1	H	Historic debris scatter near cattle track	1900 - 1940	Stock Raising
2	H	Historical debris scatter and depression	1900 - 1930	Agriculture / Settlement
3	H	Morrison Homestead	1880 - 1940	Agriculture / Settlement
4	H	Historic can dump	1940s	Agriculture
5	H/P	Lithic Scatter and historic bridge	Late Prehistoric / Early 20th C	Prehistoric / Settlement
6	H/P	Historic debris and prehistoric lithic scatter	Prehistoric/ 1900 - 1950	Prehistoric / Stock Raising
7	H	Small historic scatter	1940 - 1955	Agriculture
8	P	Lithic scatter	Prehistoric	Prehistoric
9	H	Historic debris scatter	1940 - 1960	Agriculture
10	P	Lithic scatter	Prehistoric	Prehistoric
11	P	Lithic scatter	Prehistoric	Prehistoric
14	H	Historic debris	1880 - 1930	Agriculture / Settlement
15	H	Historic structures and historic debris	1900 - 1940	Agriculture / Settlement
16	H	Historic debris scatter	1920 - 1945	Agriculture
17	P	Lithic scatter	Late Prehistoric	Prehistoric
18	H	Historic debris scatter	1900 - 1940	Agriculture
19	P	Lithic scatter	Prehistoric	Prehistoric
20	H	Historic cabin and historic debris scatter	1880 - 1930	Agriculture / Settlement
21	P	Lithic scatter	Prehistoric	Prehistoric
22	H/P	Springfield Farm (45-KT-513h update) / prehistoric lithic scatter	1880 – 1950 / Prehistoric	Agriculture / Settlement Prehistoric
23	H	Historic debris scatter	1925 – 1950	Agriculture
24	P	Lithic scatter	Prehistoric	Prehistoric
25	H	Roan Farm	1900 – Modern	Agriculture / Settlement
26	H	Historic farm (White Ranch)	1900 – Modern	Agriculture / Settlement
27	P	Lithic scatter / procurement site	Prehistoric	Prehistoric
28	H	Hodges Residence	1925 - Modern	Agriculture / Suburban Development
29	P	Lithic scatter	Prehistoric	Prehistoric
30	P	Lithic scatter	Prehistoric	Prehistoric
31	H	North Branch Canal	1926 - Modern	Irrigation Development
Isolates:				
32	P	One brown CCS flake	Prehistoric	Prehistoric
33	P	One CCS flake	Prehistoric	Prehistoric
34	H	Church-key opened beer can	1935 - 1950	Agriculture
35	H	Hole-in-top can, flattened	1900 - 1940	Agriculture
36	P	One CCS primary flake	Prehistoric	Prehistoric
37	P	One CCS primary flake	Prehistoric	Prehistoric
38	P	One CCS edge-modified flake	Prehistoric	Prehistoric
39	H	Five sheet metal fragments, possibly a piece of farm machinery.	1900 - 1960	Agriculture
40	P	One CCS primary flake	Prehistoric	Prehistoric
41	H	One cook-stove	1900 - 1950	Agriculture
42	P	One CCS tertiary flake	Prehistoric	Prehistoric
43	P	One CCS flake	Prehistoric	Prehistoric
44	P	One CCS flake	Prehistoric	Prehistoric
45	P	One CCS flake	Prehistoric	Prehistoric
46	P	Two tertiary flakes: one CCS, one basalt	Prehistoric	Prehistoric
47	P	One CCS primary flake	Prehistoric	Prehistoric
48	H	Blasting powder container, E.I. DuPont de Nemours & Company black blasting powder can	1924 - 1930	Irrigation Development
49	H	Blasting powder container, E.I. DuPont de Nemours & Company black blasting powder can	1924 - 1930	Irrigation Development
50	H	Blasting powder container, E.I. DuPont de Nemours & Company black blasting powder can	1924 - 1930	Irrigation Development

Table 5.1. Summary Properties of Cultural Resources Newly Recorded or Updated During Archaeological Field Investigations, Desert Claim Wind Power Project, Kittitas County, Washington.

FIELD NO. (DC-03-_)	COM-PONENT	DESCRIPTION	AGE	THEME
51	H	Bottle fragments with mark, possibly from the Fairmount Glass Works, Fairmount, Indiana	1889 - 1930	Agriculture / Settlement
52	P	One CCS flake	Prehistoric	Prehistoric
53	H	One crushed bucket, blasting powder container, E.I. DuPont de Nemours & Company black blasting powder can	1924 - 1930	Irrigation Development
54	P	One CCS biface/preform with cortex	Prehistoric	Prehistoric
55	P	One CCS core	Prehistoric	Prehistoric
56	P	One CCS tertiary flake	Prehistoric	Prehistoric
57	P	One CCS primary flake	Prehistoric	Prehistoric
58	P	One CCS tertiary, biface thinning flake	Prehistoric	Prehistoric
59	H	Cart or trailer	1920 - 1960	Agriculture
60	P	One fine-grained volcanic rock flake	Prehistoric	Prehistoric
61	H	One broken (11 fragments) baby formula bottle with a picture of a baby head with "We Help To Raise Them" under it; marked "Field" on bottom; possibly Enfimil brand.	1940 – 1960	Agriculture
62	P	One CCS flake	Prehistoric	Prehistoric
63	P	One CCS exhausted core	Prehistoric	Prehistoric
64	P	One CCS secondary flake	Prehistoric	Prehistoric
65	P	One CCS flake	Prehistoric	Prehistoric
66	P	One CCS flake	Prehistoric	Prehistoric
67	P	One CCS flake	Prehistoric	Prehistoric
68	P	One CCS tertiary flake	Prehistoric	Prehistoric
69	P	One CCS corner-notched projectile point, broken	Prehistoric	Prehistoric
70	H	A pile of wooden fence posts and barbed wire	1900 - 1960	Agriculture
71	H	A pile of wooden fence posts and coiled barbed wire	1900 - 1960	Agriculture
72	H	One bucket	1900 - 1960	Agriculture
73	H	Farm machinery fragments	1920 - 1960	Agriculture
74	P	One CCS tertiary flake	Prehistoric	Prehistoric
75	H	Two metal harrow sections	1900 - 1960	Agriculture
76	P	One CCS flake	Prehistoric	Prehistoric
77	P	One flake, possibly edge modified	Prehistoric	Prehistoric
78	P	Four CCS flakes	Prehistoric	Prehistoric
79	H	Wagon bed and axle fragments	1900 - 1940	Agriculture
80	H	Farm machinery fragments, possibly a hay loader	1900 - 1960	Agriculture
81	P	One CCS flake	Prehistoric	Prehistoric
82	H	Farm machinery, axle of hay loading machine	1900 - 1960	Agriculture
83	H	Wood and metal sled fragments	1920 - 1960	Agriculture
84	P	Two CCS flakes	Prehistoric	Prehistoric
85	P	One CCS tertiary flake	Prehistoric	Prehistoric
86	H	Disker attachment for a tractor	1920 - 1960	Agriculture
87	P	One CCS flake fragment	Prehistoric	Prehistoric
88	H	Sheet metal body of unknown machinery	1920 - 1960	Agriculture
89	P	One CCS biface fragment	Prehistoric	Prehistoric
90	P	Three CCS flakes	Prehistoric	Prehistoric
91	P	One CCS biface fragment, possible projectile point fragment	Prehistoric	Prehistoric
92	P	One CCS flake	Prehistoric	Prehistoric
93	P	One CCS secondary flake	Prehistoric	Prehistoric
94	P	One CCS flake	Prehistoric	Prehistoric
95	H	Red brick wrapped with bailing wire	1900 - 1960	Agriculture
96	P	One CCS flake	Prehistoric	Prehistoric
97	P	One CCS biface	Prehistoric	Prehistoric
98	P	One CCS core	Prehistoric	Prehistoric
99	P	One CCS core	Prehistoric	Prehistoric

Table 5.1. Summary Properties of Cultural Resources Newly Recorded or Updated During Archaeological Field Investigations, Desert Claim Wind Power Project, Kittitas County, Washington.

FIELD NO. (DC-03-_)	COM-PONENT	DESCRIPTION	AGE	THEME
100	P	One CCS tertiary flake	Prehistoric	Prehistoric
101	H	Irrigation dike	1900 - Modern	Agriculture
102	H	3 flattened milk buckets without handles	1900 - 1940	Agriculture
103	P	One CCS biface fragment, probably a projectile point tip	Prehistoric	Prehistoric
104	H	Stock pond complex including a pond, wood dock to a gate valve, a drainage channel, a ditch, the wood bridge over the ditch, and a headgate	1900 - Modern	Agriculture
105	P	One CCS tertiary flake	Prehistoric	Prehistoric
106	H	Stock pond complex including a pond, a cement wall, a cement and wood headgate, and a gate valve.	1900 - Modern	Agriculture
107	H	Stock pond complex including a pond, culvert, a wooden dock, and a gate valve.	1900 - Modern	Agriculture

DC-03-10: Prehistoric Lithic Scatter

This site is a moderate-density lithic scatter occupying an area measuring 30 meters north-south by 10 meters east-west on a flat between Reecer Creek to the east and an unnamed drainage to the west. A total of 26 flakes and 1 projectile point tip, all composed of CCS, were observed.

DC-03-11: Prehistoric Lithic Scatter

Site DC-03-11 is a very small lithic scatter located near an unnamed drainage/irrigation ditch that flows into a pond to the south. The site materials consisted only of a core and a flake located less than one meter apart. Both artifacts are CCS of different colors.

DC-03-17: Prehistoric Lithic Scatter

This site is a large, elongate lithic scatter measuring 240 meters north-south by 40 meters east-west on the right (west) bank of Reecer Creek. The site consists of a scatter of over 90 flakes with seven pieces of shatter, an edge-modified flake, four cores, three projectile points, one biface fragment, and a possible cairn. The projectile points included one small side-notched point and two corner-notched points. All of the points were small with neck-widths measuring less than 1 cm; stylistic attributes indicate the points had been manufactured within the last 2000 years. The cairn contained about 30 basalt cobbles and boulders and measured approximately 1.4 meters north-south and 2.0 meters east-west; it stood about 15 cm high.

Four artifact concentrations were defined during site recordation. Concentrations 1 through 3 were small, averaging about 10 flakes in a 5- to 10-meter-diameter area, but Concentration 4 consisted of twenty-seven flakes within a 5-meter-diameter area. The only complete projectile point on the site was found in Concentration 4. All of the artifacts were made from CCS in a variety of colors, translucence, and textures.

Ground visibility was limited due to the presence of thick sage, brush, and grass cover so that the site may be more extensive than recorded.

Figure 5.*3* Withheld from Publication

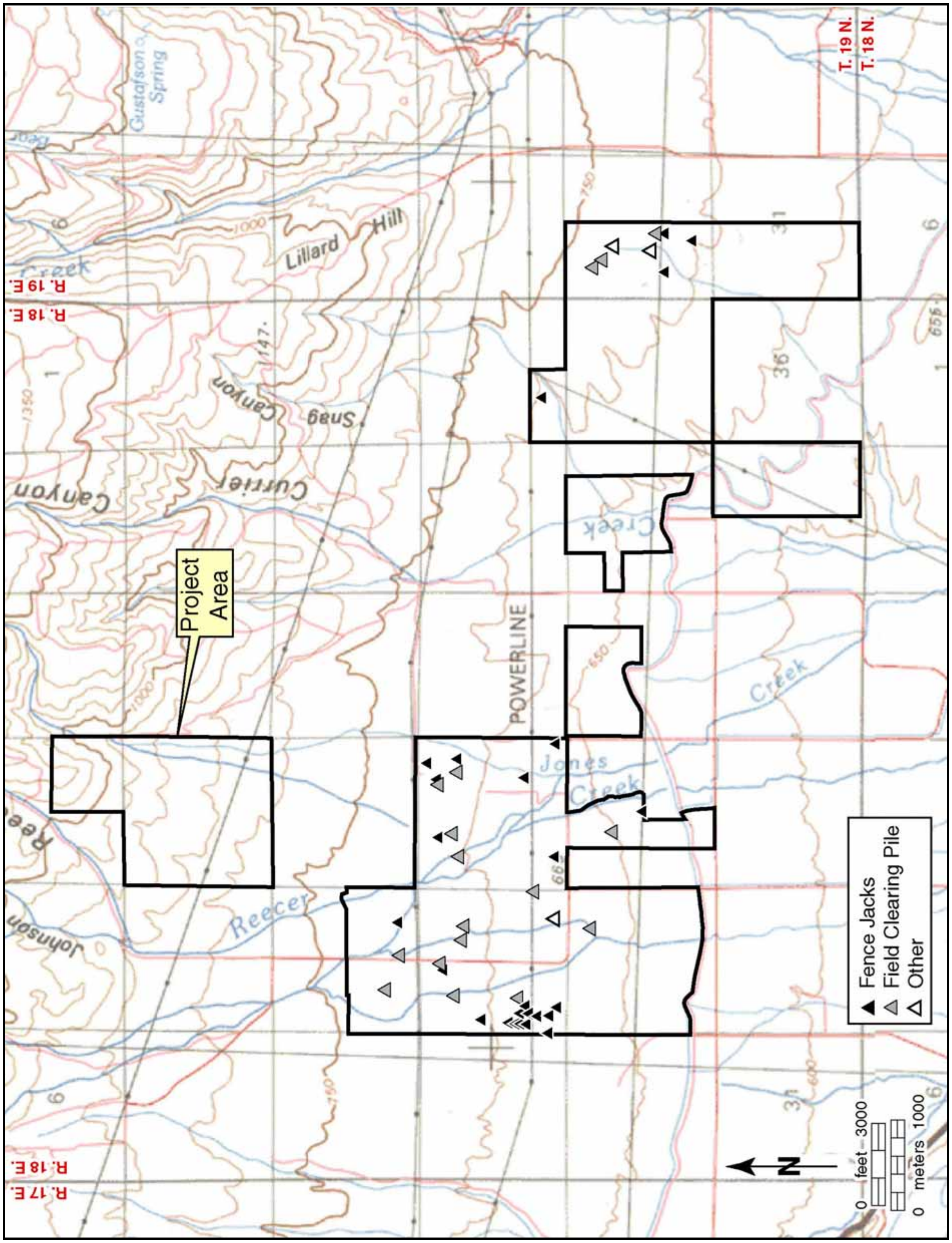

Figure 5.4. General locations of rock piles within the project boundary (USGS Wenatchee, Wash., 1:100,000 scale, 1975).

DC-03-19: Prehistoric Lithic Scatter

The site is a small (92 m^2) lithic scatter comprising 10 flakes and one unifacially modified tool fragment located on the east bank of Jones Creek near the mouth of Robbins Canyon. All the flakes are less than 3 mm in size and eight are tertiary flakes. The site is located at the interface between the foothills and the gently sloping fan surface.

Surface visibility was poor and the site boundaries are based on exposures of artifacts in cattle tracks. The high amount of material observed in very small surface exposures suggests the site is more extensive than recorded.

DC-03-21: Prehistoric Lithic Scatter

This site is a dispersed light-density lithic scatter occupying a low-lying topographic high approximately 400 meters west of Reecer Creek and directly under the BPA power transmission lines. An unsurfaced access road traverses the southern half of the site and the base of one of the transmission tower pylons is within the site boundaries.

Archaeological materials observed at the time of site recording included three flakes, three cores, one retouched flake, and a projectile point fragment. Seven of the artifacts were manufactured from CCS; the eighth (the retouched flake) had been fabricated from andesite.

The projectile point was found in exposed mineral soil on the south edge of the dirt road. Surface visibility in the site area was limited and the actual site boundaries may be more extensive than those recorded

45KT513H (DC-03-22): Springfield Farm/Robbins Homestead and Prehistoric Lithic Scatter

The site consists of four structures and a historic debris scatter associated with the Springfield Farm. The prehistoric component, consisting of a lithic scatter and associated fire-modified rock, was found in the course of updating the site record.

The prehistoric archaeological material was observed in small areas of exposed ground around the bases of the fruit trees and in rodent backdirt mounds surrounding the trees. The prehistoric material includes 27 flakes, a tested cobble, an edge-modified flake, and an unifacially modified tool fragment. In addition to the flaked stone material, about 25 fragments of fire-cracked rock were also observed. All but four of the flakes were found within 10 meters of the fruit trees. Material types represented among the artifacts included CCS, petrified wood, and basalt.

DC-03-24: Prehistoric Lithic Scatter

The site consists of a dispersed low-density lithic scatter on a gentle scabland slope characterized by few low-lying biscuit mounds. An unnamed drainage lies approximately 200 meters east of the site. Five flakes and one projectile point fragment were found within an area measuring 60 meters north-south by 20 meters east-west lying adjacent a fenceline. The project point was a small corner-notched fragment and stylistic attributes indicate it was manufactured within last 2000 years.

DC-03-27: Prehistoric Lithic Procurement Site

The site is a large (400 meters north-south by 275 meters east-west) lithic procurement site on an interfluvial ridge between two ephemeral channels. Abundant chert nodules and early-stage reduction debris were found on an eroded surface. Plentiful raw material in the form of chert nodules, the presence of early stage reduction debris, and abundant debitage of the same material type suggest the site is a lithic procurement location. There is no evidence that raw material was quarried to obtain the nodules. The chert nodules and associated flaking debris were red and yellow.

Archaeological materials observed during site recording included raw material nodules, cores, edge-modified flakes, a biface, tested nodules, and abundant flakes and shatter; all artifacts were composed of the same CCS that comprises the nodules. Most of the debitage was composed of a course-grained CCS with colors ranging from brown to gray. Sizes of flakes of this CCS were usually between 3 and 10 cm long. Smaller-sized flakes tended to be a finer grade of CCS with colors that were brown, red and yellow. Three artifact concentrations were identified within the site. The maximum density of lithic debitage was 20 items per square meter within Concentration 1 and the density of material between concentrations averaged about 5 per square meter.

DC-03-29: Prehistoric Lithic Scatter

The site is a small prehistoric lithic scatter. The site consists of two cores and a retouched flake. Both of the cores have been retouched on many of their edges. All of the CCS artifacts were found within 3 meters of each other. The site is near the fenceline separating Sections 25 (T19N, R18E) and Section 30 (T19N, R19E).

DC-03-30: Prehistoric Lithic Scatter

The site was found on the surface of a two-track road paralleling the east-west fenceline that separates Sections 24 and 25. One core and one flake, both of CCS, were found within one meter of each other.

5.2 Historic Resources

DC-03-01: Historic Debris Scatter

The site is a small high-density historic debris scatter located on the slope of a small rise overlooking an intermittent drainage. The overall dimensions of the site were 130 feet along its north-south axis and 80 feet along its east-west axis. A substantial portion of the artifacts were locally concentrated along a cattle track leading to the nearby seasonal channel. A visual estimate of artifact density for the artifacts in the cattle track was about 100 items per square meter which dropped off rapidly downslope below the concentration to about 10 artifacts per square meter.

Some of the artifacts observed within the site boundaries include an enamel pan, leather shoe parts, metal cans, metal machinery, and lead piping. Glass artifacts were dominated by aqua, amethyst, brown, clear or green bottle fragments but there were also several white glass canning lid fragments. Ceramic artifacts included earthenware, porcelain and terra cotta fragments and many of the fragments were tableware fragments decorated with ornate designs. Metal cans were varied and represented uses as containers for food, blasting powder, paint, and fuel. Some of the food containers were hole-in-top cans. Some metal machinery parts were also represented in the site assemblage and included a jack stand, tractor parts, and seat springs along with other metal objects such as wire, a funnel, and buckets.

DC-03-02: Historic Debris Scatter

This site is an excavated depression on a small knoll with an associated small historic debris scatter north of the knoll. The depression measures about 15 feet in diameter and 3 feet deep. The interior of the depression contained three hewn timbers; two of the timbers were fastened with a large round-head nail and a bolt with a square nut.

Approximately 30 items were found in the debris scatter. Some of the more distinct artifacts included a belt buckle, a lock box and tumbler, and a shoe eyelet. The ceramics were primarily earthenware dish fragments. Glass fragments were predominantly amber or amethyst bottle glass with one amethyst glass fragment a medicine bottle neck. The metal artifacts were dominated by hole-in-top cans.

DC-O3-03: The Morrison Homestead

The Morrison Homestead site is located on a relatively flat area at the headwaters of two small intermittent drainages. The site consists of the remains of at least two structures, several rock alignments, a debris scatter, and an orchard within an area measuring 560 feet north-south by 650 feet east-west.

Two debris concentrations and six features were identified. The debris concentrations included domestic and farming artifacts. The domestic artifacts included cast iron stove parts, a door lock and tumbler, glass fragments, ceramic tableware fragments, metal cans, a scale, two barrel hoops, an enamelware basin, white glass canning lid fragments, and a cooking pot. The color of the bottle fragments was amethyst, clear and aqua. Farm implements and machinery artifacts included horse buggy parts, a plow share, axe heads, harness parts, a plow hitch, a file, a barn shovel, an engine manifold, bailing wire, horseshoes, leaf springs, bricks, a wagon wheel hub, a sickle bar, binder parts, and a hoe. In the southwest portion of the homestead is an apple and plum orchard covering an area of approximately five acres.

DC-03-04: Historic Debris Scatter

This site is an historic debris scatter near an unnamed intermittent drainage that joins Currier Creek. The scatter contains approximately 15 cans within a 30-foot-diameter area. The cans had been flattened and all but two were sanitary type cans.

DC-03-06: Prehistoric Lithic Scatter and Historic Debris Scatter

The site is a small scatter of historic and prehistoric material near two ponds built around a spring. The ponds were dry at the time of site recordation. The historic debris consisted of window glass fragments, sheet metal scraps, a tin can, and some lumber. The prehistoric lithic scatter was located northeast of the larger pond.

DC-03-07: Historic Debris Scatter

The site is in an agricultural field near the North Branch Canal and consists of a small scatter of historic cultural material confined within a 30-foot-diameter area. Artifacts included shards of bottle glass, ceramic sherds, and metal can fragments. Glass colors were cobalt blue, brown, clear, and green. The ceramics were earthenware and included tableware sherds decorated with a yellow design coated with a clear glaze. The total number of artifacts was less than 100.

DC-03-09: Historic Debris Scatter

This site is a historic debris scatter along the edge of an excavated depression under the BPA transmission lines. The site covers an area 230 feet north-south by 200 feet east-west. The depression is oblong and the historic debris was distributed in two main concentrations along the southern and western margins of the depression. Two dirt roads are located adjacent the site to the east and the south, respectively.

Both of the artifact concentrations contained mixtures of historic and modern materials. Concentration 1 consisted of ceramics, glass insulators, bottle glass fragments, several types of tin cans, two spark plugs and a belt buckle. The can types included food tins, and paint and aerosol containers. Many of the ceramic earthenware dish fragments had a decorative design. Aqua, brown, cobalt blue, and clear bottle glass colors were represented among the glass fragments. Concentration 2 included six possible beer cans that had been opened with church keys and two food tins.

Most of the cultural material at the site dates between 1900 and the1950's based on maker's marks on artifacts such as glass insulators, spark plugs, and bottles. Some of the bottle glass has bubbles and one bottle had a push-up base created by bottle manufacture techniques used during the early 20 century.

DC-03-14: Historic Debris Scatter

The site is a large and dispersed historic debris scatter consisting of five features, four artifact concentrations, and an associated light scatter of artifacts representing the remains of a farmstead dating to the early 20th century. The features include two collapsed structures, an abandoned fence line, a foundation, and a depression. The artifact concentrations contain ceramic, glass, and metal artifacts representing predominantly residential or domestic debris.

Feature 1 consists of a former fenceline consisting of an alignment of rockpiles spaced at intervals 10 feet apart. The rockpiles are constructed of basalt cobbles and boulders stacked in 3-6 tiers with wood cribbing and barbed wire. Feature 2 is a three-sided rock alignment measuring 10 feet by 16 feet and may represent the remains of a structure foundation. Scattered fragments of milled wood, three red bricks, and shards of window pane glass are in the vicinity of the foundation. Feature 3 is a small collapsed 3-sided crib structure constructed of rounded poles measuring 10 feet by 16 feet. The interior of the structure contains a pile of milled wood which may be the remains of the nearby Feature 2 structure. A thick shard of green bottle glass and a shard of amethyst glass were observed near this feature. Feature 4 is a large pile of milled wood that probably represents another collapsed structure. Two concrete fragments that may represent the remains of a foundation were observed at the northwest corner of the lumber pile. Both round-head and square-head nails were embedded in the boards. Feature 5 is a two-foot-deep depression measuring 10 feet in diameter of unknown function.

Artifact Concentration 1 consists of ceramic, glass, and metal debris found in a 16-foot-diameter area. The artifacts include amethyst and clear glass, a roll of chicken wire, three metal buckets, pieces of barbed wire, a baking powder can lid, a metal pipe, a stove burner, two barrel hoops and six pieces of ceramic tableware. Concentration 2 is a small historic dump occupying a 10-foot-diameter area. Artifacts observed in the concentration included 4 metal cans, 1 Mason jar lid, ceramic plate fragments, and amethyst glass. Concentration 3 is16 feet in diameter and includes a wood frame (possibly a truck bed) and miscellaneous metal parts and glass debris. The bottle glass fragments were from Mason jars, a Bromo Seltzer bottle, and a mentholatum bottle. Concentration 4 is also 16 feet in diameter and consists of a brick pile and a few metal and glass objects located north of Feature 3.

DC-03-15: Homestead

The site is the remains of a farmstead and includes structural remains, farm machinery, and several debris dumps that were identified within an area encompassing approximately three acres. Structural remains indicating the possible location of the main residential area are in the west half of the site adjacent to a channel that empties into a stock pond; the remains of a demolished barn are in the northeast corner of the site. The remainder of the site consists of debris dumps and scattered artifacts. The current property owner, Mr. Roan, said that he razed the barn a few years ago.

A total of four features and six artifact concentrations were defined. Feature 1 is the demolished barn and associated artifacts which included leather tack as well as fragments of window glass and bottle glass. Feature 2 is a chicken coop that is the only standing structure on the site. Feature 3 is a foundation measuring 45 feet by 32 feet and extending from three to five feet deep below the surface. Artifacts associated with this feature included bricks, concrete fragments, charred wood, metal pipes, ceramic fragments, glass shards, and butchered bone. Feature 4 is a small collapsed structure.

In general, the artifacts were a mixture of residential debris, farm machinery objects, or piles of fence building materials. Residential objects included glass and ceramic fragments, metal cans, and a kerosene lantern. Glass fragments included window glass along with jar and bottle glass of the following colors: amethyst, cobalt blue, clear, and green. One of the bottles was a Heinz mustard jar, another a milk of magnesia bottle, and there were several canning jars. The ceramic artifacts were sherds of earthenware and stoneware dishes, some of which had decorative designs and glazes. There was also a white ceramic electrical fuse. Metal artifacts included food tins that had been opened with a church key opener. Metal machinery parts included an automobile axle and a variety of parts from other farm implements. There was also a McCormick-Deering binder minus the trailer, and a buggy undercarriage.

DC-03-16: Historic Debris Scatter

This is a small (115 feet by 30 feet) historic debris scatter close to where the BPA transmission lines cross Pheasant Road. The largest of the three artifact concentrations recorded on the site was Concentration 1, which consisted of a roasting pan, paint cans, Quaker State oil cans, a coffee can, two hole-in-top evaporated milk cans, an enamel basin, a black earthenware pot, stove pipe fragments, farm machinery parts, two oil filters, bottle and jar glass, ceramic tableware fragments, a broken toilet tank lid, a piece of braided steel cable, a button, a Carbide Pit Generator housing, a mop wringer, and a few bundles of bailing wire. Artifact Concentration 2 consisted of two tin cans and three metal springs from a car seat. Concentration 3 consisted of three paint cans, a large tin bucket, and a square can. Some of the metal cans were opened with a church key.

DC-03-18: Historic Debris Scatter

The site is on a small knoll near Pheasant Road just south of a recently excavated trench. Artifacts observed during recording include metal, glass and ceramic within an area 140 feet by 80 feet. Over 90 percent of the cultural material was found at the north end of the site where over 100, mostly sanitary, tin cans were found. Coffee, milk, and tobacco cans were represented. Other metal artifacts observed included an enamel cup, the tooth of a hay rake, and a Boyds zinc canning lid top. Bottle glass colors included amethyst, aqua, black, and clear. One of the bottles is a Heinz condiment container. There were a few ceramic fragments from an earthenware plate.

Some of the glass contained bubbles indicative of older bottle glass manufacturing techniques. The amethyst glass dates to prior to 1917. The artifacts observed onsite represent a mix of material from the early and mid-20th century.

DC-03-20: Cabin and Historic Debris Scatter

This historic site is a small cabin (15 feet by 19 feet), three debris concentrations, and a scatter of hole-in-top cans located on the west bank of Jones Creek near the mouth of Robbins Canyon.

The cabin is close to the creek and is surrounded by dense vegetation and trees. The cabin measures 15 feet by 9 feet and was constructed with vertical milled siding and capped with a gabled roof. The doorway faces south with windows on both sides of the door. A green and white sign by the door reads: “Pack Rat Bed and (Get Your Own Damn) Breakfast”. The interior contained a wood-framed loft and was furnished with two wooden tables and a wooden counter. There was also a square chimney flue. The cabin was constructed using 4-inch-long wire nails with a few square nails used to fasten the siding.

Three artifact concentrations were identified during site recording. Concentration 1 consisted of paint cans and numerous metal food cans that included two cans closed using soldered seams. Artifacts observed in Concentration 2 consisted of window pane glass fragments, metal cans (including one hole-in-top), and ceramic sherds. Concentration 3 is located at the northern end of the site and was the largest concentration of the three. Among the artifacts comprising this scatter were numerous bottle glass fragments, a white canning jar lid, and over 20 hole-in-top metal cans.

The rest of the site area is characterized by a light-density scatter of hole-in-top cans and other can fragments along with amethyst, aqua, brown, clear, and olive bottle glass shards.

45KT513H (DC-03-22): Springfield Farm/Robbins Homestead and Prehistoric Lithic Scatter

The site consists of four structures and a historic debris scatter associated with the Springfield Farm. A prehistoric component consisting of a lithic scatter and associated fire-modified rock was also found while the site record was being updated (summarized in Section 5.1 above).

The Robbins cabin was initially recorded in 1974 for the Washington State Historic Inventory Project by Mrs. Manson F. Backus of Bellevue, Washington, who had owned the property with her husband for four years between 1946 to 1950. The Springfield Farm, including the Robbins cabin, was recorded in 1976 by Florence Lentz of the Washington Office of Archaeology and Historic Preservation and the farm was assigned the Smithsonian Trinomial 45KT513H. At the same time, the farmstead was nominated for the National Register of Historic Places by Florence Lentz. The site is now on the State Register of Historic Places

When NWAA personnel visited the site in August, 2002, during a reconnoiter of the Desert Claim project area, Mr. J. P. Roan, the current owner, told the crew that the Robbins cabin had been disassembled, moved, and reassembled at the Ellensburg, Washington, fairgrounds (Verbal communication to Ken Juell from J. P. Roan, August 16, 2002). When the farm was visited by the NWAA field crew in July, 2003, to update the site record and assess the current condition of the site, four structures were still standing: the granary, the Robbins boys bunkhouse, the creamery, and a log cabin thought to be a blacksmith's shop. In addition to these structures, the house foundation, fruit trees, planted willow trees, a well, a powerline, and mounds of rubble were still discernible.

DC-03-23: Historic Debris Scatter

The site is a small historic debris scatter located adjacent to Pheasant Road in an area measuring 30 feet north-south by 15 feet east-west. The debris included one gas or oil burner, a one-gallon rectangular steel antifreeze can ("Everready Prestone"), a one-gallon motor oil can, several bundles of bailing wire, one steel coffee can, four barrel hoops, a length of stove pipe, one piece of woven wire screen, one fragment of clay drain tile and one clear glass bottle base.

DC-03-25: Roan Farm

The site is an operating farm complex occupying a long gentle slope just north of Reecer Creek Road. According to the current owner, this farm is a part of the original Springfield Farm (DC-03-22) and some of the outbuildings date to the time of operation of that farm between the late 19^{th} and early 20^{th} centuries (Verbal communication from J. P. Roan to Leslie Norman [NWAA], July, 2003).

There are six currently standing historic structures on the site at the time of site recording: a creamery, a barn, a shop, a chicken coop, a granary, and a hog shed. Recent structures (less than 50 years old) include a mobile home, three corrugated metal grain silos, and a pumphouse. (The original farmhouse was originally located west of the mobile home but burned down in the 1960s according to J. P. Roan). Fragments of amethyst glass and one completely brass .12 gauge shotgun shell were observed on the bare ground around the SW corner of the shop.

The buildings are clad using either vertical board-and-batten or horizontal shiplap plank. The roofs of the structures are all gabled and most have been re-roofed with aluminum or composite shingles except for the hog pen and the granary which still retain their wood shake roofs. Presumably, the barn and the creamery roofs were wood-shaked prior to renovation. The foundations were not visible on any of the structures except for the chicken coop which sits on a concrete foundation. Wire nails were observed in all of the structures except for the hog pen and the creamery which are currently not in use.

DC-03-26: White Ranch

This site is a large farm complex surrounded by pasture land and an irrigated alfalfa field on a long gentle slope. There was no evidence (such as a foundation, or a pile of collapsed wood) indicating a residence had been constructed on the farm; all the buildings recorded are associated with farm equipment and supplies storage. The complex includes eight standing structures, fenced pastures, a grain silo, and numerous pieces of farm machinery and other farm implements used for haying and stock raising. Some of the farm equipment observed during site recording included a bailer, manure spreader, cart, and grain drill.

The structures include a modern barn and seven historic structures: a machine shed, two utility sheds, two bunkhouses, fuel shed, and a tack shed. The three-sided shed is the largest of the historic buildings (60 feet by 15 feet) and has a recently installed tin roof. There are two small bunkhouses of which one has a small stall attached to it, presumably for a ranch hand to assist with the birthing of farm animals. The fuel shed is a small structure that may have been used as a privy at one time but now is used to hold a gas tank. A small wood building near the pasture was probably used as a tack shed. Most of the structures are log or post frame construction with lumber siding and are in good to fair condition. Only wire nails were used in construction. The two small utility sheds are currently in use.

DC-03-28: Hodges Residence

This site is a historic residence with two outbuildings located on the west side of Lower Green Canyon Road. (The house is currently occupied.) The main house and one shed on the property appear to be more than fifty years old. There is also a modern garage on the southeast corner of the property.

The main house is a one-story L-shaped side and back gable structure with a single front door. The poured concrete foundation is partially above ground. There are three concrete steps up to the front door. There are several windows on the main floor and in the basement. In general the windows were square single panels with sash and side lights. The house sides are covered with wood shingles. A new shop/garage has been added to the southeast corner of the house.

The shed is a 16 feet by 12 feet wood framed structure with a wood shingle roof resting on a poured concrete foundation. A wood and zinc roofed porch has been added to the east side of the shed.

The structures probably date from about 1930 to 1950.

DC-03-31: The North Branch Canal

The site is the North Branch Canal. The North Branch Canal was the last project in the Kittitas Irrigation District to be constructed and now managed by the Kittitas Reclamation District. A total of thirteen archaeological features were found along the portions of the canal within the project. The features were either bridges or culverts.

5.3 Other Resources

DC-03-12: Modern Lithic Scatter - Rockhounding Locality

The site is located on a gently sloping expanse of rocky scabland and is bisected by a dry intermittent drainage. Over two hundred pieces of lithic debitage were observed within an area measuring 100 meters by 60 meters. The debitage consisted mostly of shatter and split cobbles and pebbles with few flakes. All of the material was CCS and highly variable in color, texture, and translucence. Much of the surface in the site area showed evidence of recent excavation.

The site appears to be the result of modern rock hound activity. The artifacts exhibited features typical of those produced by a rock hammer including the absence of prepared platforms, shattering impacts, crushed platforms, and a lack of weathering on exposed surfaces. Only one flake in the site area exhibited attributes suggesting it may date to the prehistoric time period.

DC-03-13: Modern Lithic Scatter - Rockhounding Locality

The site is situated between two unnamed drainages that flow into separate stock ponds to the south. The site is a small dispersed lithic scatter consisting of a total of seven flakes and a split pebble core.

5.4 Discussion

This section presents a preliminary exploratory analysis of prehistoric site patterning with regard to the distribution of selected classes of artifacts or archaeological materials among the sites. The purpose of this analysis is to gauge the potential for the prehistoric sites to contribute to local and regional prehistory. If the sites do have such contributing properties, then they will be considered significant and will warrant further scientific treatment.

5.4.1 Prehistoric Site Patterning

Preliminary patterning among the 13 prehistoric sites was analyzed by partitioning the sites into a simple four-class typology based on site size and the number of artifact classes recorded for each site. The class boundaries were assigned at major breaks in the distribution modes for site area and the number of artifact classes represented on each site. Membership in one of the four classes was assigned according to the size of the site and the number of classes represented within the site boundaries. Sites were divided into “large” or “small” classes based on area, and were “simple” or “complex” based on the number of artifact classes found on the site. Table 5.2 shows the presence/absence data of the occurrence of classes on the sites. Row and column totals show the number of classes observed at each site and the number of

Table 5.2 Presence-Absence Occurrence of Artifact Classes and Archaeological Materials Among Prehistoric Sites Recorded During the Desert Claim Wind Power Project.

SITE (DC-03-)	ARTIFACT CLASS									NUMBER OF CLASSES
	FLAKE	PROJECTILE POINT	BIFACE	UTILIZED FLAKE	RETOUCH ED FLAKE	SCRAPER	CORE	TESTED COBBLE	FMR[b]	
5	0.042	1	-	-	-	-	1	-	-	**3**
6	1	-	-	-	-	-	-	-	-	**1**
08	1	-	-	1	1	-	1	-	-	**4**
10	1	1	-	-	-	-	-	-	-	**2**
11	1	-	-	-	-	-	1	-	-	**2**
17	1	1	1	-	1	-	1	-	-	**5**
19	1	-	-	-	-	1	-	-	-	**2**
21	1	1	-	-	1	-	1	-	-	**4**
22	1	-	-	-	1	1	-	1	1	**5**
24	1	1	-	-	-	-	-	-	-	**2**
27	1	-	1	1	-	-	1	1	-	**5**
29	-	-	-	1	1	-	-	-	-	**2**
30	1	-	-	-	-	-	1	-	-	**2**
Total Sites	**12**	**5**	**2**	**3**	**5**	**2**	**7**	**2**	**1**	

[a] 1 = present; blank = absent.
[b] FMR = fire-modified rock

sites at which a particular artifact class is present, respectively. The table shows that, as expected, most (12, or 92%) of the sites contain flakes. Among the formal tool classes, cores are the most represented among the sites (7 sites) followed by retouched flakes (5 sites) and projectile points (5 sites). The rest of the artifact classes are distributed at low levels among the sites. No site contained all nine of the artifact classes, but three sites (23%) included five classes and just over half (n = 7, 54%) of the sites consisted of two or one classes.

Table 5.3 shows how the typology is set up, the site type definitions, and the number of sites included in each type. Table 5.4 shows the application of the site types to the prehistoric sites found during the project. In terms of complexity, the sites are about evenly divided between simple and complex sites but complexity does not appear to be a function of size since complex sites are evenly divided among small and large sites. Indeed, regression of the number of classes against site area indicates almost no correlation between site area and number of classes (r^2 = .16). Small, simple sites (Type I) are the most common site type (n = 6) and large, simple sites are the most poorly represented in the sample (n = 1).

Table 5.3 Four-part Classification Scheme for Prehistoric Sites Discovered During Field Survey.

	SIZE	
COMPLEXITY:	Small ($\leq$4000 m^2)	Large (>4000 m^2)
Simple ($\leq$2 classes)	I (n =6)	II (n = 1)
Complex ($\geq$3 classes)	III (n = 3)	IV (n = 3)

Table 5.4 Assignment of Site Type to Prehistoric Sites Based on Site Area and Number of Classes.

SITE (DC-03-_)	AREA (M^2)	NO. OF CLASSES	TYPE I	TYPE II	TYPE III	TYPE IV
5	2602	3			X	
6	12214	1		X		
8	1039	4			X	
10	119	2	X			
11	1	2	X			
17	13627	5				X
19	92	2	X			
21	983	4			X	
22	10044	5				X
24	710	2	X			
27	75898	5				X
29	4	2	X			
30	1	2	X			
		Total:	6 (46%)	1 (8%)	3 (23%)	3 (23%)

The second step in the examination of the site patterning is to suggest the kind of activities that may have been performed at the site based on the formal characteristics of the site assemblages. Table 5.5 lists some informal interpretations of various lithic artifact types that commonly occur on prehistoric archaeological sites and Table 5.6 compares the formal site type against a list of possible activities that may have been performed at the site based on the presence or absence of artifact types.

Table 5.5 Suggested Functional Interpretations of Lithic Tool Classes Found on the Desert Claim Prehistoric Sites (derived from Salo 1985, Elston and Bullock 1994).

OBJECTS	FUNCTION(S)	ACTIVITY
Scrapers	Soft scraping	Fabricating
Debitage Cores Bifaces (through middle stages)	Flaking Flaking Flaking	Tools used in manufacturing, and manufacturing byproducts
Retouched flakes Late stage bifaces Edge-modified pieces	Soft scraping Penetration/cutting Soft scraping	General Utility Tools
Projectile points	Piercing	Weaponry

The variety exhibited among the sites in terms of possible activities represented by the artifact classes suggests that some sites may have functioned as camps from which forays were made to target specific resources; other sites appear to be localities created by people using the fan as a travel route from the Yakima River to the Wenatchee Mountains. Further analysis and research would be able to inform on the detailed relationships between the landform and land use patterns, and would provide data contributing to understanding regional land use patterns. Similar pattern analyses, though using slightly different classificatory systems and addressing slightly different research problems, have been used in nearby areas, most notably on the Yakima Firing Range (Benson et al. 1989; see also Miss and Campbell 2001). The results of the Desert Claim cultural resources survey appears to have potential to complement and contribute to these earlier studies.

Table 5.6 Inferred Functions of Prehistoric Sites.

SITE (DC-03-_)	NO. OF CLASSES	SITE TYPE	RANGE OF ACTIVITIES REPRESENTED
5	3	III	Flaking and piercing: Hunting, manufacturing
6	1	II	Flaking: Manufacturing byproducts
8	4	III	Scraping and flaking: Manufacturing, general processing
10	2	I	Piercing: Hunting
11	2	I	Flaking: Manufacturing byproducts
17	5	IV	Flaking, scraping, and piercing: Hunting, manufacturing, general processing
19	2	I	Flaking and scraping: Manufacturing byproducts, general processing
21	4	III	Flaking, scraping, piercing: Hunting, manufacturing, general processing
22	5	IV	Flaking and scraping: Hunting, manufacturing byproducts, general processing (site materials also includes FMR)
24	2	I	Flaking and piercing: Manufacturing byproducts, hunting
27	5	IV	Flaking and scraping: Manufacturing byproducts, general processing (lithic procurement site)
29	2	I	Scraping: General processing or fabricating
30	2	I	Flaking: Manufacturing byproducts

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5.4.2 Historic Site Patterning

The range of variation among the historic sites was examined by using a simple classification that categorized sites based on the presence of structures (Table 5.7). Three classes were defined: 1) sites that were debris scatters with no evidence for structures (n = 8) , 2) sites with remains of structures but no standing structures or buildings (n = 3), and 3) sites with standing structures and buildings (n = 7). Although not a building as such, North Branch Canal is included in the third class because it is a still extant built feature of the landscape.

Table 5.7 also provides data from documentary sources showing when the claim was purchased or proved up and shows the role that the Northern Railroad land holdings played in settling this portion of Kittitas Valley (Figure 5.5). The documentary evidence combined with the archaeological remains found at the historical sites with structural remains or standing structures and buildings indicate that the historical archaeological data garnered during this project has the potential to inform on changes in historic land use. Much of the data appears to fall at the beginning of the period when the rest of the valley was beginning to pass from subsistence farming to increasingly intensive, highly capitalized farming that characterizes the twentieth century.

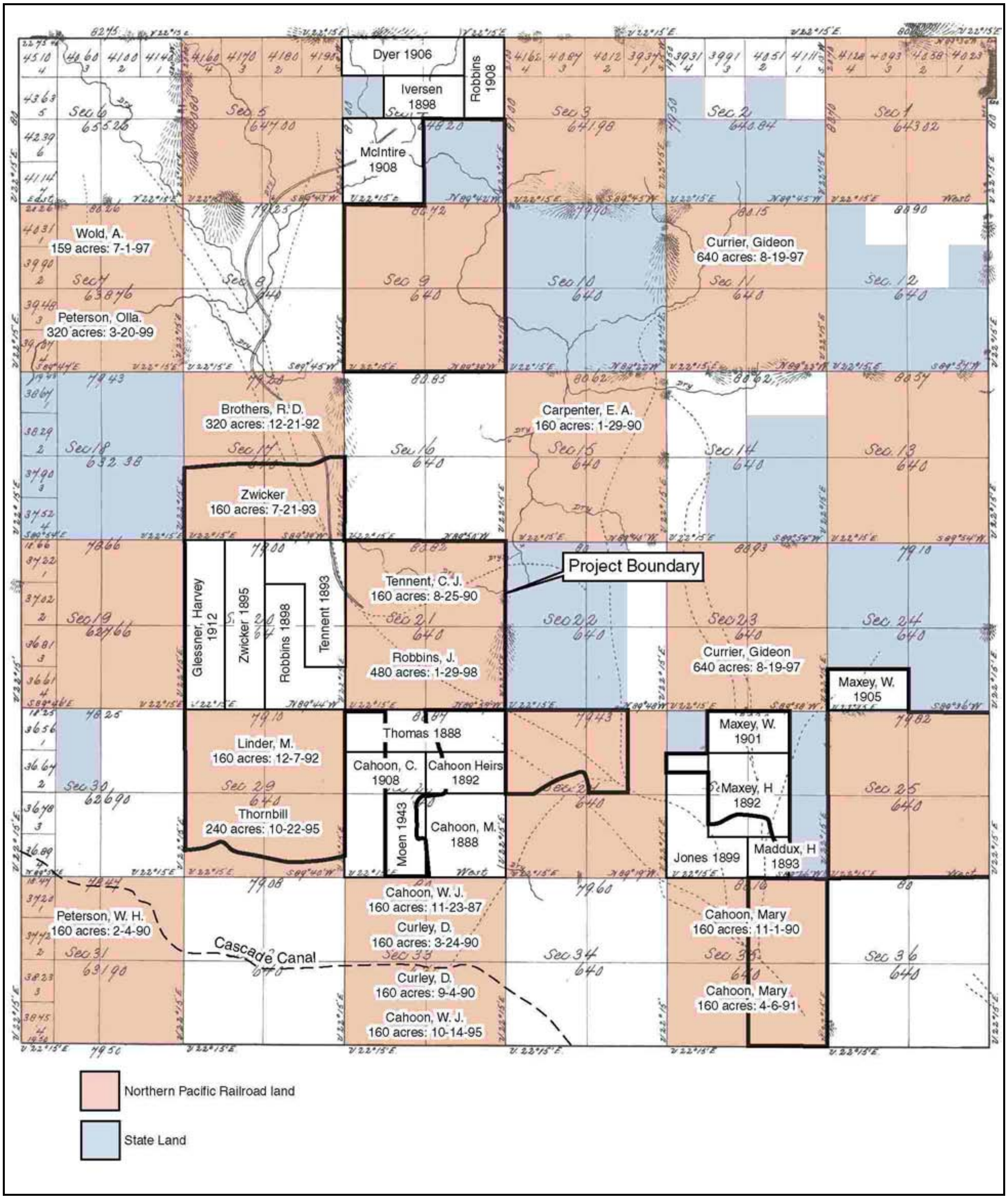

Figure 5.5. 1869 GLO plat of T. 19 N., R. 19 E., showing homestead boundaries (see also Appendix B)

Table 5.7 Classification of Historical Sites Based on Presence of Structures with Additional Data on Initial Homesteaders in the Project Area.

SITE (DC-03-_)	DESCRIPTION	HOMESTEAD DATA			
		NAME	DEED TYPE	DATE	ACRES
Sites with standing structures or buildings:					
15	Farmstead: foundation, razed barn, chicken coop, another collapsed structure.	Zwicker, Barthel	Northern Pacific	1895	160
20	Cabin and debris scatter of cans, window glass, and ceramics.	No data			
22	Springfield Farm/Robbins Homestead	Tennant, Charles	Northern Pacific	1890	240
25	Roan Farm with six standing structures: creamery, barn, ship, chicken coop, granary and hog shed.	Robbins, John	Northern Pacific	1898	480
26	White Ranch: machine shed, two utility sheds, fuel shed, and tack shed.	Thornhill, John	Northern Pacific	1889	240
28	Single family residence.	Thornhill, John	Northern Pacific	1895	240
31	North Branch Canal	Constructed in the late 1920s, first water delivery in 1932.			
Sites with structural remains:					
2	Debris scatter with possible root cellar	No data			
3	Homestead site (Zumbrunner/Morrison)	Zumbrunner, Victor	Homestead	1906	160
14	Homestead: Collapsed structure, foundation, and depression.	Zwicker, Barthel	Homestead	1895	160
Debris scatters:					
1	Cans and other metal fragments, glass, ceramic				
4	Can scatter				
6	Window glass, tin can, lumber				
7	Bottle glass, ceramics, can fragments				
9	Ceramics, bottle glass, ceramics				
16	Diversity of objects along with glass, metal and ceramic fragments.				
18	Metal cans and bottle glass				
23	Concentration of objects				

6. EVALUATION AND RECOMMENDATIONS

Washington state laws addressing cultural resources include the Indian Sites and Resources Act (RCW 27.53) and the Indian Graves and Records Act (RCW 27.44). The first Act prohibits disturbance or excavation of historic or prehistoric archaeological resources on state or private land without a permit from the state. The second Act prohibits knowingly disturbing a Native American or historic grave.

State laws provide no measure of significance for sites since they were crafted with the intention of preventing damage to all. Nonetheless, some properties have greater scientific or historic value than others and federal criteria for significance provide a useful way to measure this value. Under federal guidelines (36 CFR part 800) properties must be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria of significance. Significance is present for properties that are A) associated with events that have made a significant contribution to the broad patterns of our history; B) that are associated with the lives of persons significant in our past; 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 are likely to yield, information important in prehistory or history. Historic properties may include archaeological sites, buildings, structures, districts, or objects.

Table 6.1 presents recommendations of significance based on these criteria. Prehistoric and historic archaeological sites are generally evaluated using criterion D, and for the prehistoric sites, the determination of significance was buttressed by the preliminary data analysis presented in Chapter 5. This exploratory analysis indicates that some of the prehistoric sites in the project area possess enough archaeological information to fulfill the data requirements of archaeological research questions that seek to link archaeological contexts to past human activities.

Table 6.1 Determination of Significance for Cultural Resources Newly Recorded or Revisited in the Desert Claim Wind Power Project Area.

FIELD NO. DC-03-	COM-PONENT	DESCRIPTION	AGE	THEME	SIGNI-CANCE
Sites:					
1	H	Historic debris scatter near cattle track	1900 - 1940	Stock Raising	N
2	H	Historical debris scatter and depression	1900 - 1930	Agriculture / Settlement	N
3	H	Zumbrunner/Morrison Homestead	1880 - 1940	Agriculture / Settlement	Y
4	H	Historic can dump	1940s	Agriculture	N
5	H/P	Lithic Scatter and historic bridge	Late Prehistoric / Early 20th C	Prehistoric / Settlement	N
6	H/P	Historic debris and prehistoric lithic scatter	Prehistoric/ 1900 - 1950	Prehistoric / Stock Raising	N
7	H	Small historic scatter	1940 - 1955	Agriculture	N
8	P	Lithic scatter	Prehistoric	Prehistoric	Y
9	H	Historic debris scatter	1940 - 1960	Agriculture	N
10	P	Lithic scatter	Prehistoric	Prehistoric	N
11	P	Lithic scatter	Prehistoric	Prehistoric	N

Table 6.1 Determination of Significance for Cultural Resources Newly Recorded or Revisited in the Desert Claim Wind Power Project Area.

FIELD NO. DC-03-	COM-PONENT	DESCRIPTION	AGE	THEME	SIGNI-CANCE
14	H	Historic debris	1880 - 1930	Agriculture / Settlement	Y
15	H	Historic structures and historic debris	1900 - 1940	Agriculture / Settlement	Y
16	H	Historic debris scatter	1920 - 1945	Agriculture	N
17	P	Lithic scatter	Late Prehistoric	Prehistoric	Y
18	H	Historic debris scatter	1900 - 1940	Agriculture	N
19	P	Lithic scatter	Prehistoric	Prehistoric	N
20	H	Historic cabin and historic debris scatter	1880 - 1930	Agriculture / Settlement	Y
21	P	Lithic scatter	Prehistoric	Prehistoric	Y
22	H/P	Springfield Farm (45-KT-513h update) / prehistoric lithic scatter	1880 – 1950 / Prehistoric	Agriculture / Settlement Prehistoric	Y
23	H	Historic debris scatter	1925 – 1950	Agriculture	N
24	P	Lithic scatter	Prehistoric	Prehistoric	N
25	H	Roan Farm	1900 – Modern	Agriculture / Settlement	Y
26	H	Historic farm (White Ranch)	1900 – Modern	Agriculture / Settlement	Y
27	P	Lithic scatter / procurement site	Prehistoric	Prehistoric	Y
28	H	Hodges Residence	1925 - Modern	Agriculture / Suburban Development	Y
29	P	Lithic scatter	Prehistoric	Prehistoric	N
30	P	Lithic scatter	Prehistoric	Prehistoric	N
31	H	North Branch Canal	1926 - Modern	Irrigation Development	Y

Although some of the lithic scatters can provide information on prehistoric lithic technology and land use, extremely small sites with low artifact counts and little diversity in tool types are viewed as having exhausted their data potential. These sites are, therefore, considered to have less importance than other prehistoric sites. Historical properties with standing structures or buildings are most often evaluated using criteria A or C. Integrity standards require that a historical property be attributable to the period through documentation or artifacts, be identifiable as one of the contributing property types, and have integrity of physical association of features and artifacts. For this project certain features and the farmsteads provide a good representation of lifeways of the late 19th/early 20th century during the early period of settlement and when agriculture was developed in the Kittitas Valley.

The isolates are not included in the following discussion because there is no evidence that they are significant beyond this recording. They provide no additional research opportunities nor meet the standards of either the historic criteria that would make them potentially eligible for inclusion on the NRHP. The historical isolates include flattened food and beverage tins, fragments of glass vessels, fragments of domestic utilitarian and fine ceramic ware types, abandoned machinery, and fragments of other metal tools and artifacts.

SEPA Checklist Item 13 (*Historic and Cultural Preservation*) provides suggestions for ways of mitigating adverse effects to historic properties. These can take several forms, including, but not limited to,

- Avoidance of the site,
- Maintaining or restoring the integrity of the site or landmark to the extent possible,
- Relocating the structure or artifact,
- Meeting tribal needs for the sanctity of the location.

However, SEPA does not discuss the case of unavoidable impacts. Significant sites containing information that can contribute to history or prehistory in the region will require appropriate treatments that will ensure recovery of information capable of addressing the prehistoric and historic research needs of the region.

Five prehistoric sites were deemed to possess enough information to contribute to scientific and cultural understanding of human land use, settlement, and subsistence in the Kittitas Valley. The discovery of a prehistoric component at the Springfield Farm (DC-03-22) containing fire-modified rock was an unexpected, and important, discovery based on low prior expectations about the possibility of residential site types to be present on the fan surface. The large lithic procurement site (DC-03-27) has potential to make an important contribution to scientific knowledge about toolstone procurement and its inclusion in the seasonal round. The remaining three sites, in addition to possessing the formal and functional properties described in Chapter 5 above, exhibit discrete, well-bounded, high-density clusters of artifacts that can potentially inform about re-use of localities in the landscape.

Nine of the historic cultural resources recorded or updated during the survey were deemed to possess artifacts and features that made them important to understanding regional history. The majority of these sites still retain standing structures and buildings. The Morrison homestead (DC-03-03) is the exception, but retains enough information about the farmstead lay-out that detailed study of the homestead can inform about the spatial arrangement and use of space on one of the earlier homesteads in the project. The historical sites also retain enough artifacts and features to provide information on spatial arrangement and use; additionally, the sites retain enough time-diagnostic artifacts and features to document changing land use through time.

The single-family residence (DC-03-28) is particularly interesting in light of historic land use practices above the North Branch canal because it may represent an early suburban encroachment on land formerly exclusively devoted to agricultural and livestock production.

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APPENDIX E

Health and Safety - Shadow Flicker

Contents

APPENDIX E
TABLE E1
Summary of Shadow Flicker Analysis Results

SF Receptor	Theoretical Maximum Possible Shadow Flicker Time [hr/year]	Theoretical Maximum Number of Shadow Flicker Days [days/year]	Theoretical Maximum Shadow Flicker Hours in 1 Day [hr/day]	Expected Shadow Flicker Time [hr/year]
SF001N	16:22	53	0:26	5:44
SF001S	33:36	76	0:38	9:08
SF001W	50:04	123	0:38	14:52
SF002N	10:08	64	0:16	3:42
SF002S	27:48	82	0:38	6:35
SF002W	38:14	147	0:38	10:17
SF003N	19:08	97	0:20	6:50
SF003S	82:54	104	0:58	6:40
SF003W	102:16	203	0:58	12:04
SF004N	17:58	95	0:20	6:26
SF004S	82:20	115	0:56	7:38
SF004W	100:32	212	0:56	12:51
SF005N	0:00	0	0:00	0:00
SF005S	6:02	50	0:14	0:34
SF005W	6:06	50	0:14	0:35
SF006E	58:02	120	0:48	13:07
SF006N	0:00	0	0:00	0:00
SF006S	166:44	142	2:18	22:10
SF006W	108:54	109	1:30	9:52
SF007E	18:58	72	0:26	3:10
SF007N	0:00	0	0:00	0:00
SF007S	49:56	71	0:54	5:34
SF007W	34:38	71	0:40	2:45
SF008E	22:56	42	0:42	3:12
SF008N	0:00	0	0:00	0:00
SF008S	96:26	109	1:38	10:10
SF008W	73:42	109	0:58	6:48
SF009E	0:00	0	0:00	0:00
SF009N	0:00	0	0:00	0:00
SF009S	6:30	41	0:18	0:58
SF009W	6:34	41	0:18	0:58
SF010E	14:52	72	0:24	3:33
SF010N	19:12	110	0:24	6:53
SF010S	51:26	147	1:12	11:15
SF010W	66:06	216	0:52	16:23
SF011E	60:26	200	0:30	15:51
SF011N	105:16	169	1:18	37:58
SF011S	104:44	192	1:02	21:00
SF011W	151:04	260	1:08	42:33
SF012E	39:10	126	0:28	10:55
SF012N	64:52	160	0:38	20:35
SF012S	58:18	98	0:54	16:58
SF012W	84:38	189	0:56	26:44
SF013E	0:00	0	0:00	0:00
SF013N	20:34	82	0:28	8:06
SF013W	20:50	83	0:28	8:13
SF014E	4:26	54	0:06	1:08
SF014N	4:24	54	0:06	1:07
SF014S	0:00	0	0:00	0:00
SF014W	0:00	0	0:00	0:00

APPENDIX E
TABLE E1
Summary of Shadow Flicker Analysis Results

	Theoretical Maximum Possible Shadow Flicker Time	Theoretical Maximum Number of Shadow Flicker Days	Theoretical Maximum Shadow Flicker Hours in 1 Day	Expected Shadow Flicker Time
SF015E	0:00	0	0:00	0:00
SF015N	27:18	97	0:26	10:41
SF015W	27:22	97	0:26	10:43
SF016E	0:00	0	0:00	0:00
SF016N	18:56	78	0:24	7:15
SF016W	19:08	78	0:24	7:19
SF017E	0:00	0	0:00	0:00
SF017N	27:52	95	0:26	10:40
SF017W	28:02	96	0:26	10:44
SF018E	0:00	0	0:00	0:00
SF018N	9:14	65	0:14	3:34
SF018W	9:18	65	0:14	3:35
SF019E	12:38	66	0:20	3:13
SF019N	80:02	91	1:10	29:15
SF019S	35:28	59	0:46	8:25
SF019W	103:38	150	0:52	34:17
SF020E	0:00	0	0:00	0:00
SF020N	0:00	0	0:00	0:00
SF020W	0:00	0	0:00	0:00
SF021E	0:00	0	0:00	0:00
SF021N	0:00	0	0:00	0:00
SF021W	0:00	0	0:00	0:00
SF022E	10:50	67	0:16	2:41
SF022N	23:26	101	0:34	7:13
SF022W	17:00	83	0:18	5:49
SF023E	14:56	83	0:16	3:49
SF023N	38:08	129	0:34	12:07
SF023S	9:20	47	0:20	2:23
SF023W	32:40	127	0:26	10:38
SF024E	30:40	93	0:30	8:26
SF024N	108:20	147	1:18	37:37
SF024S	49:44	153	0:32	8:51
SF024W	128:54	255	0:52	37:28
SF025E	40:18	141	0:28	11:28
SF025N	31:26	107	0:36	9:30
SF025S	67:02	181	1:06	15:12
SF025W	74:14	193	1:02	15:47
SF026E	7:16	44	0:18	1:57
SF026N	26:32	92	0:32	9:09
SF026S	7:34	49	0:18	2:03
SF026W	26:58	93	0:32	9:18
SF027E	29:58	106	0:30	6:54
SF027N	0:00	0	0:00	0:00
SF027S	29:52	106	0:30	6:52
SF028E	13:52	56	0:22	4:01
SF028N	25:24	97	0:26	8:12
SF028W	17:02	66	0:26	5:53
SF029E	35:58	100	0:34	9:25
SF029N	84:02	138	1:06	27:11
SF029W	51:24	139	0:40	18:45
SF030E	14:08	56	0:24	4:21

APPENDIX E
TABLE E1
Summary of Shadow Flicker Analysis Results

	Theoretical Maximum Possible Shadow Flicker Time	Theoretical Maximum Number of Shadow Flicker Days	Theoretical Maximum Shadow Flicker Hours in 1 Day	Expected Shadow Flicker Time
SF030S	91:50	203	0:52	17:50
SF030W	83:18	182	0:46	15:19
SF031E	2:52	18	0:12	0:47
SF031N	2:52	18	0:12	0:47
SF031S	0:00	0	0:00	0:00
SF032E	4:38	24	0:16	1:16
SF032N	4:38	24	0:16	1:16
SF032S	0:00	0	0:00	0:00
SF032W	0:00	0	0:00	0:00
SF033E	45:02	101	0:50	14:42
SF033N	6:32	39	0:22	2:02
SF033S	41:12	80	0:48	13:35
SF033W	3:22	31	0:10	1:09
SF034E	9:28	44	0:20	2:47
SF034N	6:32	41	0:14	1:50
SF101E	0:00	0	0:00	0:00
SF101N	9:04	60	0:16	3:22
SF101W	9:12	60	0:16	3:25
SF102E	0:00	0	0:00	0:00
SF102N	5:34	32	0:16	2:08
SF102W	5:36	32	0:16	2:09
SF103E	0:00	0	0:00	0:00
SF103N	6:02	49	0:14	2:14
SF103W	6:10	50	0:14	2:17
SF104E	0:00	0	0:00	0:00
SF104N	9:50	72	0:12	3:49
SF104W	10:08	72	0:12	3:55
SF105E	0:00	0	0:00	0:00
SF105N	0:00	0	0:00	0:00
SF105W	0:00	0	0:00	0:00
SF106E	0:00	0	0:00	0:00
SF106N	0:00	0	0:00	0:00
SF106W	0:00	0	0:00	0:00
SF107E	0:00	0	0:00	0:00
SF107N	0:00	0	0:00	0:00
SF107W	0:00	0	0:00	0:00
SF108E	8:26	52	0:14	2:07
SF108N	8:20	51	0:14	2:05
SF108W	0:00	0	0:00	0:00
SF109E	25:30	116	0:24	7:07
SF109N	81:06	99	1:18	25:46
SF109S	35:00	98	0:50	7:04
SF109W	95:14	160	1:04	26:26
SF110E	55:12	105	0:56	15:46
SF110S	37:22	62	0:56	10:19
SF111S	40:24	131	0:40	4:16
SF111W	33:36	86	0:40	2:51
SF112E	20:34	105	0:20	4:32
SF112S	20:24	105	0:20	4:29
SF113E	13:20	69	0:18	3:05
SF113S	13:20	69	0:18	3:05

APPENDIX E
TABLE E1
Summary of Shadow Flicker Analysis Results

	Theoretical Maximum Possible Shadow Flicker Time	Theoretical Maximum Number of Shadow Flicker Days	Theoretical Maximum Shadow Flicker Hours in 1 Day	Expected Shadow Flicker Time
SF114E	2:44	28	0:10	0:40
SF114N	0:00	0	0:00	0:00
SF114W	0:00	0	0:00	0:00
SF118E	21:56	90	0:24	5:34
SF118N	21:50	90	0:24	5:33
SF119E	7:44	56	0:16	1:58
SF119N	7:44	56	0:16	1:58
SF120E	12:24	66	0:16	3:06
SF120N	12:18	66	0:16	3:05
SF121E	5:34	42	0:14	1:26
SF121N	5:34	42	0:14	1:26
SF122E	4:08	47	0:10	1:02
SF122N	4:08	47	0:10	1:02
SF123E	2:26	28	0:08	0:37
SF123N	2:26	28	0:08	0:37
SF124E	1:18	14	0:08	0:19
SF124N	1:16	14	0:08	0:18
SF125E	6:16	58	0:10	1:33
SF125N	6:12	58	0:10	1:32
SF126E	6:46	65	0:12	1:39
SF126N	6:44	65	0:12	1:39
SF127E	1:42	21	0:06	0:25
SF127N	1:42	21	0:06	0:25
SF128E	0:00	0	0:00	0:00
SF128N	0:00	0	0:00	0:00
SF129E	0:00	0	0:00	0:00
SF129N	0:00	0	0:00	0:00
SF130E	0:00	0	0:00	0:00
SF130N	0:00	0	0:00	0:00
SF131E	0:00	0	0:00	0:00
SF131N	0:00	0	0:00	0:00
SF132E	0:00	0	0:00	0:00
SF132N	0:00	0	0:00	0:00
SF133E	0:00	0	0:00	0:00
SF133N	0:00	0	0:00	0:00
SF134E	0:00	0	0:00	0:00
SF134N	0:00	0	0:00	0:00
SF135E	0:00	0	0:00	0:00
SF135N	0:00	0	0:00	0:00
SF135W	0:00	0	0:00	0:00
SF136E	0:00	0	0:00	0:00
SF136N	7:54	35	0:20	2:50
SF136W	7:56	35	0:20	2:51
SF137E	5:08	30	0:14	1:18
SF137N	5:06	30	0:14	1:18
SF137S	0:00	0	0:00	0:00
SF137W	0:00	0	0:00	0:00
SF138E	20:12	76	0:22	5:09
SF138N	20:02	76	0:22	5:06
SF138S	0:00	0	0:00	0:00
SF138W	0:00	0	0:00	0:00

APPENDIX E
TABLE E1
Summary of Shadow Flicker Analysis Results

	Theoretical Maximum Possible Shadow Flicker Time	Theoretical Maximum Number of Shadow Flicker Days	Theoretical Maximum Shadow Flicker Hours in 1 Day	Expected Shadow Flicker Time
SF139E	7:36	42	0:16	2:03
SF139N	7:30	41	0:16	2:01
SF139S	0:00	0	0:00	0:00
SF140E	30:46	126	0:22	8:22
SF140N	30:24	126	0:22	8:16
SF140S	0:00	0	0:00	0:00
SF141E	19:56	85	0:20	5:43
SF141N	17:34	79	0:20	4:59
SF141S	2:06	18	0:10	0:39
SF142E	30:54	126	0:24	8:14
SF142N	30:42	126	0:22	8:11
SF142S	0:00	0	0:00	0:00
SF143E	25:06	104	0:22	6:31
SF143N	25:02	104	0:22	6:30
SF143S	0:00	0	0:00	0:00
SF144E	30:56	120	0:22	8:08
SF144N	30:38	119	0:22	8:03
SF144S	0:00	0	0:00	0:00
SF145E	0:00	0	0:00	0:00
SF145N	0:00	0	0:00	0:00
SF145S	6:42	51	0:12	0:31
SF145W	6:42	51	0:12	0:31
SF146E	0:00	0	0:00	0:00
SF146N	0:00	0	0:00	0:00
SF146S	5:02	41	0:14	0:29
SF146W	5:02	41	0:14	0:29
SF147E	0:00	0	0:00	0:00
SF147N	0:00	0	0:00	0:00
SF147S	5:26	38	0:16	0:33
SF147W	5:26	38	0:16	0:33

Note: Highlight shows windows with 20 hours or more per year.

Exhibit 2
WindPRO Shadow Flicker Output

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 05 - North, South and West windows
Turbines 013 through 018 and 027 through 035
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Printed/Page
07/25/2004 23:00 / 1

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 22:04/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 05, tubines 013-018, 027-035

Assumptions for shadow calculations

Maximum distance for influence	1,500 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes

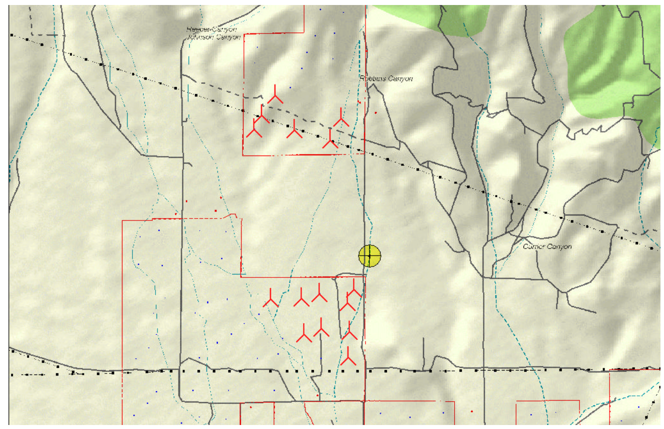
Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304



Scale 1:100,000

New WTG   Shadow Receptor

WTGs

	UTM NAD27 Zone: 10				WTG type						
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
013	682,232	5,224,844	863	013	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
014	683,114	5,224,561	846	014	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
015	682,061	5,224,572	825	015	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
016	682,499	5,224,392	819	016	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
017	681,965	5,224,388	803	017	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
018	682,979	5,224,272	826	018	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
027	682,253	5,222,153	705	027	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
028	682,664	5,222,171	709	028	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
029	682,712	5,221,699	690	029	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
030	682,901	5,222,242	715	030	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
031	682,937	5,221,783	695	031	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
032	683,278	5,222,135	714	032	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
033	683,318	5,221,753	697	033	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
034	683,306	5,221,415	685	034	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
035	683,360	5,222,311	722	035	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Shadow Receptor-Input

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF005	SF005N	683,552	5,222,758	744	1.0	1.0	1.0	180.0	90.0
SF005	SF005S	683,552	5,222,758	744	1.0	1.0	1.0	0.0	90.0
SF005	SF005W	683,552	5,222,758	744	1.0	1.0	1.0	90.0	90.0

Calculation Results

No	Name	Shadow, worst case: Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values: Shadow hours per year [h/year]
SF005	SF005N	0:00	0	0:00	0:00
SF005	SF005S	6:02	50	0:14	0:34
SF005	SF005W	6:06	50	0:14	0:35

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 05 - North, South and West windows
Turbines 013 through 018 and 027 through 035
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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07/25/2004 22:51 / 5

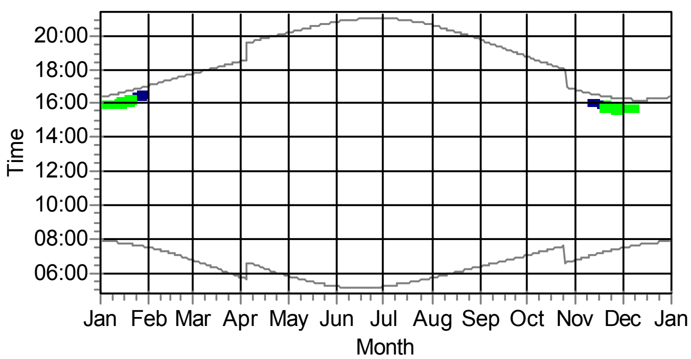
Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 22:04/2.3.0.216

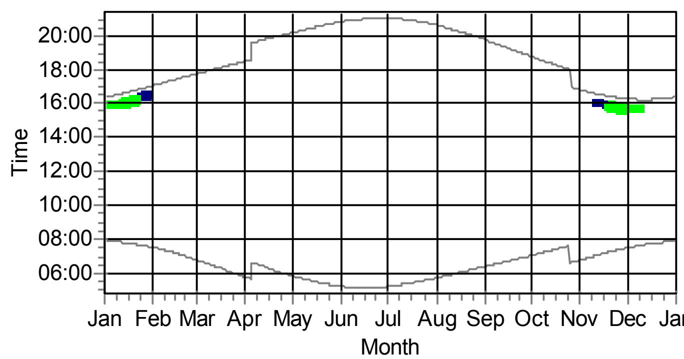
SHADOW - Calendar, graphical

Calculation: 040725 SF 05, tubines 013-018, 027-035

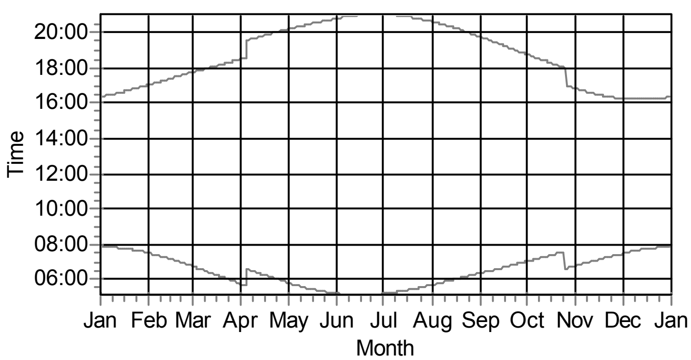
SF005W



SF005S



SF005N



WTGs

028

030

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 05 - North, South and West windows
Turbines 013 through 018 and 027 through 035
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

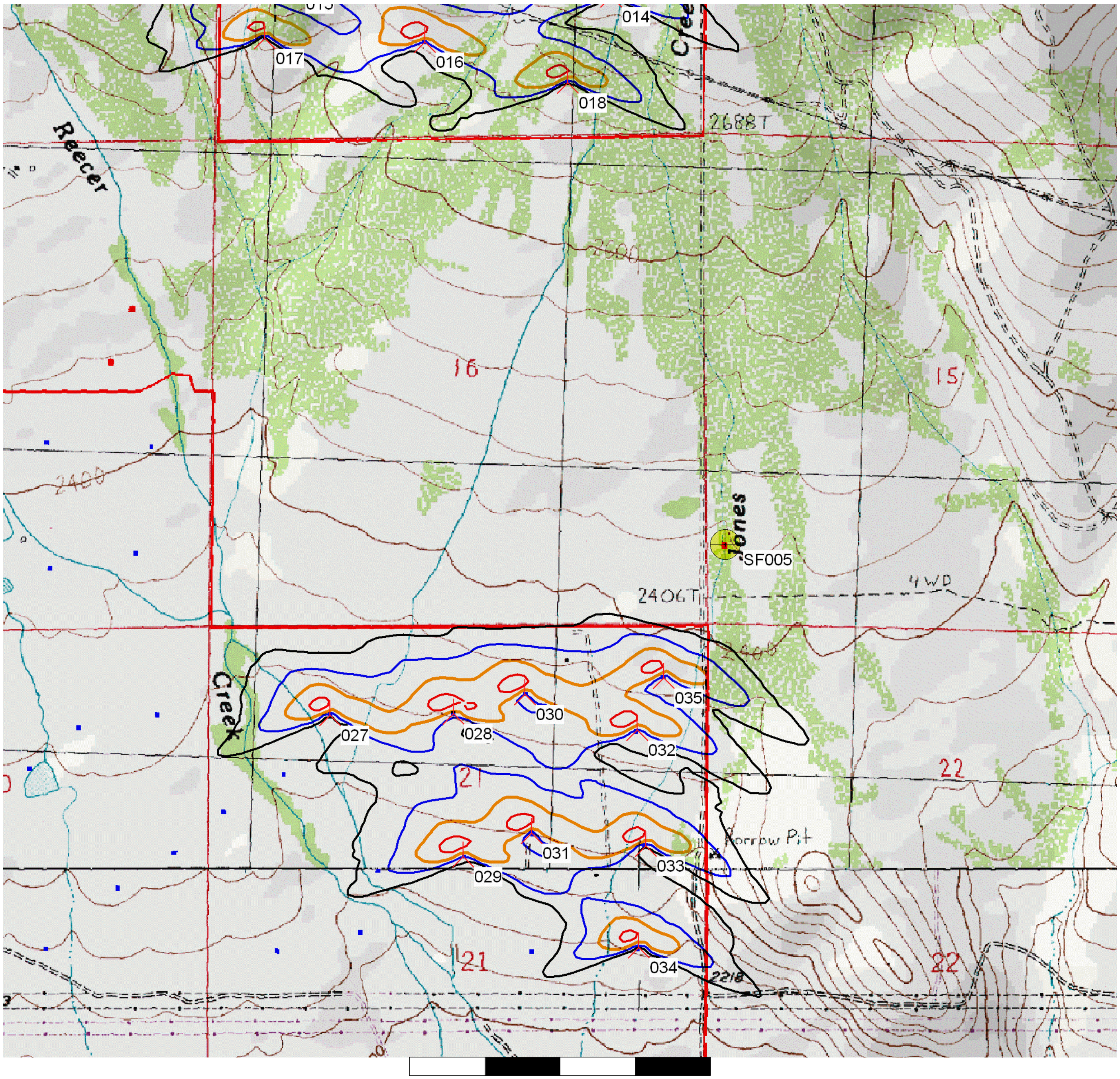
Printed/Page
07/25/2004 22:51 / 6

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 22:04/2.3.0.216

SHADOW - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040725 SF 05, tubines 013-018, 027-035 **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 682,940 North: 5,222,727

New WTG — Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25 — 50 — 100 — 200

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA	Shadow-Flicker receptor 001 through 004 - all windows	07/25/2004 22:38 / 1
Huckell/Weinman Associates, Inc.	Turbines 001 through 018	Licensed user:
	GE 1.5sle (77m diameter) at 65m hub height	**Wind Engineers, Inc.**
	Monthly sunshine percentage applied	7660 Whitegate Avenue
	Joint frequency distribution applied (for run-hours and direction)	CA-92506 Riverside, USA
	1500 meter shadow limit applied	Calculated:
		07/25/2004 13:09/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 001-004, tubines 001-018

Assumptions for shadow calculations

Maximum distance for influence	1,500 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes

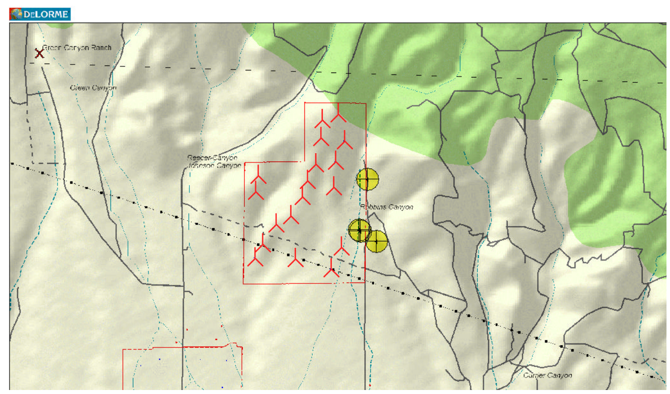
Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304



Scale 1:100,000

New WTG   Shadow Receptor

WTGs

	UTM NAD27 Zone: 10				WTG type						
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
001	683,014	5,226,319	1,110	001	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
002	682,804	5,226,234	1,074	002	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
003	682,791	5,226,001	1,025	003	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
004	683,105	5,225,970	1,025	004	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
005	682,740	5,225,651	961	005	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
006	682,994	5,225,693	980	006	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
007	681,975	5,225,474	920	007	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
008	682,634	5,225,428	927	008	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
009	682,981	5,225,355	923	009	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
010	681,946	5,225,268	900	010	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
011	682,569	5,225,217	900	011	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
012	682,426	5,224,961	880	012	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
013	682,232	5,224,844	863	013	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
014	683,114	5,224,561	846	014	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
015	682,061	5,224,572	825	015	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
016	682,499	5,224,392	819	016	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
017	681,965	5,224,388	803	017	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
018	682,979	5,224,272	826	018	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Shadow Receptor-Input

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF001	SF001S	683,428	5,225,473	919	1.0	1.0	1.0	0.0	90.0
SF001	SF001N	683,428	5,225,473	919	1.0	1.0	1.0	180.0	90.0
SF001	SF001W	683,428	5,225,473	919	1.0	1.0	1.0	90.0	90.0
SF002	SF002S	683,575	5,224,656	856	1.0	1.0	1.0	0.0	90.0
SF002	SF002N	683,575	5,224,656	856	1.0	1.0	1.0	180.0	90.0
SF002	SF002W	683,575	5,224,656	856	1.0	1.0	1.0	90.0	90.0
SF003	SF003S	683,340	5,224,798	863	1.0	1.0	1.0	0.0	90.0
SF003	SF003N	683,340	5,224,798	863	1.0	1.0	1.0	180.0	90.0
SF003	SF003W	683,340	5,224,798	863	1.0	1.0	1.0	90.0	90.0
SF004	SF004S	683,362	5,224,784	863	1.0	1.0	1.0	0.0	90.0
SF004	SF004N	683,362	5,224,784	863	1.0	1.0	1.0	180.0	90.0
SF004	SF004W	683,362	5,224,784	863	1.0	1.0	1.0	90.0	90.0

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 001 through 004 - all windows
Turbines 001 through 018
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 13:09/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 001-004, tubines 001-018

Calculation Results

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF001	SF001S	33:36	76	0:38	9:08
SF001	SF001N	16:22	53	0:26	5:44
SF001	SF001W	50:04	123	0:38	14:52
SF002	SF002S	27:48	82	0:38	6:35
SF002	SF002N	10:08	64	0:16	3:42
SF002	SF002W	38:14	147	0:38	10:17
SF003	SF003S	82:54	104	0:58	6:40
SF003	SF003N	19:08	97	0:20	6:50
SF003	SF003W	102:16	203	0:58	12:04
SF004	SF004S	82:20	115	0:56	7:38
SF004	SF004N	17:58	95	0:20	6:26
SF004	SF004W	100:32	212	0:56	12:51

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 001 through 004 - all windows
Turbines 001 through 018
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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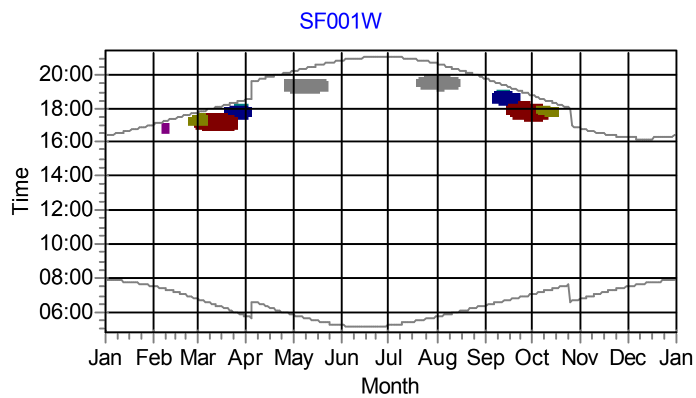
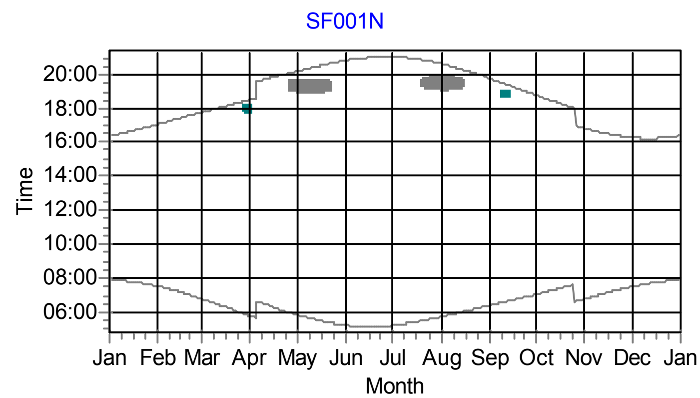
CA-92506 Riverside, USA

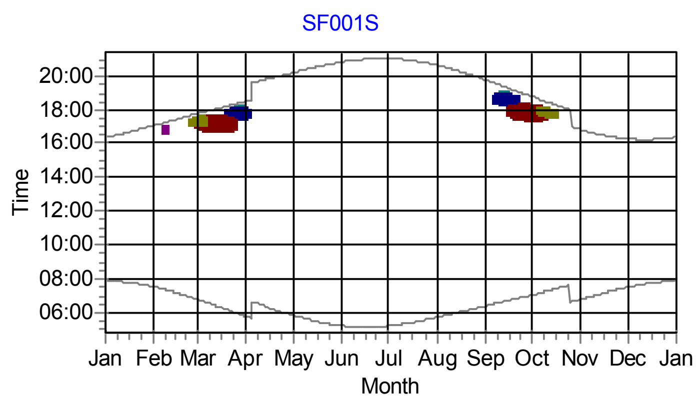
Calculated:
07/25/2004 13:09/2.3.0.216

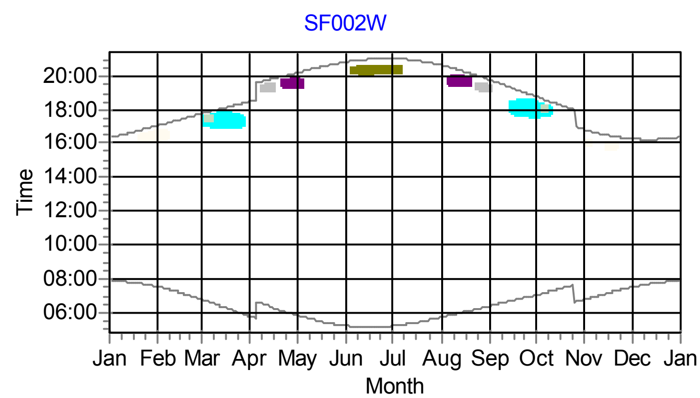
SHADOW - Calendar, graphical

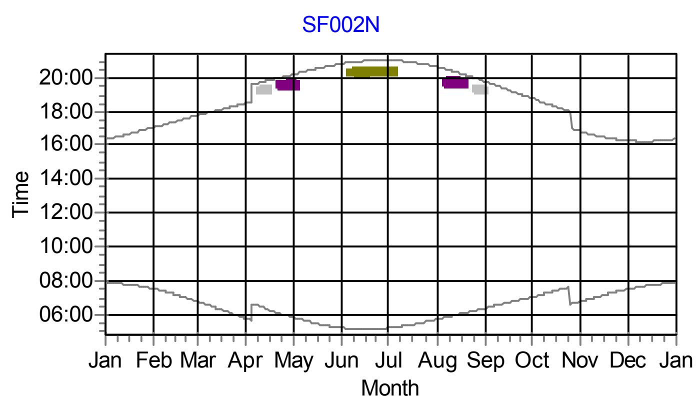
Calculation: 040725 SF 001-004, tubines 001-018

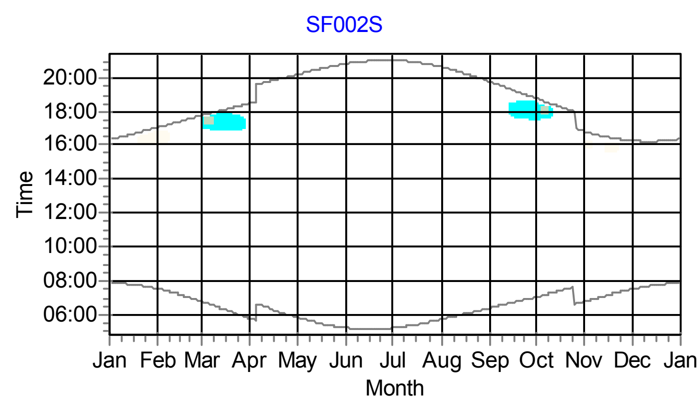












WTGs

005	008	011	013	016
007	009	012	014	018

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 001 through 004 - all windows
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Joint frequency distribution applied (for run-hours and direction)
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Calculated:
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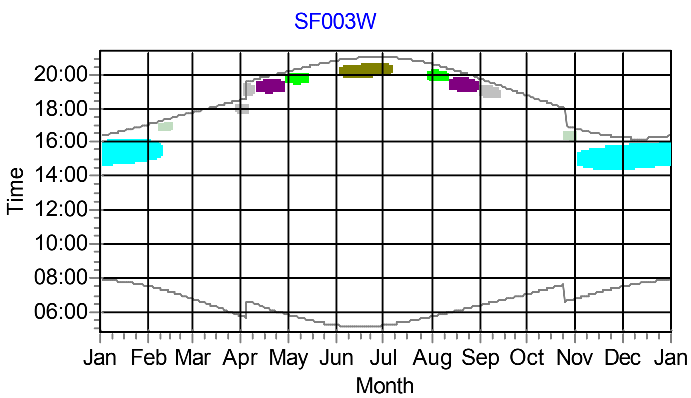
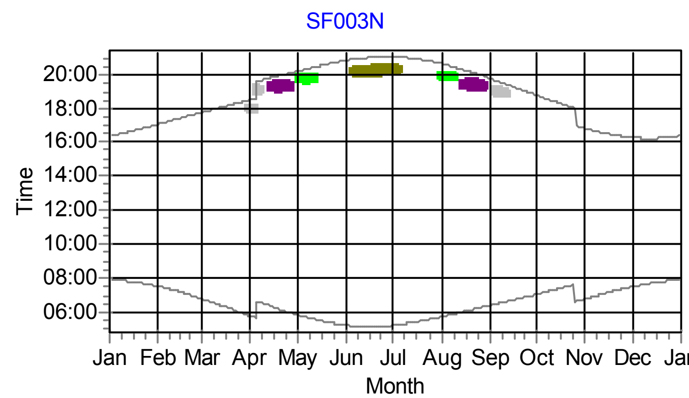
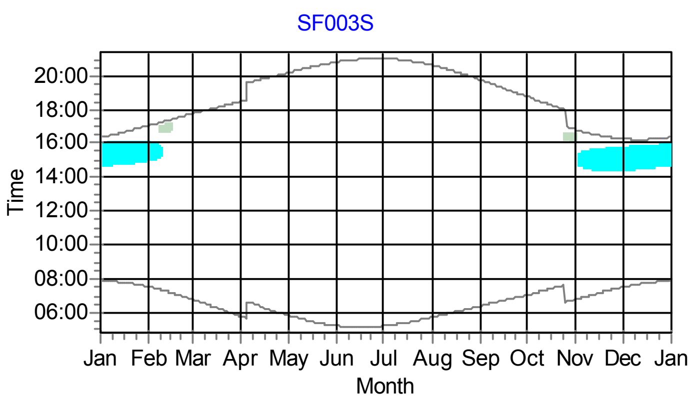
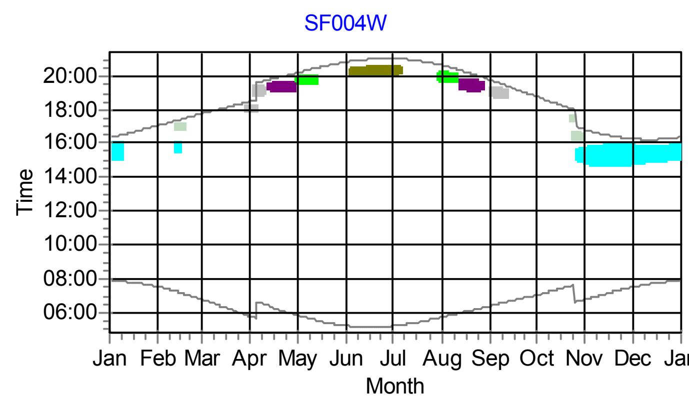
SHADOW - Calendar, graphical

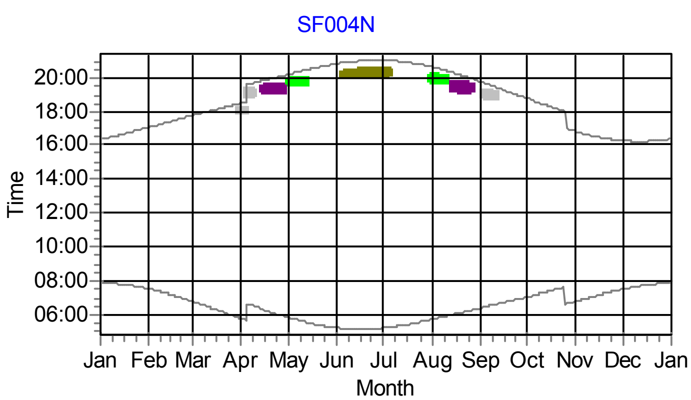
Calculation: 040725 SF 001-004, tubines 001-018

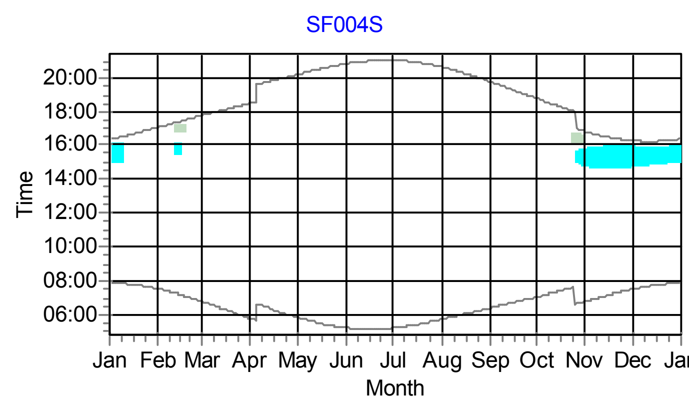












WTGs

010 011 012 013 014 016

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 001 through 004 - all windows
Turbines 001 through 018
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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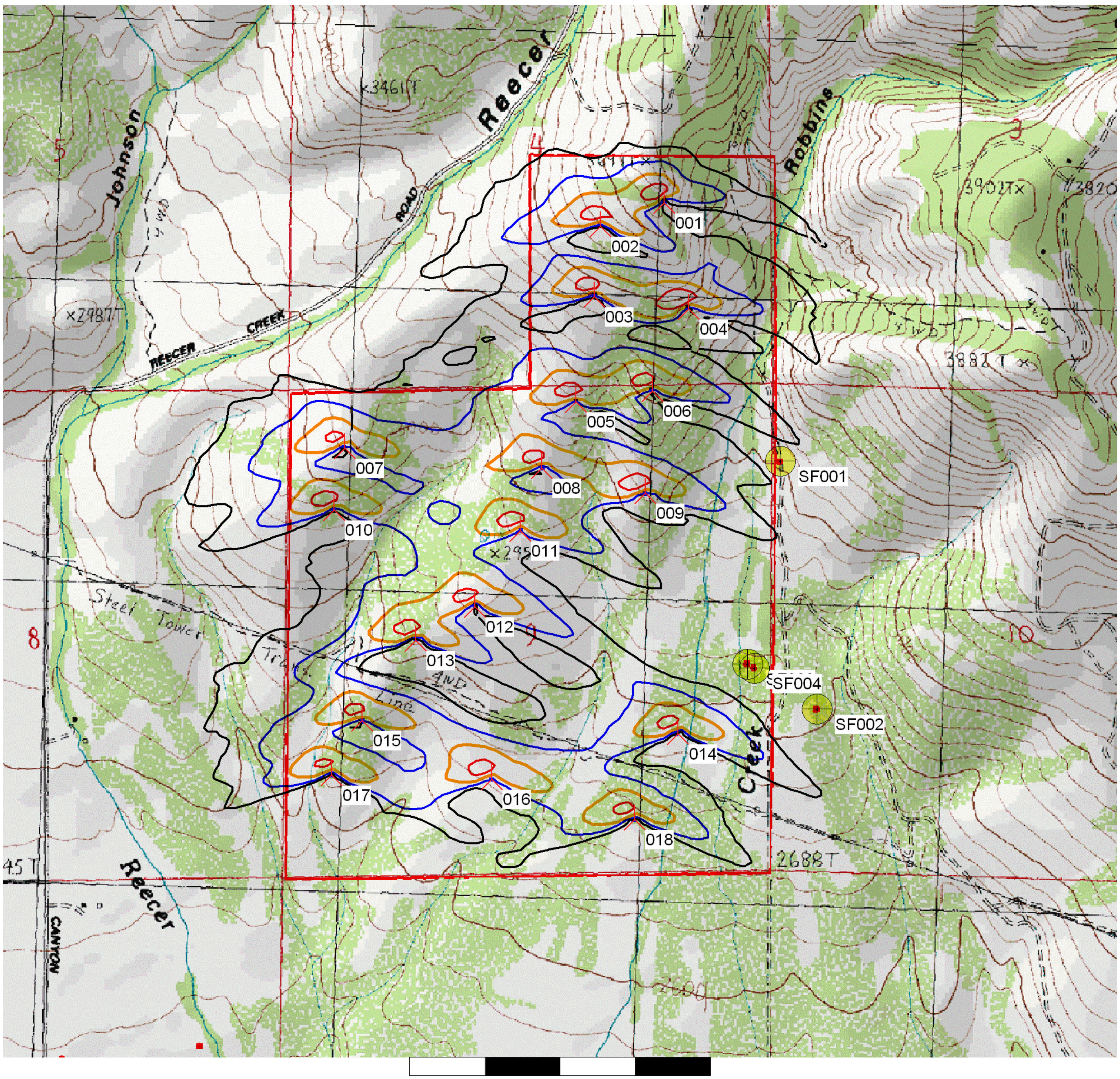
Calculated:
07/25/2004 13:09/2.3.0.216

SHADOW - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040725 SF 001-004, tubines 001-018 **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 682,640 North: 5,225,160

New WTG   Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25   50   100   200

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA Huckell/Weinman Associates, Inc.	Shadow-Flicker receptors 006-009, 137-147 - all windows Turbines 001 through 026 GE 1.5sle (77m diameter) at 65m hub height Monthly sunshine percentage applied Joint frequency distribution applied (for run-hours and direction) 1500 meter shadow limit applied	07/25/2004 23:21 / 1 Licensed user: **Wind Engineers, Inc.** 7660 Whitegate Avenue CA-92506 Riverside, USA Calculated: 07/25/2004 15:26/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

Assumptions for shadow calculations

Maximum distance for influence	1,500 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes

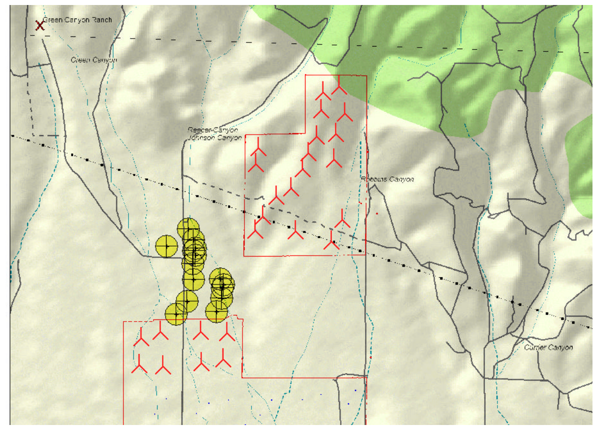
Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304



Scale 1:100,000

New WTG   Shadow Receptor

WTGs

	UTM NAD27 Zone: 10				WTG type						
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
001	683,014	5,226,319	1,110	001	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
002	682,804	5,226,234	1,074	002	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
003	682,791	5,226,001	1,025	003	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
004	683,105	5,225,970	1,025	004	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
005	682,740	5,225,651	961	005	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
006	682,994	5,225,693	980	006	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
007	681,975	5,225,474	920	007	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
008	682,634	5,225,428	927	008	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
009	682,981	5,225,355	923	009	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
010	681,946	5,225,268	900	010	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
011	682,569	5,225,217	900	011	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
012	682,426	5,224,961	880	012	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
013	682,232	5,224,844	863	013	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
014	683,114	5,224,561	846	014	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
015	682,061	5,224,572	825	015	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
016	682,499	5,224,392	819	016	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
017	681,965	5,224,388	803	017	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
018	682,979	5,224,272	826	018	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
019	681,632	5,223,025	731	019	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
020	680,746	5,223,014	742	020	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
021	681,284	5,223,026	737	021	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
022	680,495	5,222,921	743	022	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
023	681,306	5,222,614	723	023	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
024	680,481	5,222,564	729	024	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
025	681,589	5,222,672	721	025	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
026	680,800	5,222,554	728	026	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Shadow Receptor-Input

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF006	SF006E	680,958	5,223,243	747	1.0	1.0	1.0	-90.0	90.0
SF006	SF006N	680,958	5,223,243	747	1.0	1.0	1.0	180.0	90.0
SF006	SF006S	680,958	5,223,243	747	1.0	1.0	1.0	0.0	90.0
SF006	SF006W	680,958	5,223,243	747	1.0	1.0	1.0	90.0	90.0
SF007	SF007E	681,096	5,223,419	753	1.0	1.0	1.0	-90.0	90.0

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 15:26/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

No	Name	UTM NAD27 Zone: 10 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window
				[m]	[m]	[m]	[m]	[°]	[°]
SF007	SF007N	681,096	5,223,419	753	1.0	1.0	1.0	180.0	90.0
SF007	SF007S	681,096	5,223,419	753	1.0	1.0	1.0	0.0	90.0
SF007	SF007W	681,096	5,223,419	753	1.0	1.0	1.0	90.0	90.0
SF008	SF008E	681,486	5,223,297	743	1.0	1.0	1.0	-90.0	90.0
SF008	SF008N	681,486	5,223,297	743	1.0	1.0	1.0	180.0	90.0
SF008	SF008S	681,486	5,223,297	743	1.0	1.0	1.0	0.0	90.0
SF008	SF008W	681,486	5,223,297	743	1.0	1.0	1.0	90.0	90.0
SF009	SF009E	681,551	5,223,473	749	1.0	1.0	1.0	-90.0	90.0
SF009	SF009N	681,551	5,223,473	749	1.0	1.0	1.0	180.0	90.0
SF009	SF009S	681,551	5,223,473	749	1.0	1.0	1.0	0.0	90.0
SF009	SF009W	681,551	5,223,473	749	1.0	1.0	1.0	90.0	90.0
SF137	SF137N	681,166	5,223,712	764	1.0	1.0	1.0	180.0	90.0
SF137	SF137E	681,166	5,223,712	764	1.0	1.0	1.0	-90.0	90.0
SF137	SF137W	681,166	5,223,712	764	1.0	1.0	1.0	90.0	90.0
SF137	SF137S	681,166	5,223,712	764	1.0	1.0	1.0	0.0	90.0
SF138	SF138N	681,154	5,223,921	772	1.0	1.0	1.0	180.0	90.0
SF138	SF138E	681,154	5,223,921	772	1.0	1.0	1.0	-90.0	90.0
SF138	SF138W	681,154	5,223,921	772	1.0	1.0	1.0	90.0	90.0
SF138	SF138S	681,154	5,223,921	772	1.0	1.0	1.0	0.0	90.0
SF139	SF139N	680,798	5,224,135	780	1.0	1.0	1.0	180.0	90.0
SF139	SF139E	680,798	5,224,135	780	1.0	1.0	1.0	-90.0	90.0
SF139	SF139S	680,798	5,224,135	780	1.0	1.0	1.0	0.0	90.0
SF140	SF140N	681,149	5,224,236	782	1.0	1.0	1.0	180.0	90.0
SF140	SF140E	681,149	5,224,236	782	1.0	1.0	1.0	-90.0	90.0
SF140	SF140S	681,149	5,224,236	782	1.0	1.0	1.0	0.0	90.0
SF141	SF141S	681,078	5,224,377	792	1.0	1.0	1.0	0.0	90.0
SF141	SF141E	681,078	5,224,377	792	1.0	1.0	1.0	-90.0	90.0
SF141	SF141N	681,078	5,224,377	792	1.0	1.0	1.0	180.0	90.0
SF142	SF142S	681,179	5,224,127	779	1.0	1.0	1.0	0.0	90.0
SF142	SF142E	681,179	5,224,127	779	1.0	1.0	1.0	-90.0	90.0
SF142	SF142N	681,179	5,224,127	779	1.0	1.0	1.0	180.0	90.0
SF143	SF143S	681,182	5,224,034	776	1.0	1.0	1.0	0.0	90.0
SF143	SF143E	681,182	5,224,034	776	1.0	1.0	1.0	-90.0	90.0
SF143	SF143N	681,182	5,224,034	776	1.0	1.0	1.0	180.0	90.0
SF144	SF144S	681,159	5,224,089	778	1.0	1.0	1.0	0.0	90.0
SF144	SF144E	681,159	5,224,089	778	1.0	1.0	1.0	-90.0	90.0
SF144	SF144N	681,159	5,224,089	778	1.0	1.0	1.0	180.0	90.0
SF145	SF145E	681,529	5,223,732	760	1.0	1.0	1.0	-90.0	90.0
SF145	SF145S	681,529	5,223,732	760	1.0	1.0	1.0	0.0	90.0
SF145	SF145N	681,529	5,223,732	760	1.0	1.0	1.0	180.0	90.0
SF145	SF145W	681,529	5,223,732	760	1.0	1.0	1.0	90.0	90.0
SF146	SF146E	681,569	5,223,657	756	1.0	1.0	1.0	-90.0	90.0
SF146	SF146W	681,569	5,223,657	756	1.0	1.0	1.0	90.0	90.0
SF146	SF146N	681,569	5,223,657	756	1.0	1.0	1.0	180.0	90.0
SF146	SF146S	681,569	5,223,657	756	1.0	1.0	1.0	0.0	90.0
SF147	SF147S	681,556	5,223,614	754	1.0	1.0	1.0	0.0	90.0
SF147	SF147W	681,556	5,223,614	754	1.0	1.0	1.0	90.0	90.0
SF147	SF147N	681,556	5,223,614	754	1.0	1.0	1.0	180.0	90.0
SF147	SF147E	681,556	5,223,614	754	1.0	1.0	1.0	-90.0	90.0

Calculation Results

No	Name	Shadow, worst case: Shadow hours per year	Shadow days per year	Max shadow hours per day	Shadow, expected values: Shadow hours per year
		[h/year]	[days/year]	[h/day]	[h/year]
SF006	SF006E	58:02	120	0:48	13:07
SF006	SF006N	0:00	0	0:00	0:00
SF006	SF006S	166:44	142	2:18	22:10
SF006	SF006W	108:54	109	1:30	9:52

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 15:26/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF007	SF007E	18:58	72	0:26	3:10
SF007	SF007N	0:00	0	0:00	0:00
SF007	SF007S	49:56	71	0:54	5:34
SF007	SF007W	34:38	71	0:40	2:45
SF008	SF008E	22:56	42	0:42	3:12
SF008	SF008N	0:00	0	0:00	0:00
SF008	SF008S	96:26	109	1:38	10:10
SF008	SF008W	73:42	109	0:58	6:48
SF009	SF009E	0:00	0	0:00	0:00
SF009	SF009N	0:00	0	0:00	0:00
SF009	SF009S	6:30	41	0:18	0:58
SF009	SF009W	6:34	41	0:18	0:58
SF137	SF137N	5:06	30	0:14	1:18
SF137	SF137E	5:08	30	0:14	1:18
SF137	SF137W	0:00	0	0:00	0:00
SF137	SF137S	0:00	0	0:00	0:00
SF138	SF138N	20:02	76	0:22	5:06
SF138	SF138E	20:12	76	0:22	5:09
SF138	SF138W	0:00	0	0:00	0:00
SF138	SF138S	0:00	0	0:00	0:00
SF139	SF139N	7:30	41	0:16	2:01
SF139	SF139E	7:36	42	0:16	2:03
SF139	SF139S	0:00	0	0:00	0:00
SF140	SF140N	30:24	126	0:22	8:16
SF140	SF140E	30:46	126	0:22	8:22
SF140	SF140S	0:00	0	0:00	0:00
SF141	SF141S	2:06	18	0:10	0:39
SF141	SF141E	19:56	85	0:20	5:43
SF141	SF141N	17:34	79	0:20	4:59
SF142	SF142S	0:00	0	0:00	0:00
SF142	SF142E	30:54	126	0:24	8:14
SF142	SF142N	30:42	126	0:22	8:11
SF143	SF143S	0:00	0	0:00	0:00
SF143	SF143E	25:06	104	0:22	6:31
SF143	SF143N	25:02	104	0:22	6:30
SF144	SF144S	0:00	0	0:00	0:00
SF144	SF144E	30:56	120	0:22	8:08
SF144	SF144N	30:38	119	0:22	8:03
SF145	SF145E	0:00	0	0:00	0:00
SF145	SF145S	6:42	51	0:12	0:31
SF145	SF145N	0:00	0	0:00	0:00
SF145	SF145W	6:42	51	0:12	0:31
SF146	SF146E	0:00	0	0:00	0:00
SF146	SF146W	5:02	41	0:14	0:29
SF146	SF146N	0:00	0	0:00	0:00
SF146	SF146S	5:02	41	0:14	0:29
SF147	SF147S	5:26	38	0:16	0:33
SF147	SF147W	5:26	38	0:16	0:33
SF147	SF147N	0:00	0	0:00	0:00
SF147	SF147E	0:00	0	0:00	0:00

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

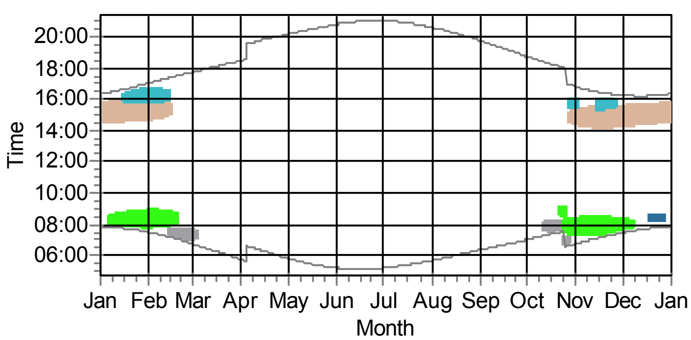
Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/25/2004 15:26/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF006S



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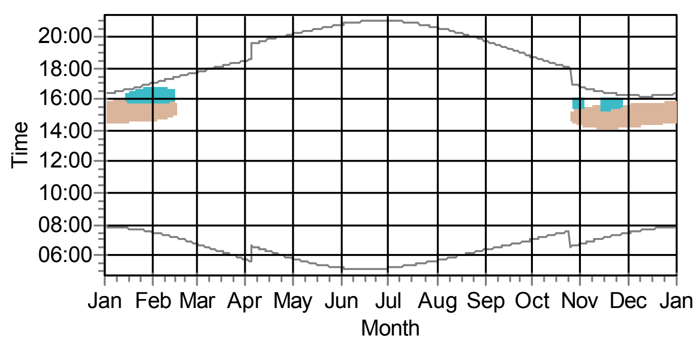
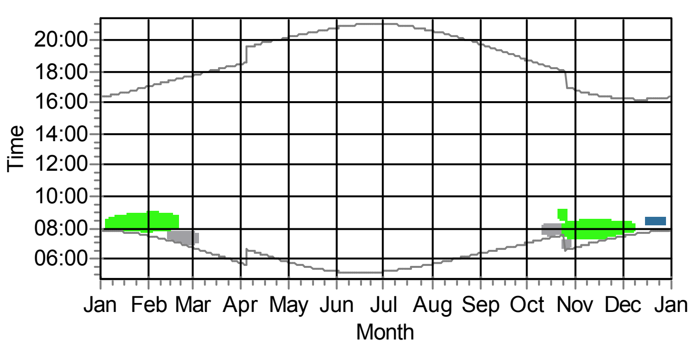


SF006E



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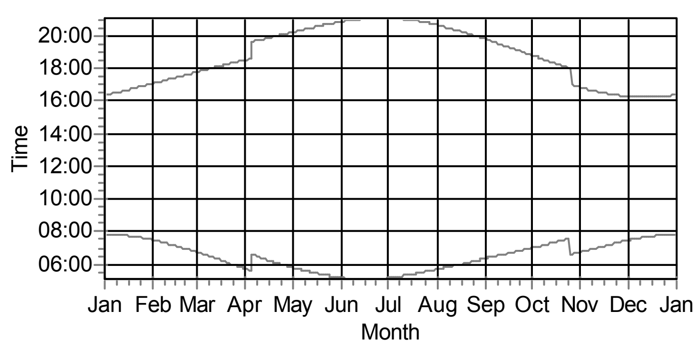

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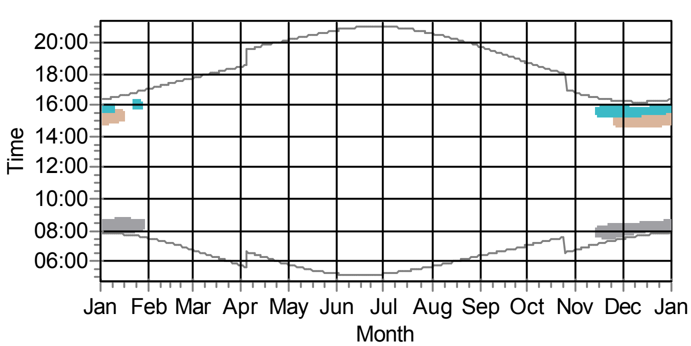
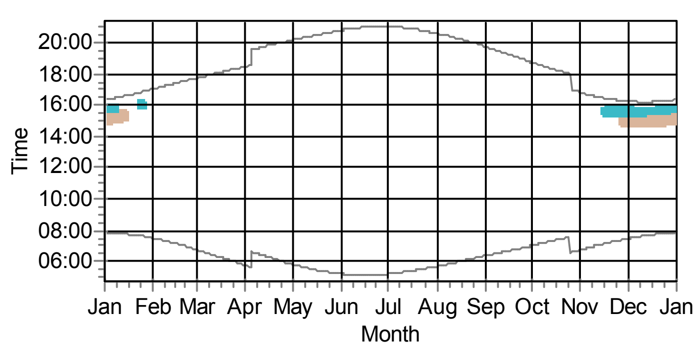


SF007W



WTGs

019 020 021 022 025

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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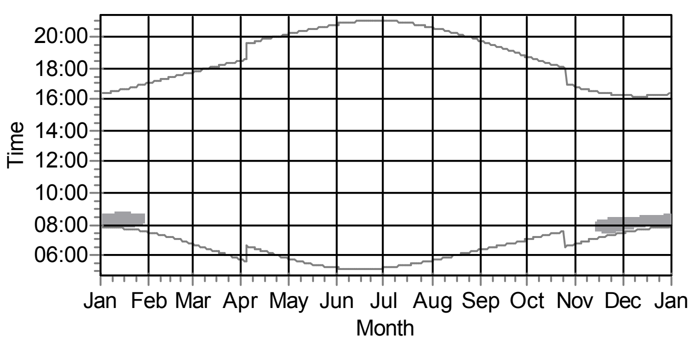
Calculated:
07/25/2004 15:26/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF007E



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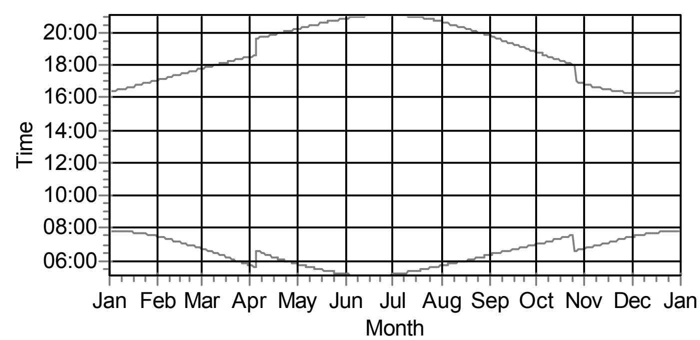
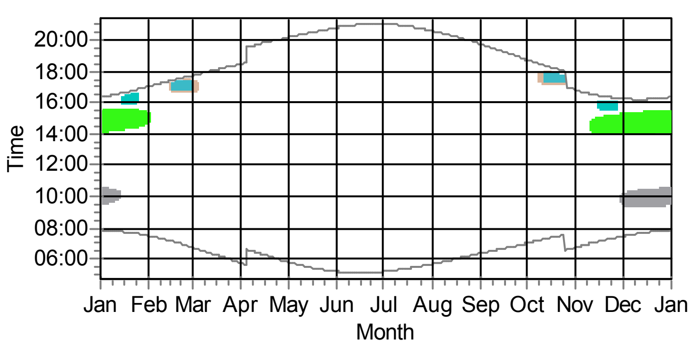


SF008S



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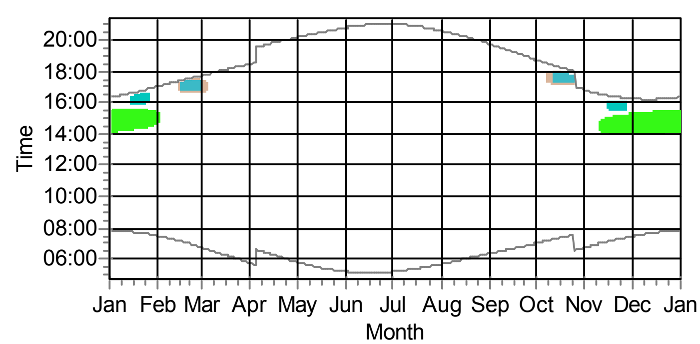

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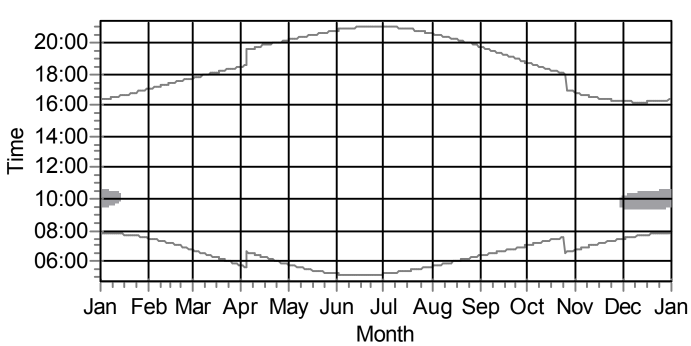

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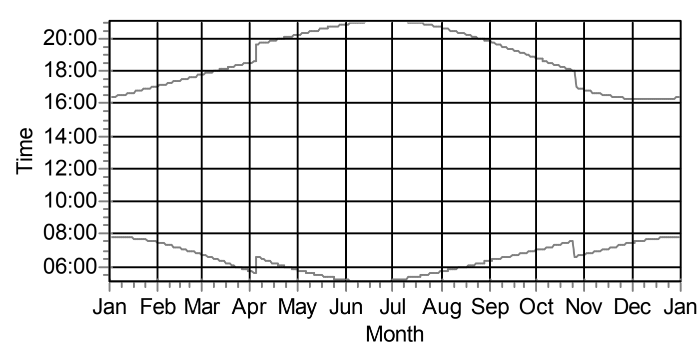

WTGs

019 020 021 022 024

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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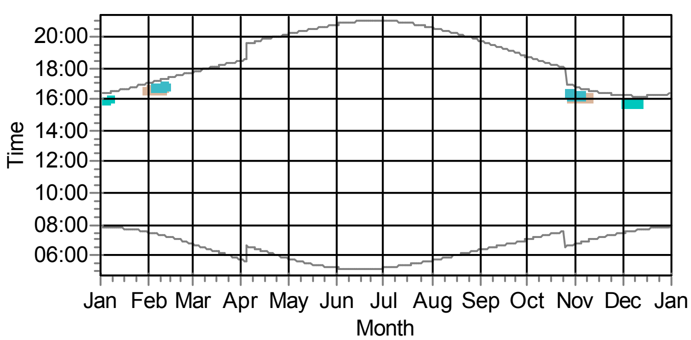
SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF009S



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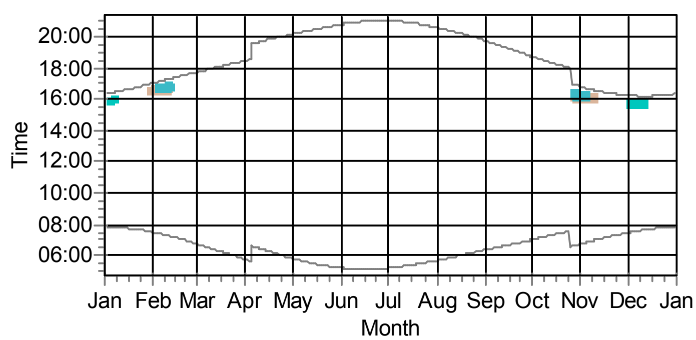
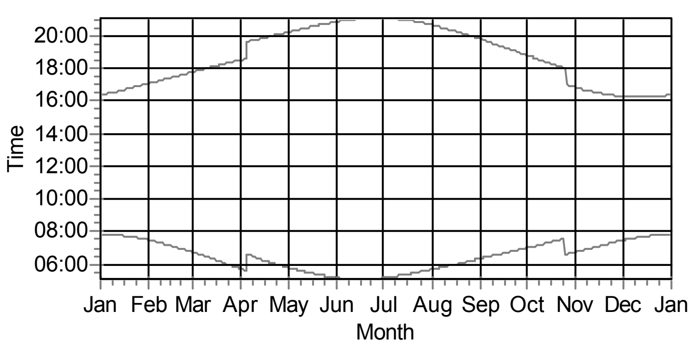
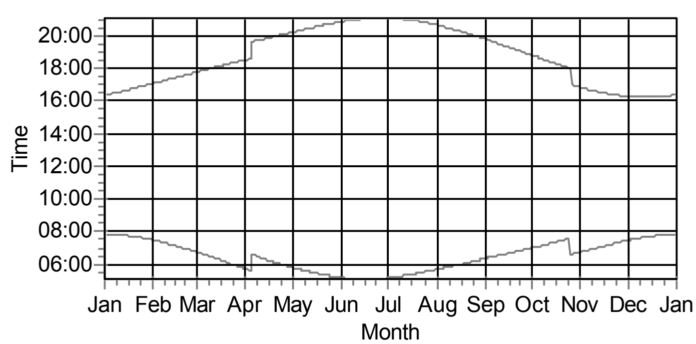


SF009E



SF009N



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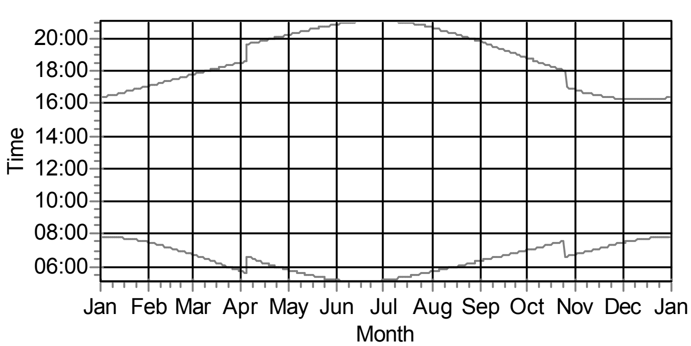
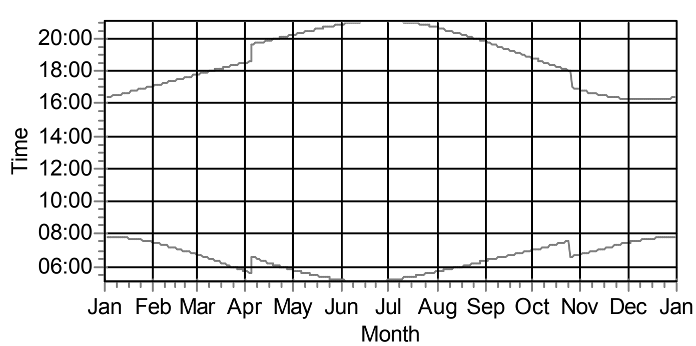


SF137S



WTGs

020 022 024

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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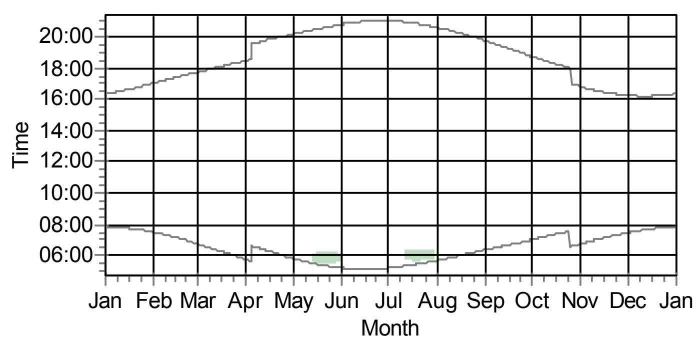
SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF137N



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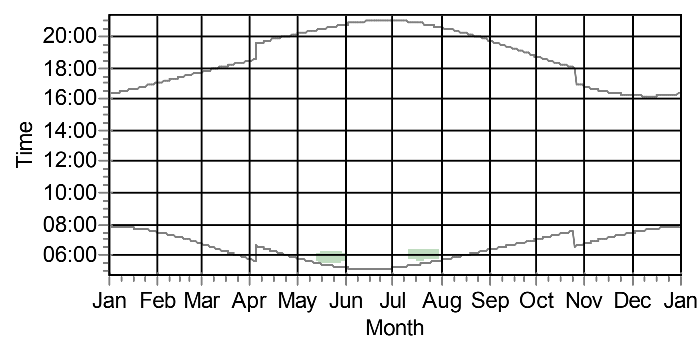

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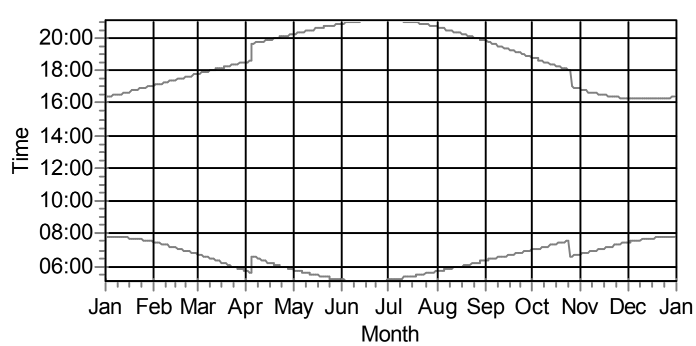

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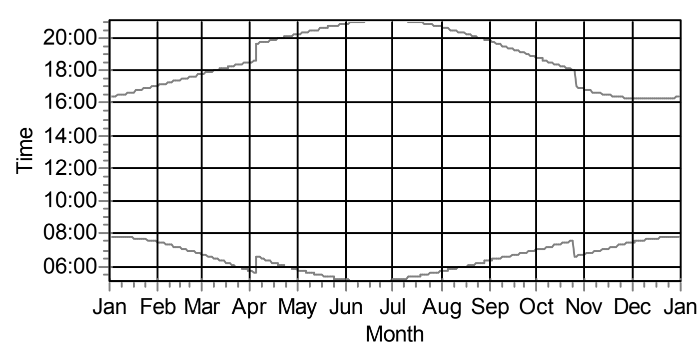
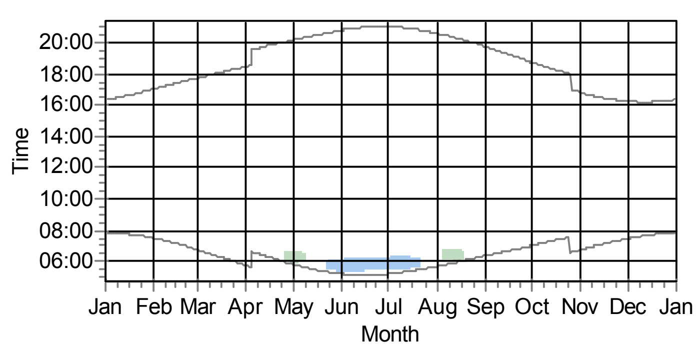
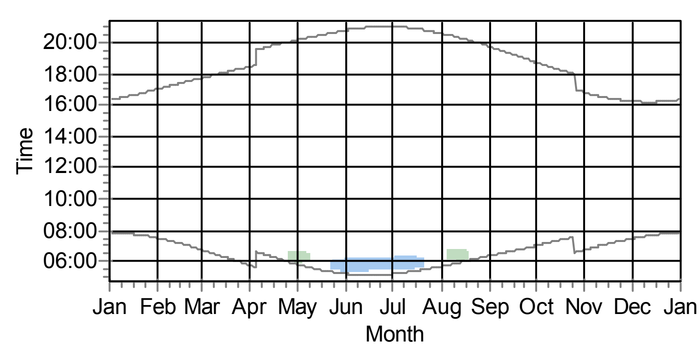


SF138N



SF138E



WTGs

016

017

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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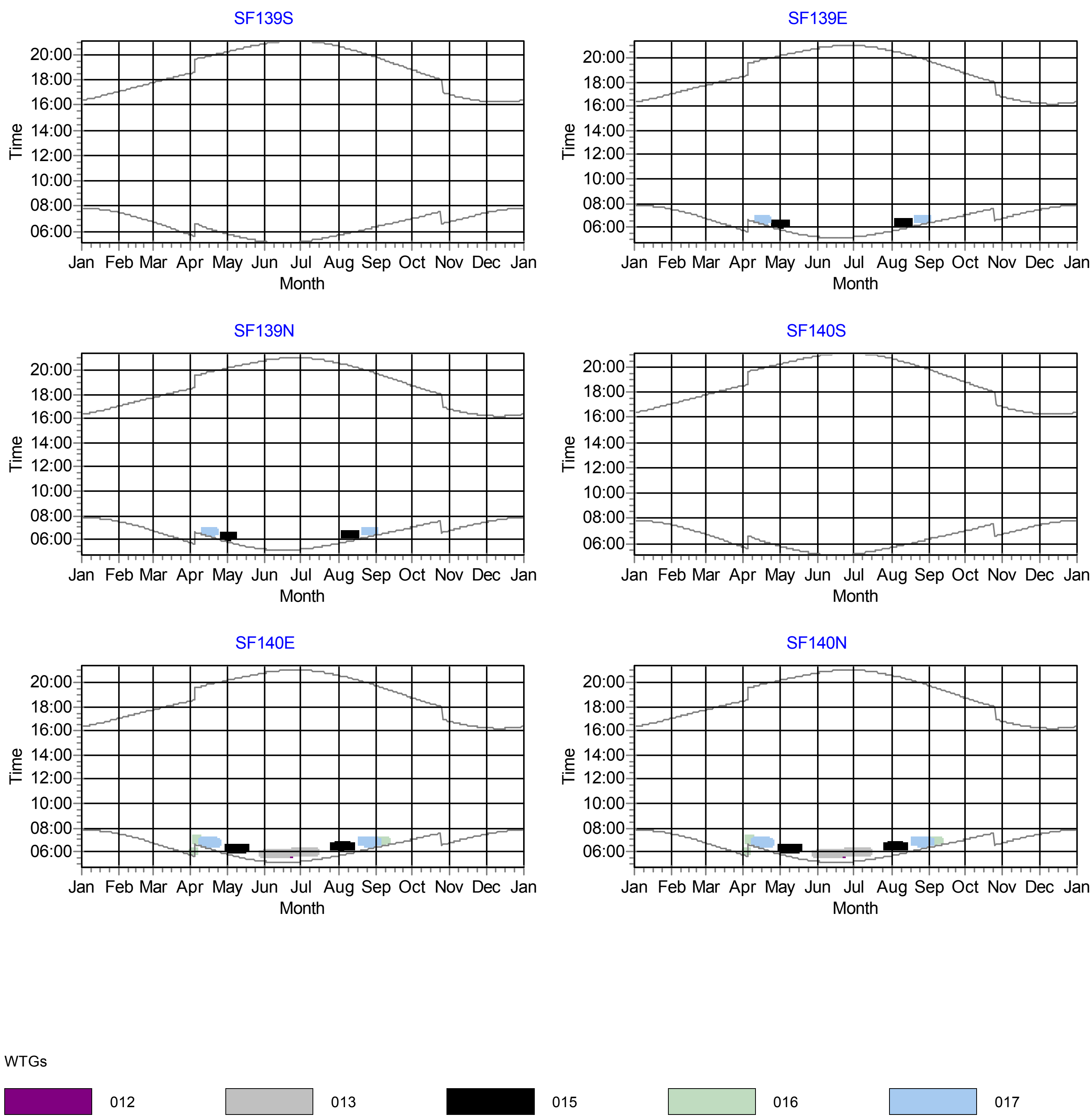
SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026



Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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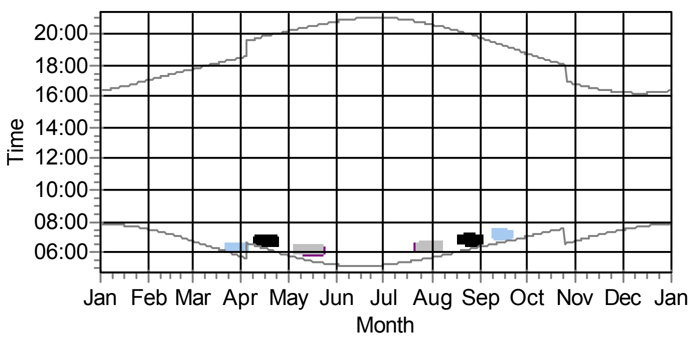
SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF141N



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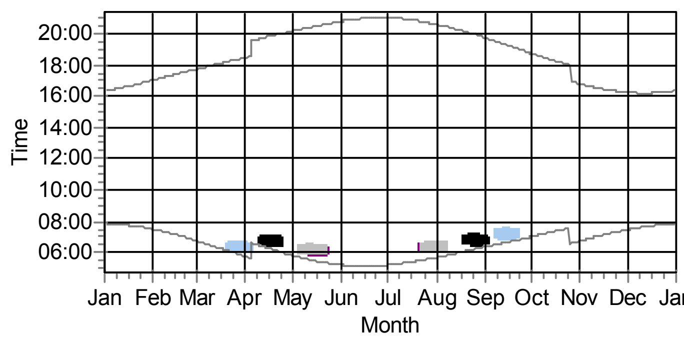

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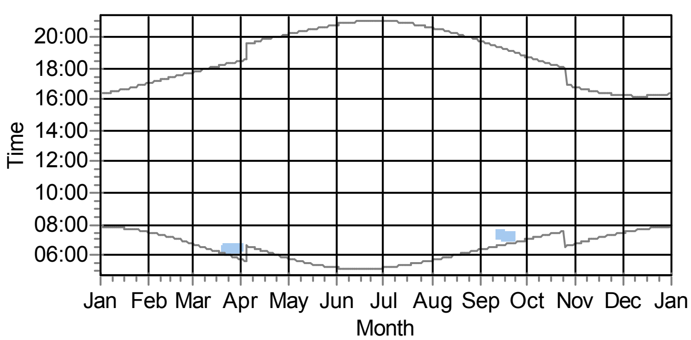

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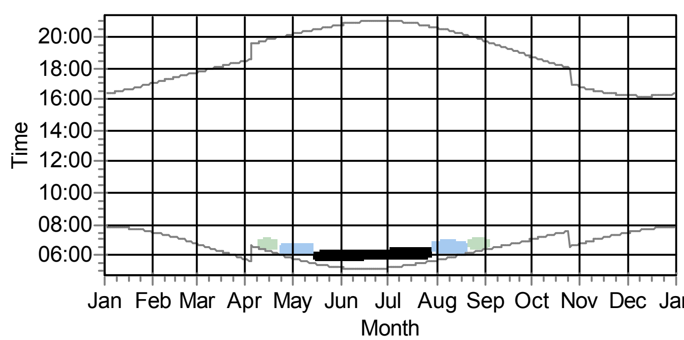

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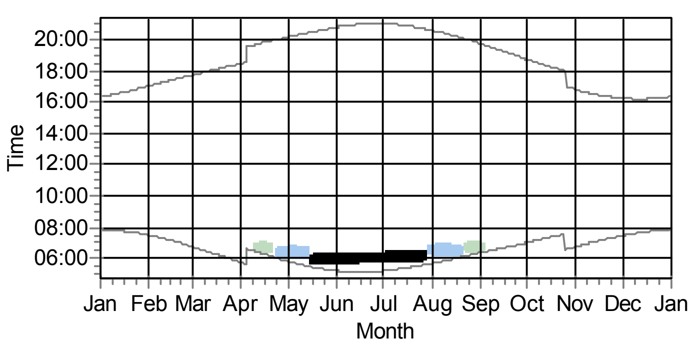
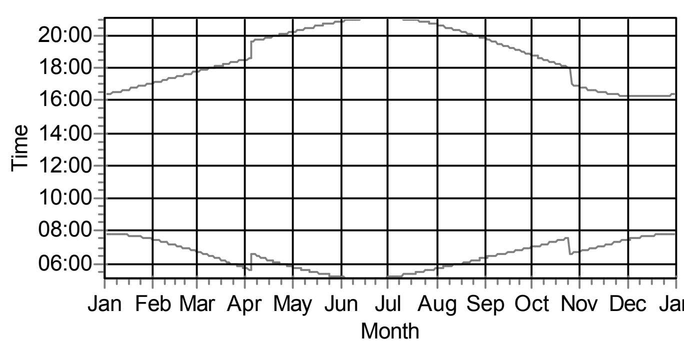


SF142S



WTGs

012 013 015 016 017

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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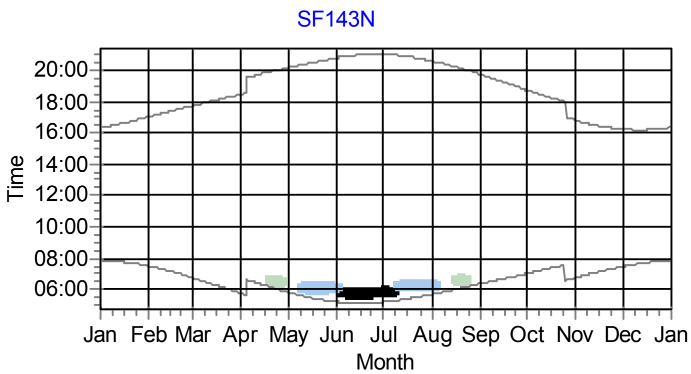
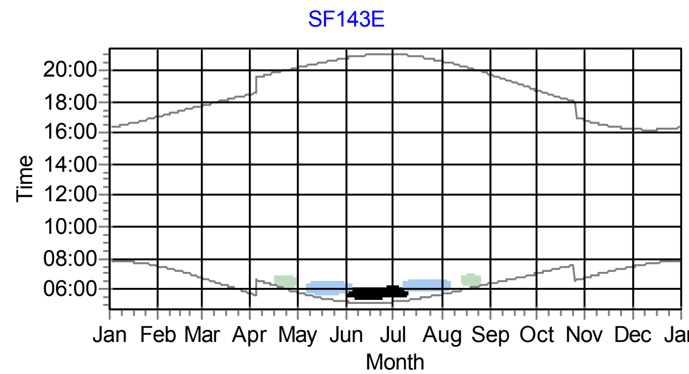
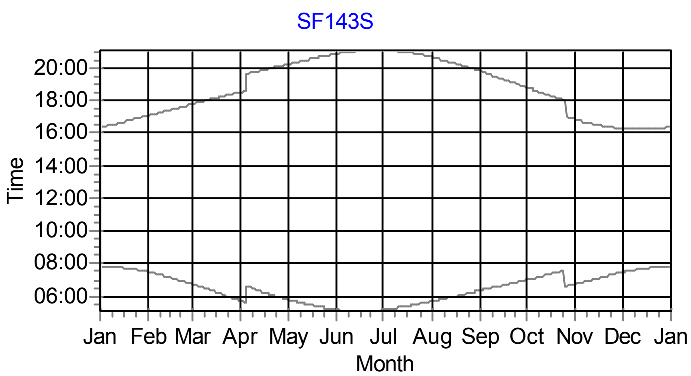
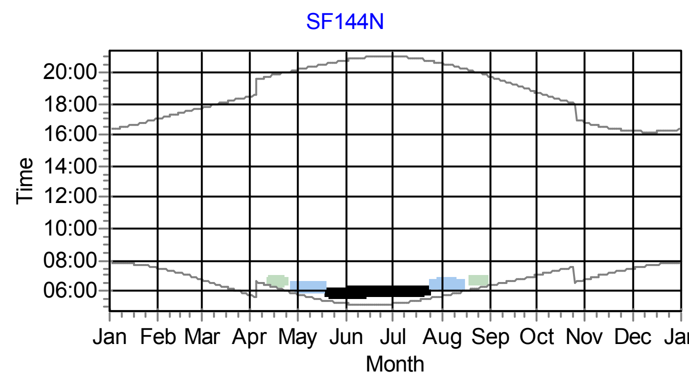
SHADOW - Calendar, graphical

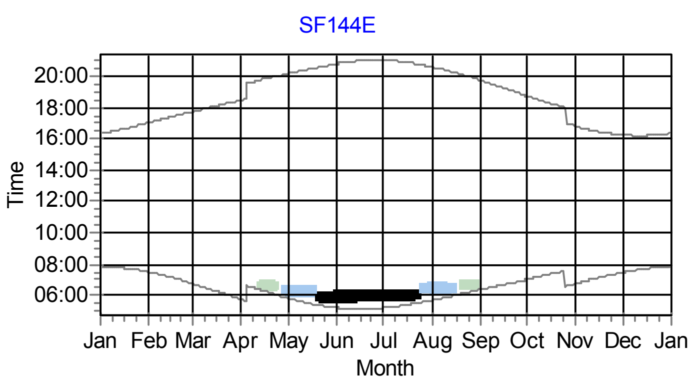
Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

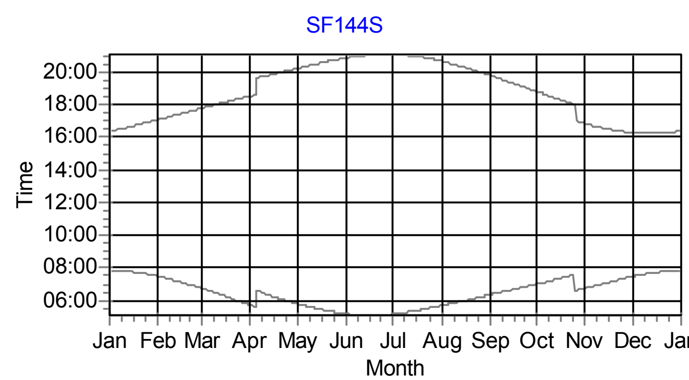












WTGs

015 016 017

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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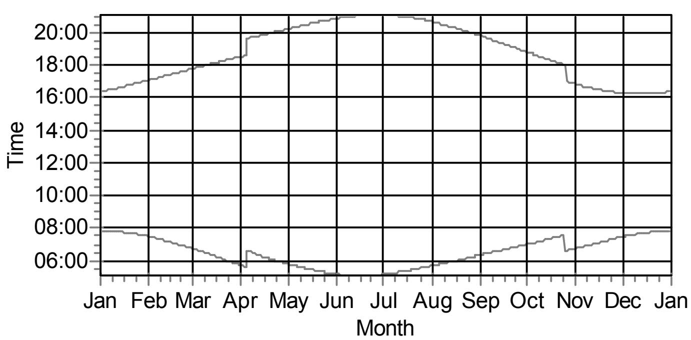
SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF145N



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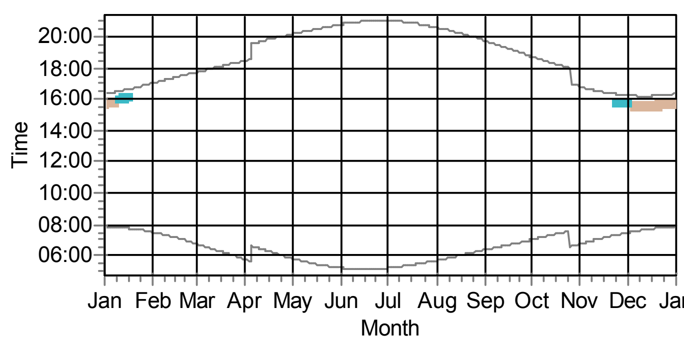

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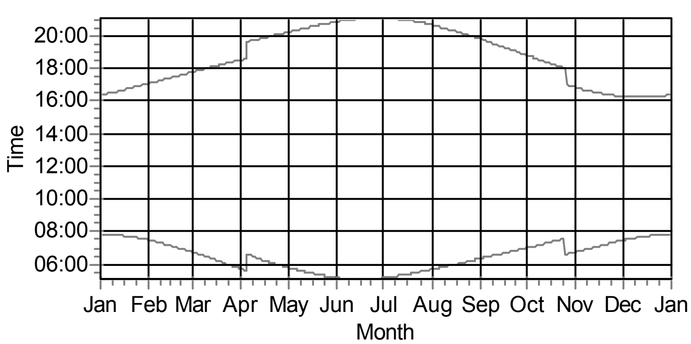
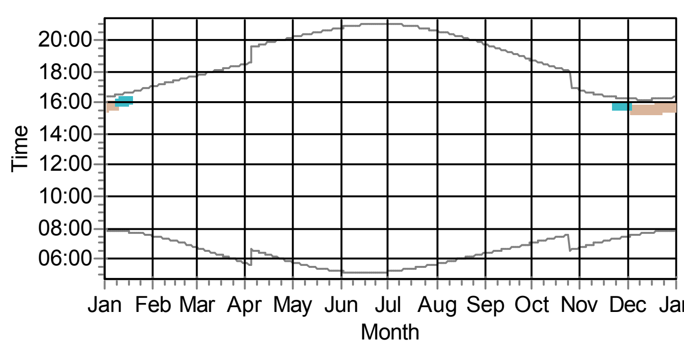


SF145S



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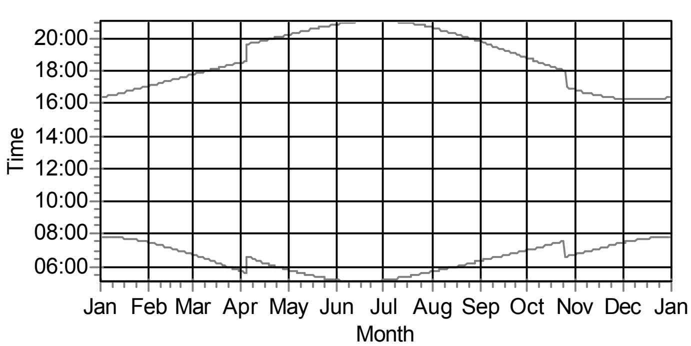

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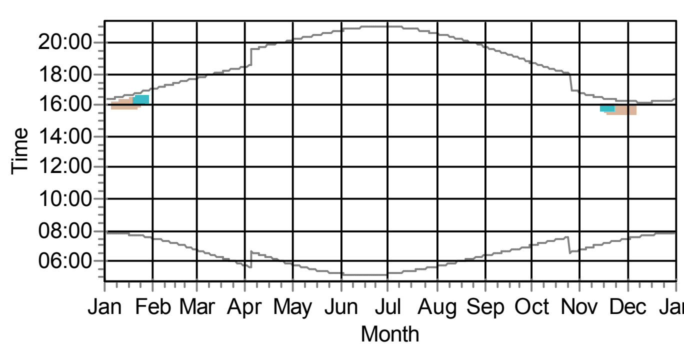

WTGs

020

022

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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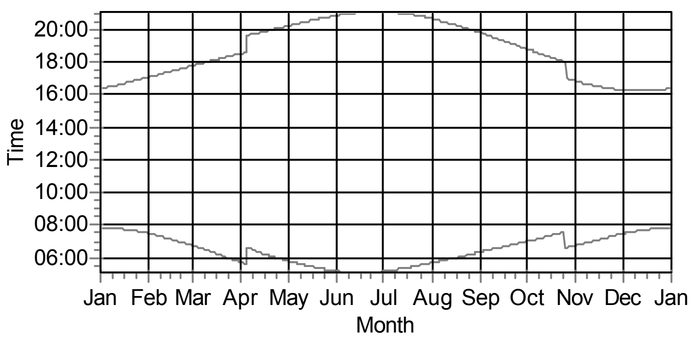
Calculated:
07/25/2004 15:26/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026

SF146E



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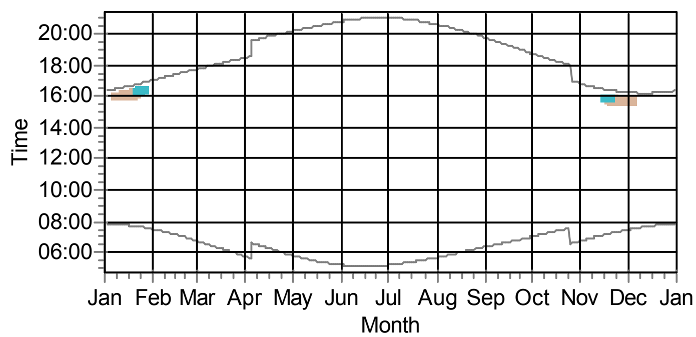

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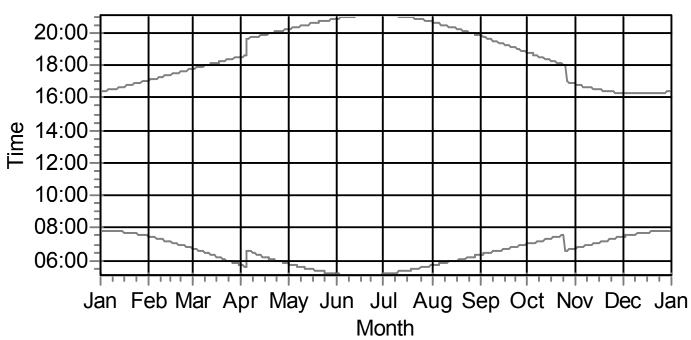

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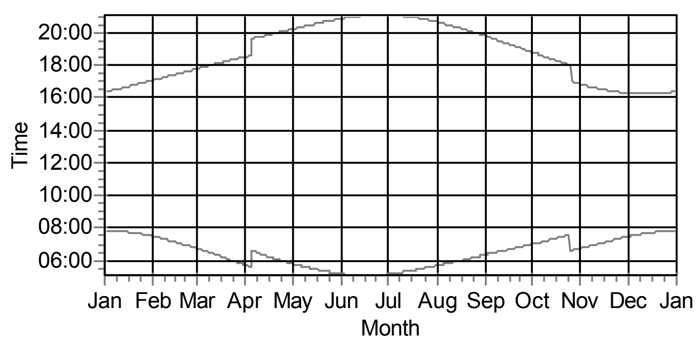

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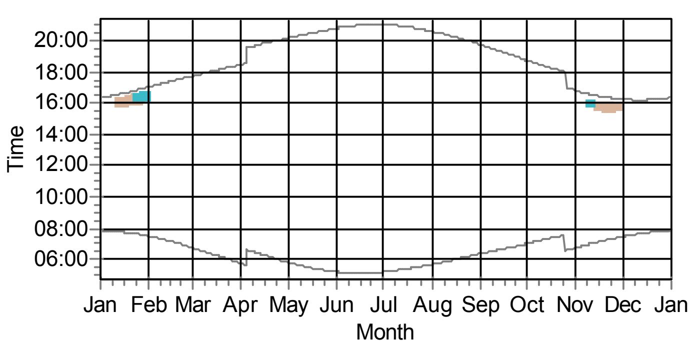

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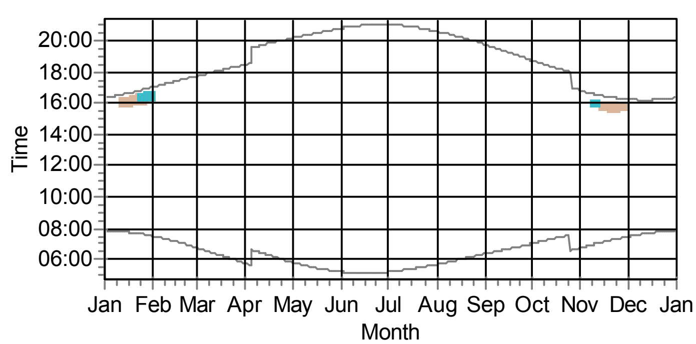

WTGs

020

022

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptors 006-009, 137-147 - all windows
Turbines 001 through 026
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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CA-92506 Riverside, USA

Calculated:
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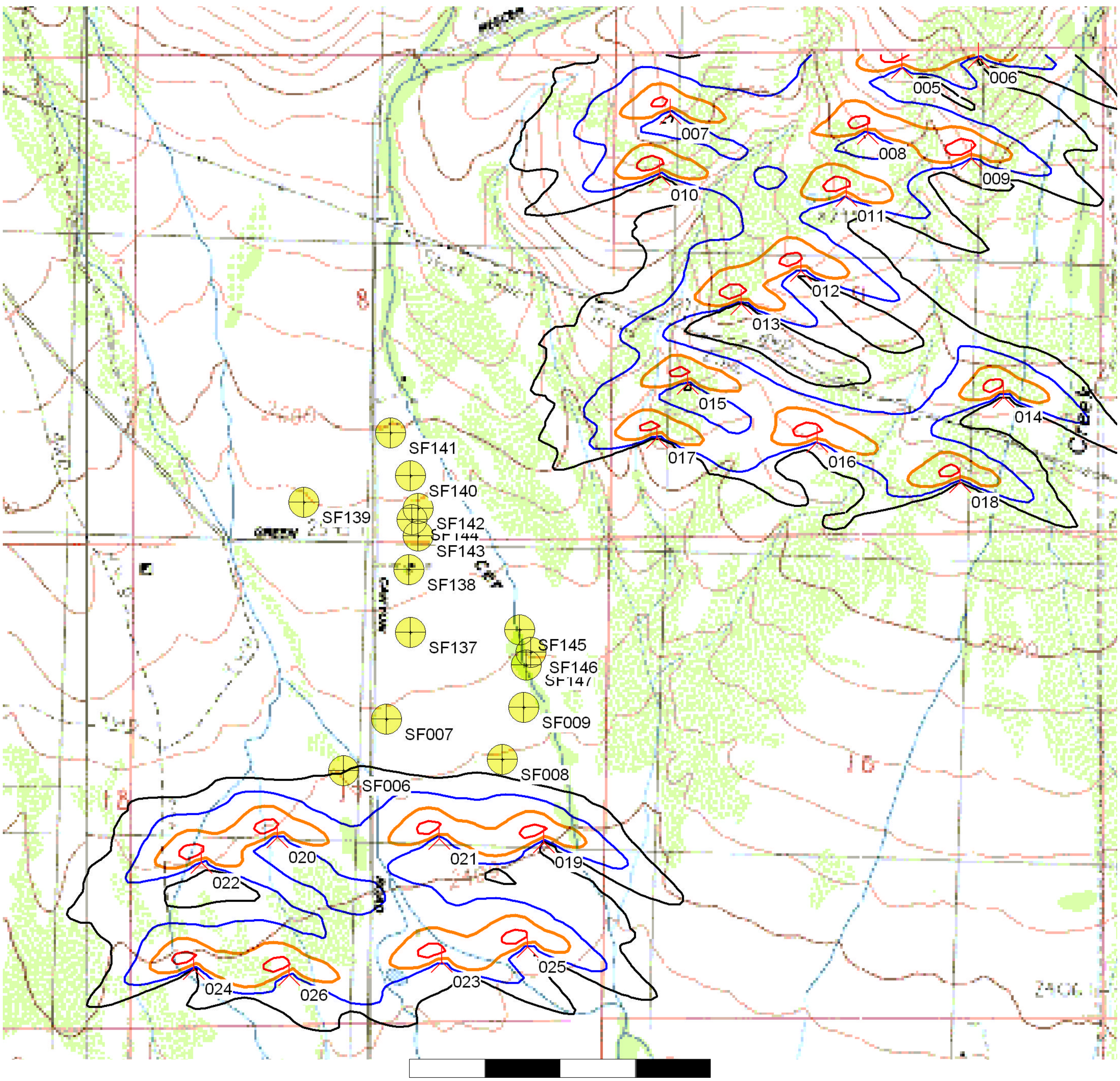
SHADOW - Bitmap map: 030410 Enxco DCWP 24k.bmi

Calculation: 040725 SF 006-009, SF 137-147, tubines 001-026 **File:** 030410 Enxco DCWP 24k.bmi



Map: 030410 Enexco DCWP 24k , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 681,590 North: 5,224,014

New WTG   Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25   50   100   200

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

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Calculated:
07/26/2004 21:12/2.3.0.216

SHADOW - Main Result

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

Assumptions for shadow calculations

Maximum distance for influence	1,500 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes

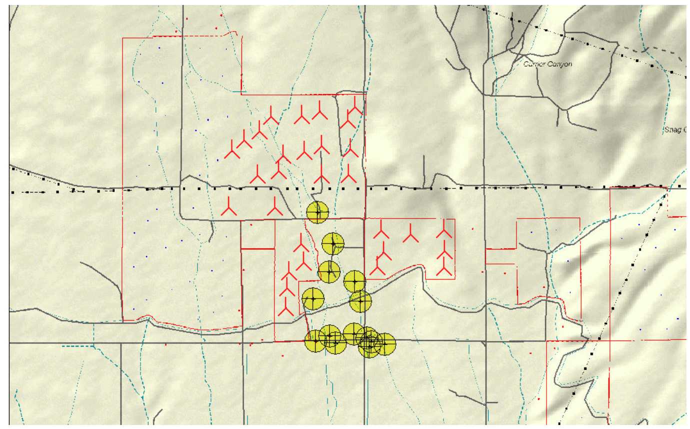
Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304



Scale 1:100,000
New WTG   Shadow Receptor

WTGs

	UTM NAD27 Zone: 10 East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
027	682,253	5,222,153	705	027	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
028	682,664	5,222,171	709	028	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
029	682,712	5,221,699	690	029	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
030	682,901	5,222,242	715	030	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
031	682,937	5,221,783	695	031	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
032	683,278	5,222,135	714	032	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
033	683,318	5,221,753	697	033	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
034	683,306	5,221,415	685	034	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
035	683,360	5,222,311	722	035	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
055	682,558	5,220,102	647	055	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
063	682,099	5,221,366	685	063	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
064	682,377	5,221,436	680	064	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
065	682,429	5,221,643	685	065	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
066	682,530	5,219,631	636	066	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
067	682,538	5,219,890	641	067	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
068	682,745	5,220,236	648	068	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
069	682,948	5,221,392	681	069	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
070	683,722	5,220,210	638	070	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
071	683,802	5,220,409	641	071	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
072	683,762	5,220,692	652	072	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
073	684,611	5,220,451	655	073	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
074	684,595	5,220,725	680	074	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
075	684,609	5,220,225	644	075	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
081	682,706	5,220,478	654	081	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
083	684,158	5,220,654	651	083	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
085	681,731	5,220,931	677	085	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
086	682,344	5,220,953	673	086	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
088	682,103	5,221,953	698	088	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
089	681,910	5,221,823	697	089	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
090	681,750	5,221,684	697	090	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

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Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 21:12/2.3.0.216

SHADOW - Main Result

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

Shadow Receptor-Input

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF019	SF019E	682,888	5,219,762	635	1.0	1.0	1.0	-90.0	90.0
SF019	SF019N	682,888	5,219,762	635	1.0	1.0	1.0	180.0	90.0
SF019	SF019S	682,888	5,219,762	635	1.0	1.0	1.0	0.0	90.0
SF019	SF019W	682,888	5,219,762	635	1.0	1.0	1.0	90.0	90.0
SF020	SF020N	682,944	5,219,200	621	1.0	1.0	1.0	180.0	90.0
SF020	SF020W	682,944	5,219,200	621	1.0	1.0	1.0	90.0	90.0
SF020	SF020E	682,944	5,219,200	621	1.0	1.0	1.0	-90.0	90.0
SF021	SF021E	683,122	5,219,272	621	1.0	1.0	1.0	-90.0	90.0
SF021	SF021N	683,122	5,219,272	621	1.0	1.0	1.0	180.0	90.0
SF021	SF021W	683,122	5,219,272	621	1.0	1.0	1.0	90.0	90.0
SF022	SF022N	683,517	5,219,743	629	1.0	1.0	1.0	180.0	90.0
SF022	SF022E	683,517	5,219,743	629	1.0	1.0	1.0	-90.0	90.0
SF022	SF022W	683,517	5,219,743	629	1.0	1.0	1.0	90.0	90.0
SF023	SF023W	683,434	5,220,001	636	1.0	1.0	1.0	90.0	90.0
SF023	SF023S	683,434	5,220,001	636	1.0	1.0	1.0	0.0	90.0
SF023	SF023N	683,434	5,220,001	636	1.0	1.0	1.0	180.0	90.0
SF023	SF023E	683,434	5,220,001	636	1.0	1.0	1.0	-90.0	90.0
SF024	SF024W	683,095	5,220,123	641	1.0	1.0	1.0	90.0	90.0
SF024	SF024N	683,095	5,220,123	641	1.0	1.0	1.0	180.0	90.0
SF024	SF024E	683,095	5,220,123	641	1.0	1.0	1.0	-90.0	90.0
SF024	SF024S	683,095	5,220,123	641	1.0	1.0	1.0	0.0	90.0
SF025	SF025E	683,132	5,220,497	651	1.0	1.0	1.0	-90.0	90.0
SF025	SF025W	683,132	5,220,497	651	1.0	1.0	1.0	90.0	90.0
SF025	SF025N	683,132	5,220,497	651	1.0	1.0	1.0	180.0	90.0
SF025	SF025S	683,132	5,220,497	651	1.0	1.0	1.0	0.0	90.0
SF026	SF026N	682,914	5,220,903	663	1.0	1.0	1.0	180.0	90.0
SF026	SF026S	682,914	5,220,903	663	1.0	1.0	1.0	0.0	90.0
SF026	SF026E	682,914	5,220,903	663	1.0	1.0	1.0	-90.0	90.0
SF026	SF026W	682,914	5,220,903	663	1.0	1.0	1.0	90.0	90.0
SF101	SF101E	683,619	5,219,269	617	1.0	1.0	1.0	-90.0	90.0
SF101	SF101W	683,619	5,219,269	617	1.0	1.0	1.0	90.0	90.0
SF101	SF101N	683,619	5,219,269	617	1.0	1.0	1.0	180.0	90.0
SF102	SF102E	683,656	5,219,149	614	1.0	1.0	1.0	-90.0	90.0
SF102	SF102N	683,656	5,219,149	614	1.0	1.0	1.0	180.0	90.0
SF102	SF102W	683,656	5,219,149	614	1.0	1.0	1.0	90.0	90.0
SF103	SF103N	683,680	5,219,214	616	1.0	1.0	1.0	180.0	90.0
SF103	SF103W	683,680	5,219,214	616	1.0	1.0	1.0	90.0	90.0
SF103	SF103E	683,680	5,219,214	616	1.0	1.0	1.0	-90.0	90.0
SF104	SF104N	683,861	5,219,193	614	1.0	1.0	1.0	180.0	90.0
SF104	SF104W	683,861	5,219,193	614	1.0	1.0	1.0	90.0	90.0
SF104	SF104E	683,861	5,219,193	614	1.0	1.0	1.0	-90.0	90.0
SF135	SF135W	683,203	5,219,185	619	1.0	1.0	1.0	90.0	90.0
SF135	SF135N	683,203	5,219,185	619	1.0	1.0	1.0	180.0	90.0
SF135	SF135E	683,203	5,219,185	619	1.0	1.0	1.0	-90.0	90.0
SF136	SF136E	683,448	5,219,314	620	1.0	1.0	1.0	-90.0	90.0
SF136	SF136N	683,448	5,219,314	620	1.0	1.0	1.0	180.0	90.0
SF136	SF136W	683,448	5,219,314	620	1.0	1.0	1.0	90.0	90.0

Calculation Results

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF019	SF019E	12:38	66	0:20	3:13
SF019	SF019N	80:02	91	1:10	29:15
SF019	SF019S	35:28	59	0:46	8:25
SF019	SF019W	103:38	150	0:52	34:17

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

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Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 21:12/2.3.0.216

SHADOW - Main Result

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF020	SF020N	0:00	0	0:00	0:00
SF020	SF020W	0:00	0	0:00	0:00
SF020	SF020E	0:00	0	0:00	0:00
SF021	SF021E	0:00	0	0:00	0:00
SF021	SF021N	0:00	0	0:00	0:00
SF021	SF021W	0:00	0	0:00	0:00
SF022	SF022N	23:26	101	0:34	7:13
SF022	SF022E	10:50	67	0:16	2:41
SF022	SF022W	17:00	83	0:18	5:49
SF023	SF023W	32:40	127	0:26	10:38
SF023	SF023S	9:20	47	0:20	2:23
SF023	SF023N	38:08	129	0:34	12:07
SF023	SF023E	14:56	83	0:16	3:49
SF024	SF024W	128:54	255	0:52	37:28
SF024	SF024N	108:20	147	1:18	37:37
SF024	SF024E	30:40	93	0:30	8:26
SF024	SF024S	49:44	153	0:32	8:51
SF025	SF025E	40:18	141	0:28	11:28
SF025	SF025W	74:14	193	1:02	15:47
SF025	SF025N	31:26	107	0:36	9:30
SF025	SF025S	67:02	181	1:06	15:12
SF026	SF026N	26:32	92	0:32	9:09
SF026	SF026S	7:34	49	0:18	2:03
SF026	SF026E	7:16	44	0:18	1:57
SF026	SF026W	26:58	93	0:32	9:18
SF101	SF101E	0:00	0	0:00	0:00
SF101	SF101W	9:12	60	0:16	3:25
SF101	SF101N	9:04	60	0:16	3:22
SF102	SF102E	0:00	0	0:00	0:00
SF102	SF102N	5:34	32	0:16	2:08
SF102	SF102W	5:36	32	0:16	2:09
SF103	SF103N	6:02	49	0:14	2:14
SF103	SF103W	6:10	50	0:14	2:17
SF103	SF103E	0:00	0	0:00	0:00
SF104	SF104N	9:50	72	0:12	3:49
SF104	SF104W	10:08	72	0:12	3:55
SF104	SF104E	0:00	0	0:00	0:00
SF135	SF135W	0:00	0	0:00	0:00
SF135	SF135N	0:00	0	0:00	0:00
SF135	SF135E	0:00	0	0:00	0:00
SF136	SF136E	0:00	0	0:00	0:00
SF136	SF136N	7:54	35	0:20	2:50
SF136	SF136W	7:56	35	0:20	2:51

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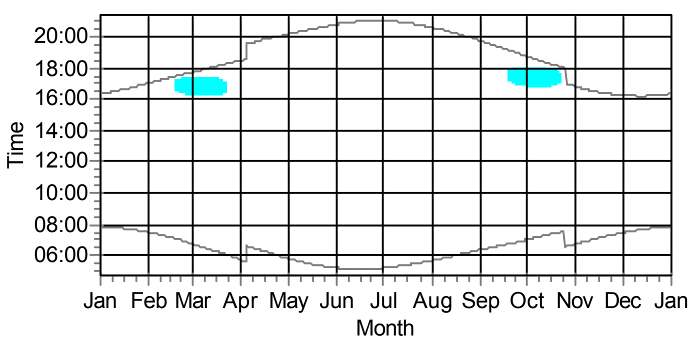
Calculated:
07/26/2004 21:12/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

SF019S



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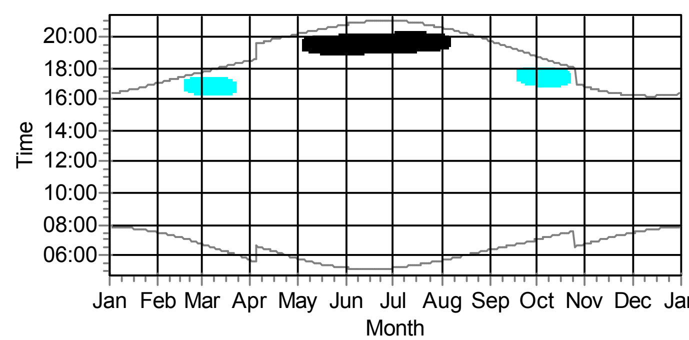

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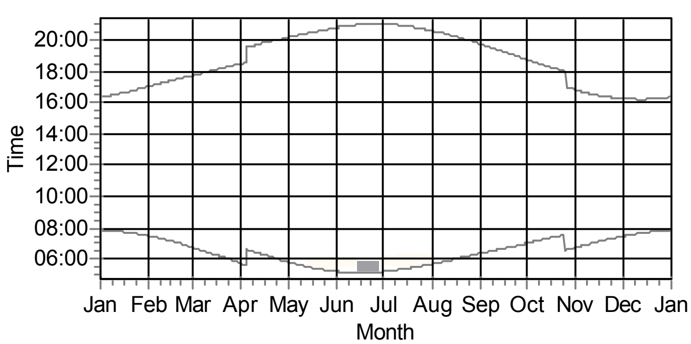
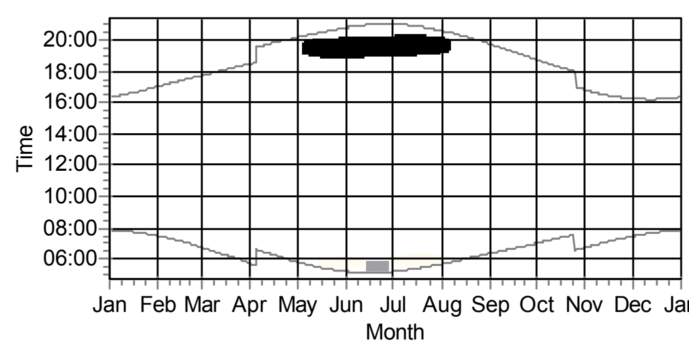
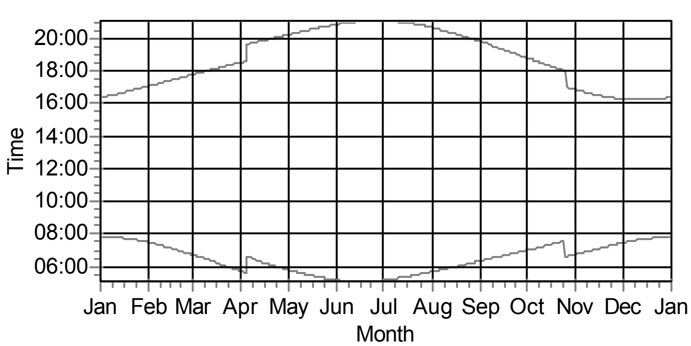


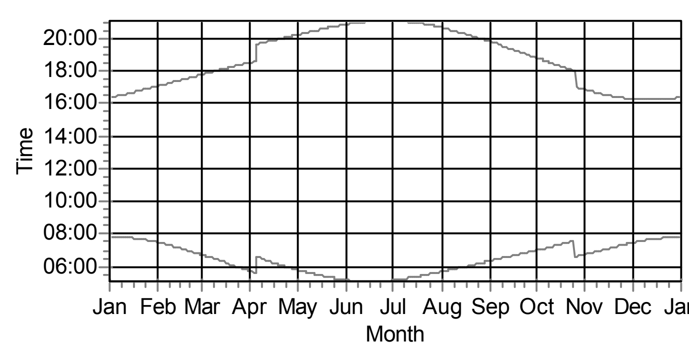
SF019N



SF020N



SF020E



WTGs

066 067 070 071

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
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GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

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Licensed user:
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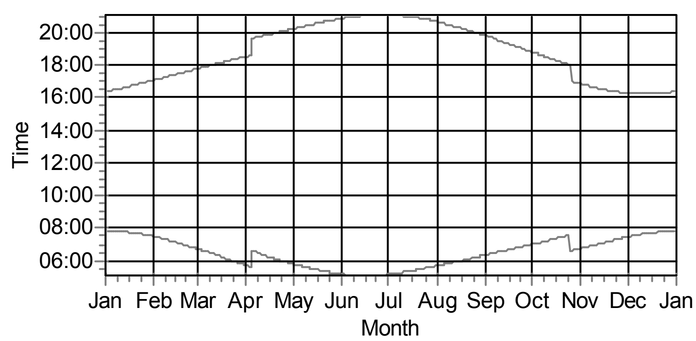
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 21:12/2.3.0.216

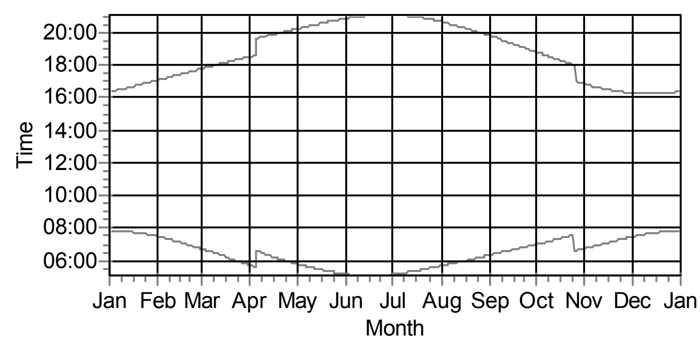
SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

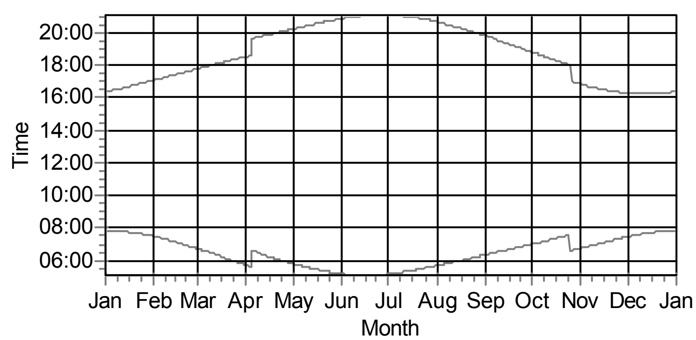
SF020W



SF021N



SF021W



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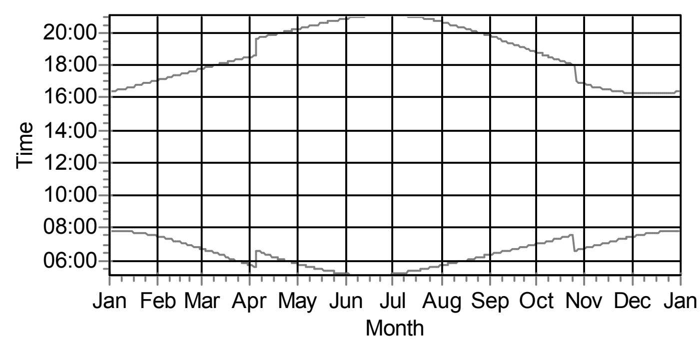

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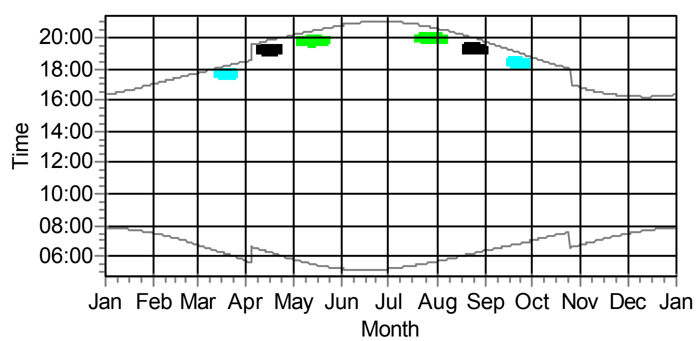
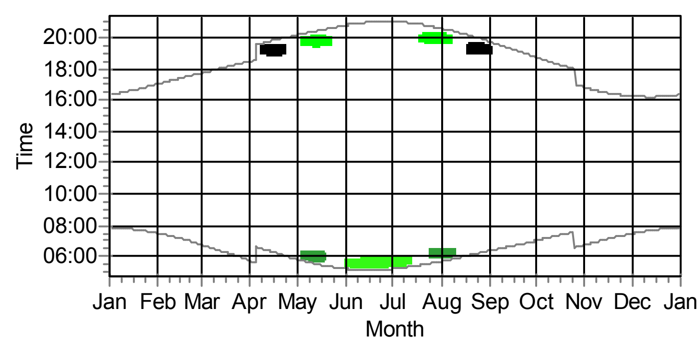


SF022N



WTGs

055 066 067 073 075

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
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Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

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Licensed user:
Wind Engineers, Inc.
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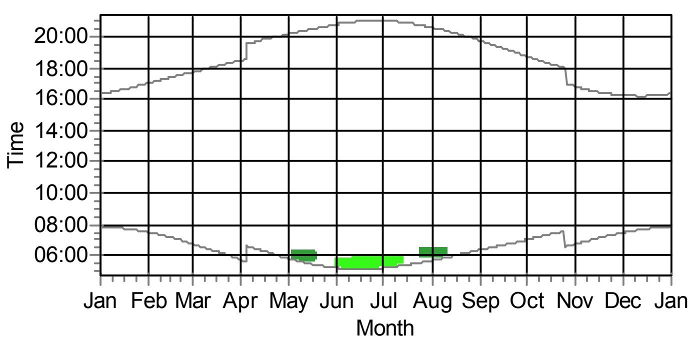
Calculated:
07/26/2004 21:12/2.3.0.216

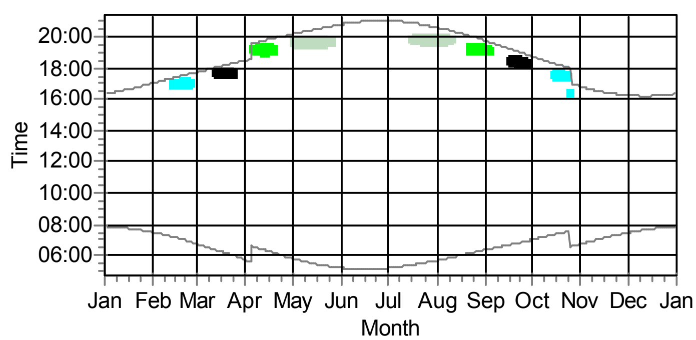
SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

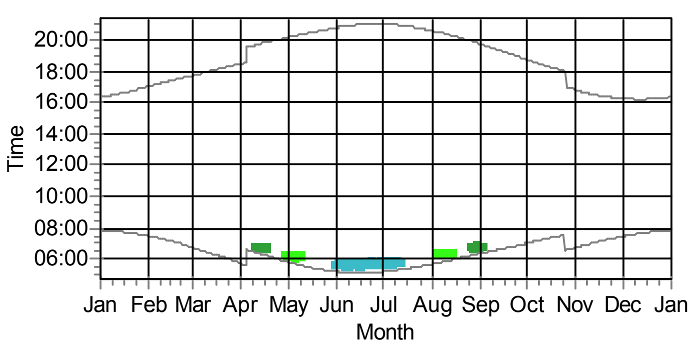
SF022E



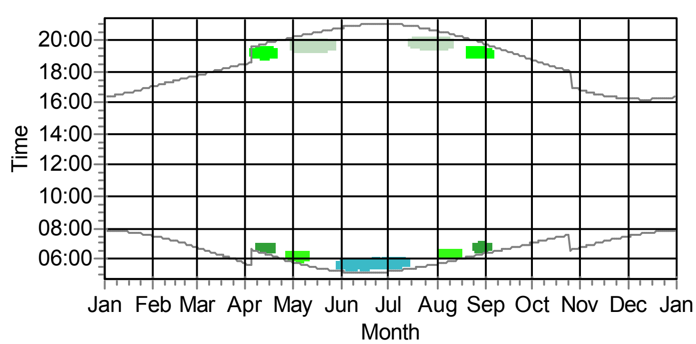
SF023W



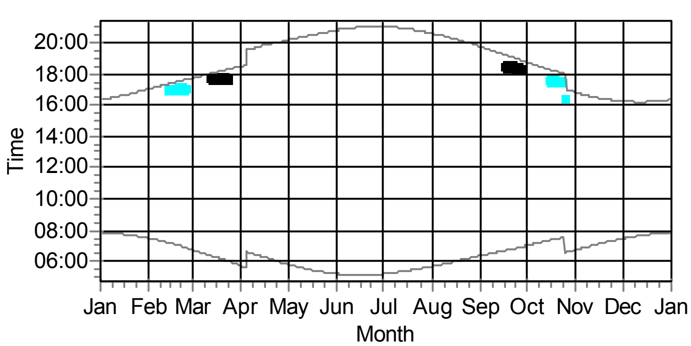
SF023E



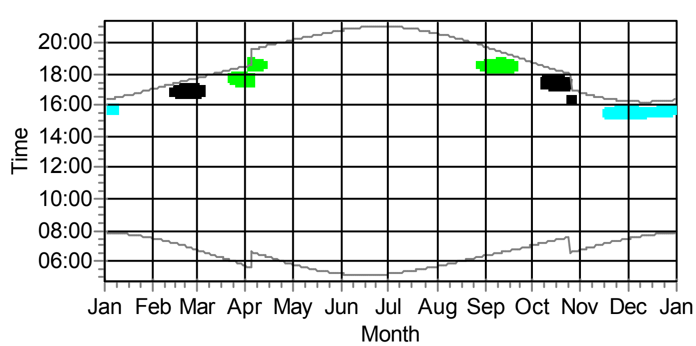
SF023N



SF023S



SF024S



WTGs

055
066
067
068
073
074
075

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

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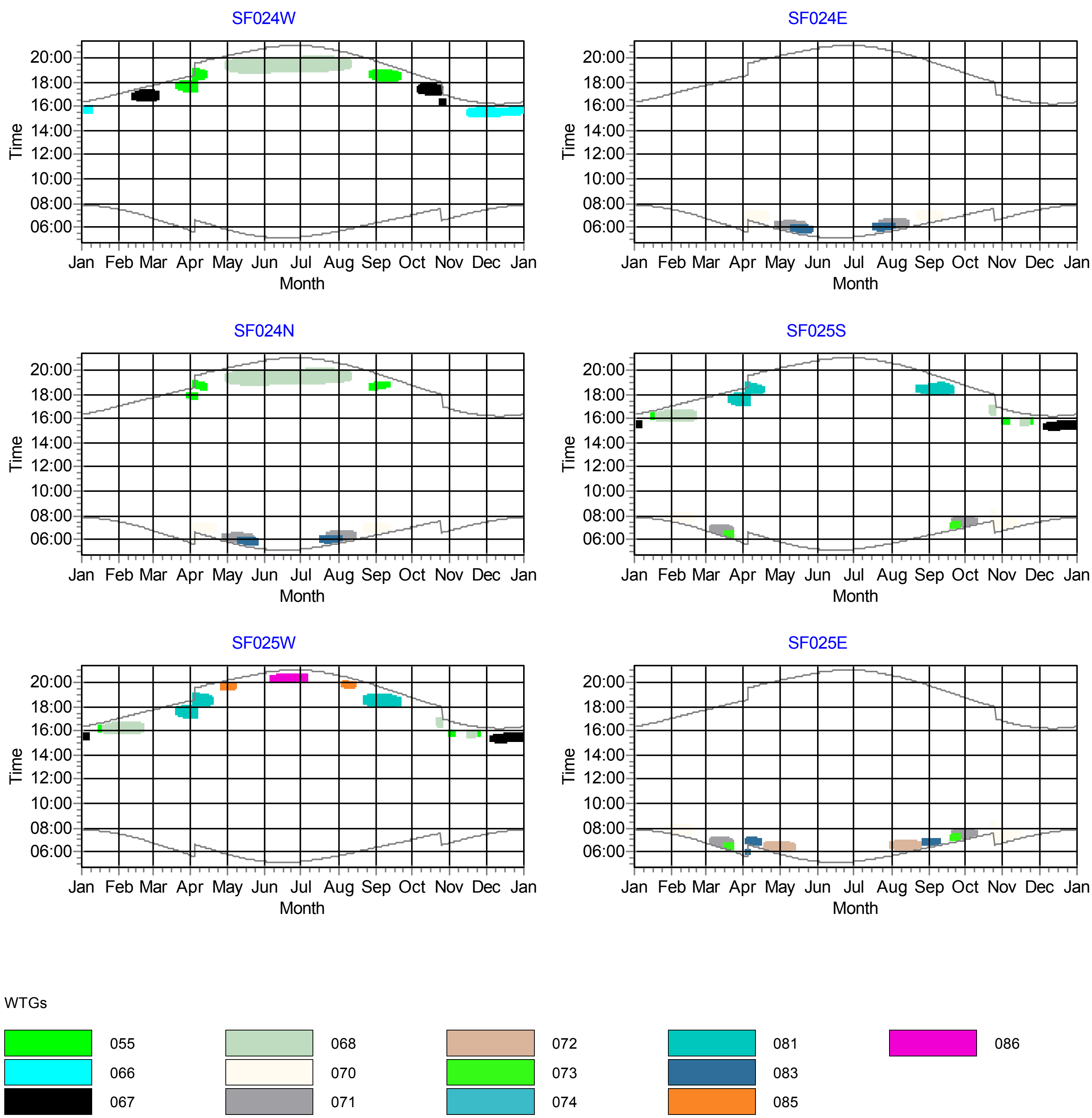
CA-92506 Riverside, USA

Calculated:
07/26/2004 21:12/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered



Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

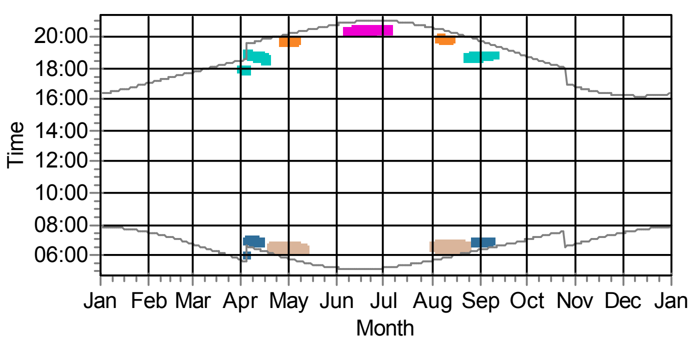
Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 21:12/2.3.0.216

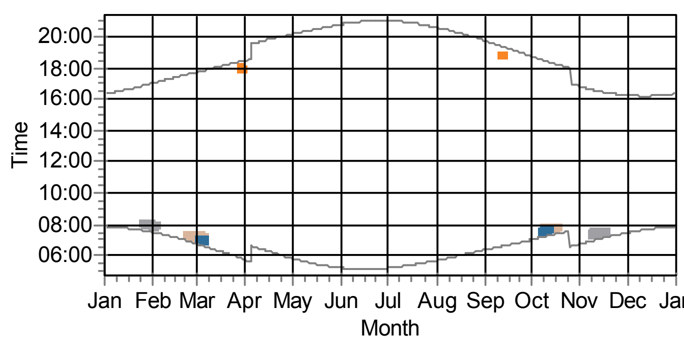
SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

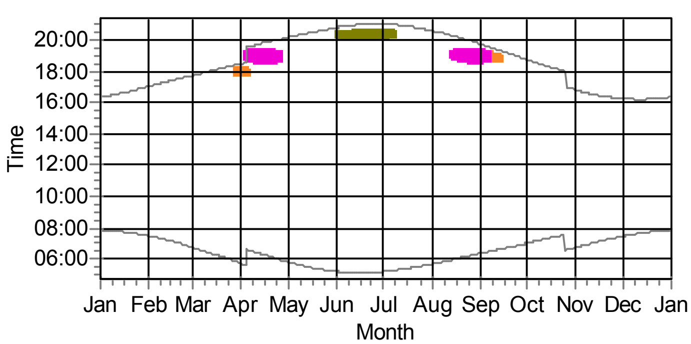
SF025N



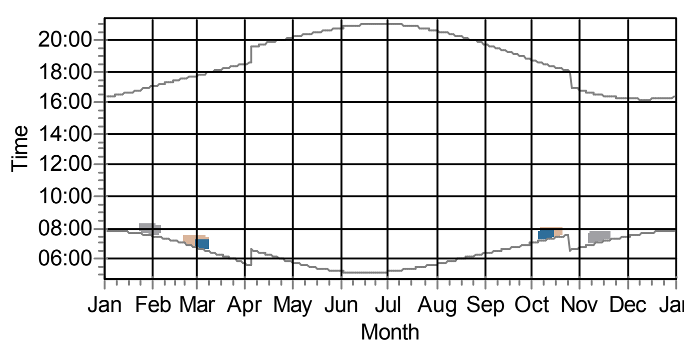
SF026S



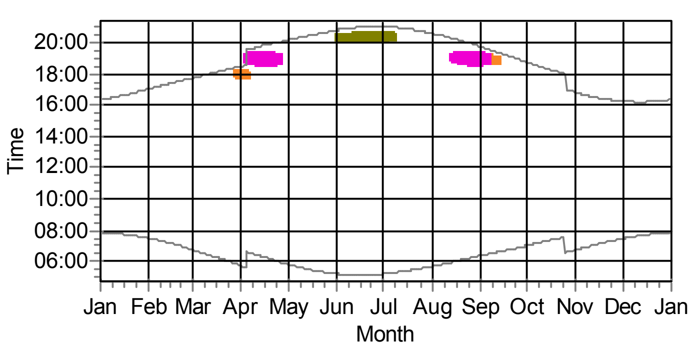
SF026W



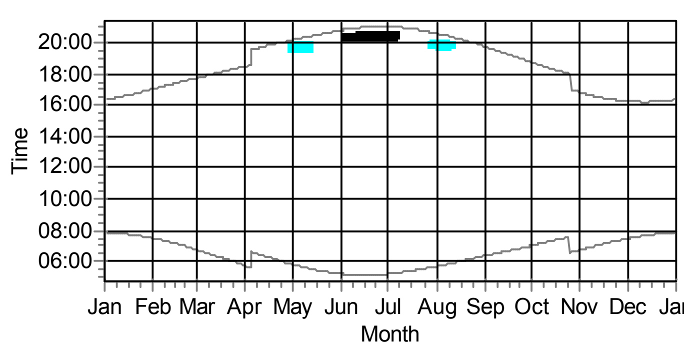
SF026E



SF026N



SF101N



WTGs

063 066 067 071 072 074 081 083 085 086

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
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GE 1.5sle (77m diameter) at 65m hub height
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1500 meter shadow distance applied

Licensed user:
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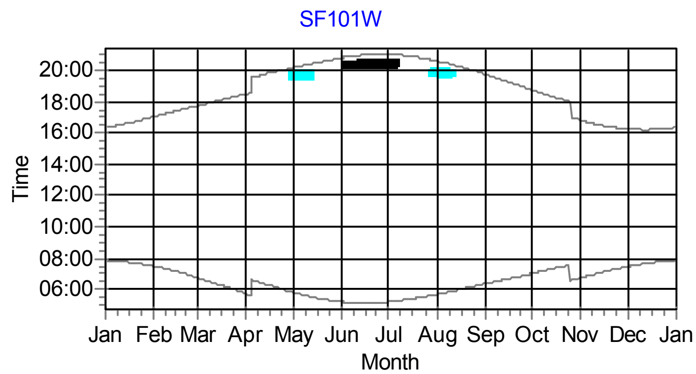
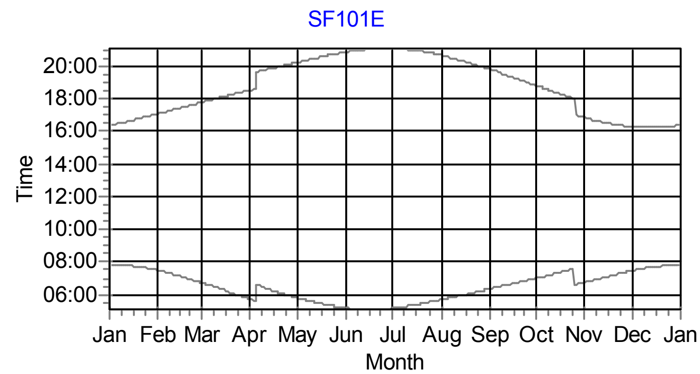
7660 Whitegate Avenue
CA-92506 Riverside, USA

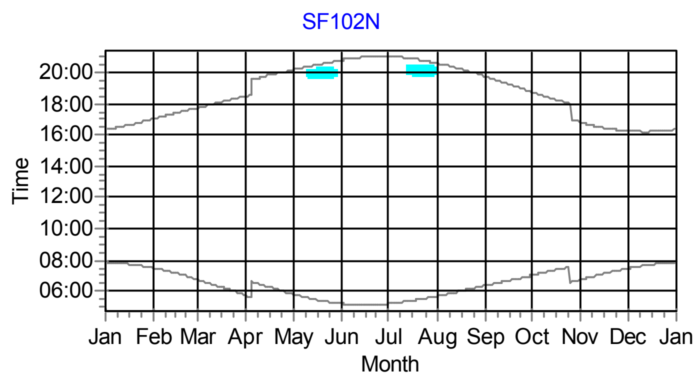
Calculated:
07/26/2004 21:12/2.3.0.216

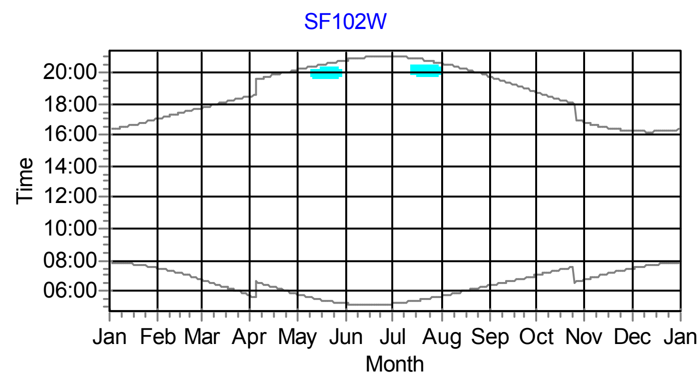
SHADOW - Calendar, graphical

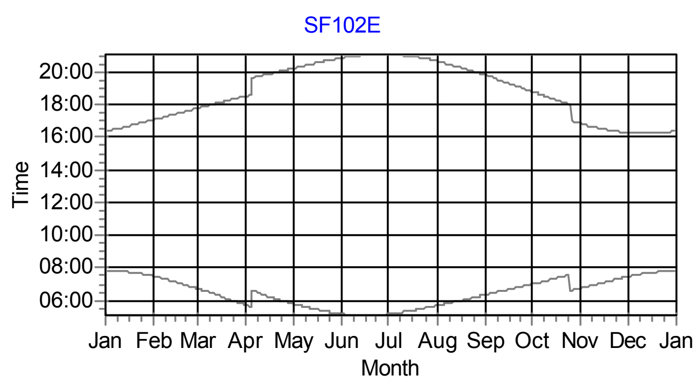
Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

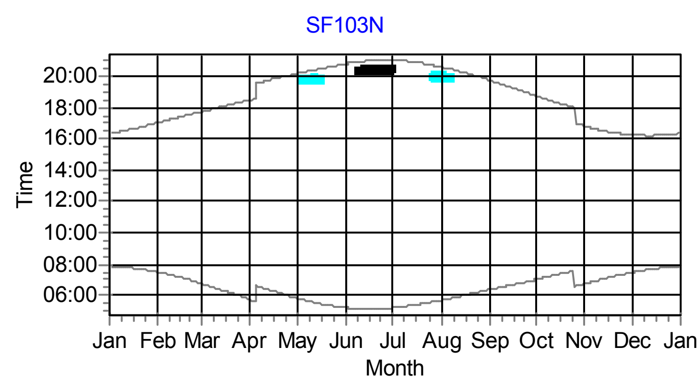












WTGs

066

067

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

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Calculated:
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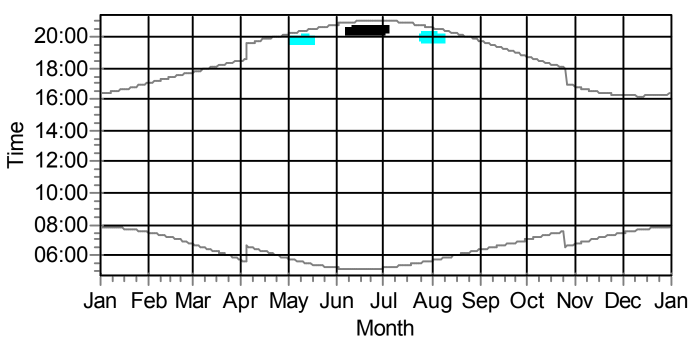
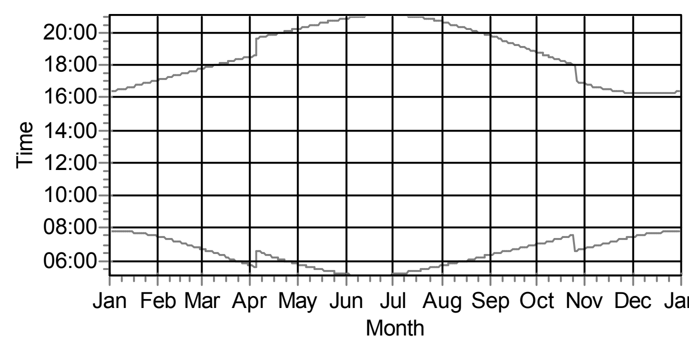
SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

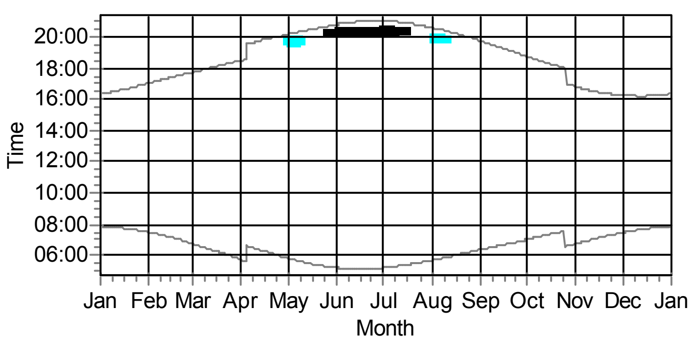
SF103W



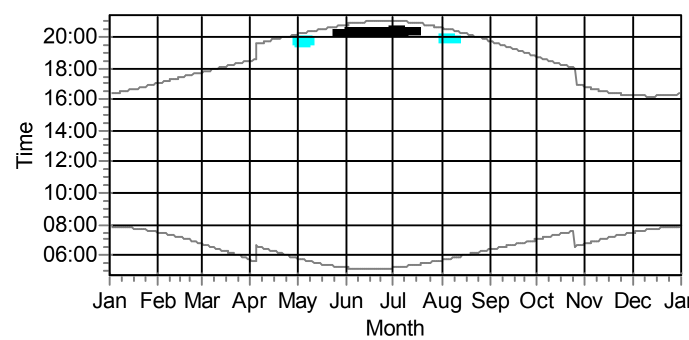
SF103E



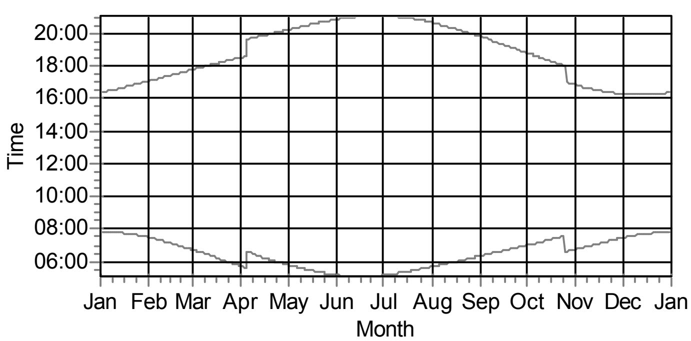
SF104N



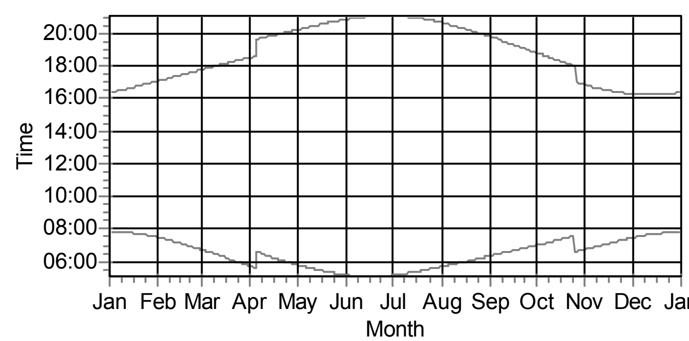
SF104W



SF104E



SF135N



WTGs

066

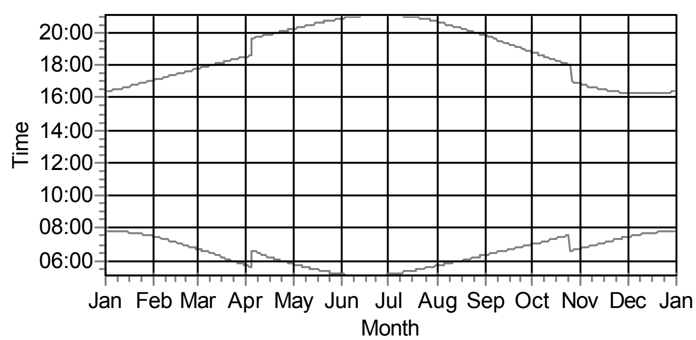
067

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA Huckell/Weinman Associates, Inc.	Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090 GE 1.5sle (77m diameter) at 65m hub height Monthly sunshine percentage applied Joint frequency distribution applied (for run-hours and direction) 1500 meter shadow distance applied	07/26/2004 21:28 / 65 Licensed user: **Wind Engineers, Inc.** 7660 Whitegate Avenue CA-92506 Riverside, USA Calculated: 07/26/2004 21:12/2.3.0.216

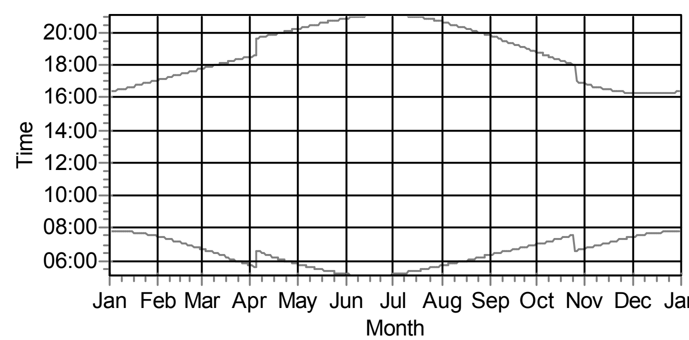
SHADOW - Calendar, graphical

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered

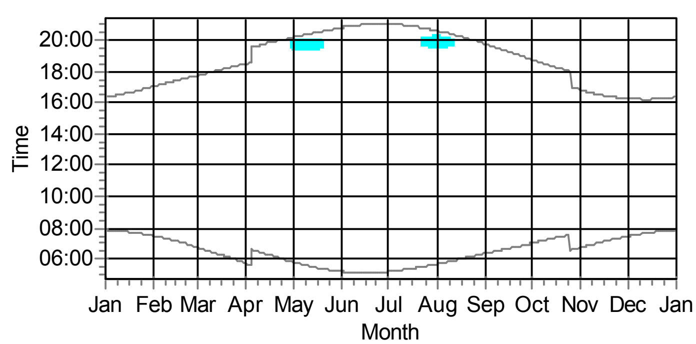
SF135W



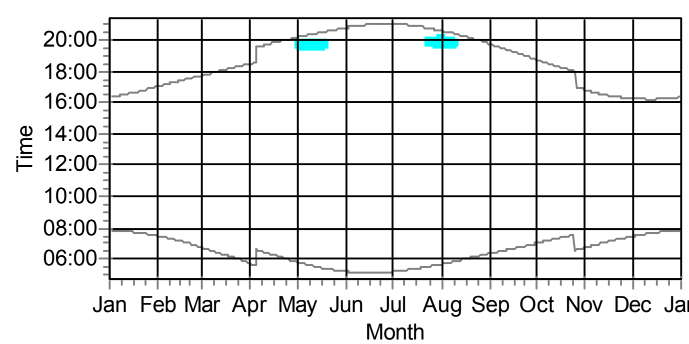
SF135E



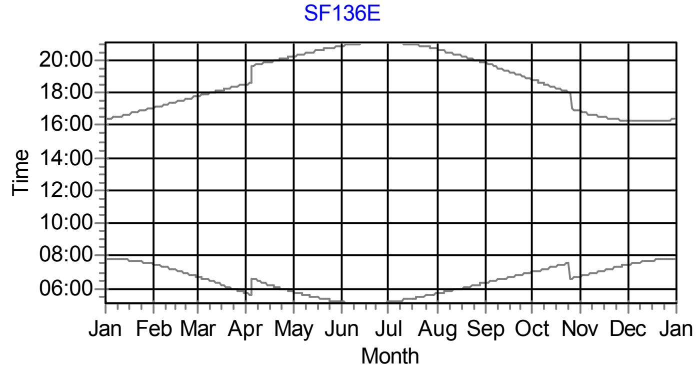
SF136N



SF136W



SF136E



WTGs

066

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 019 through 026, 101 through 104, 135, 136 - selected windows
Turbines 027-035, 055, 063-075, 081, 083, 085, 086, 088-090
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow distance applied

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Licensed user:
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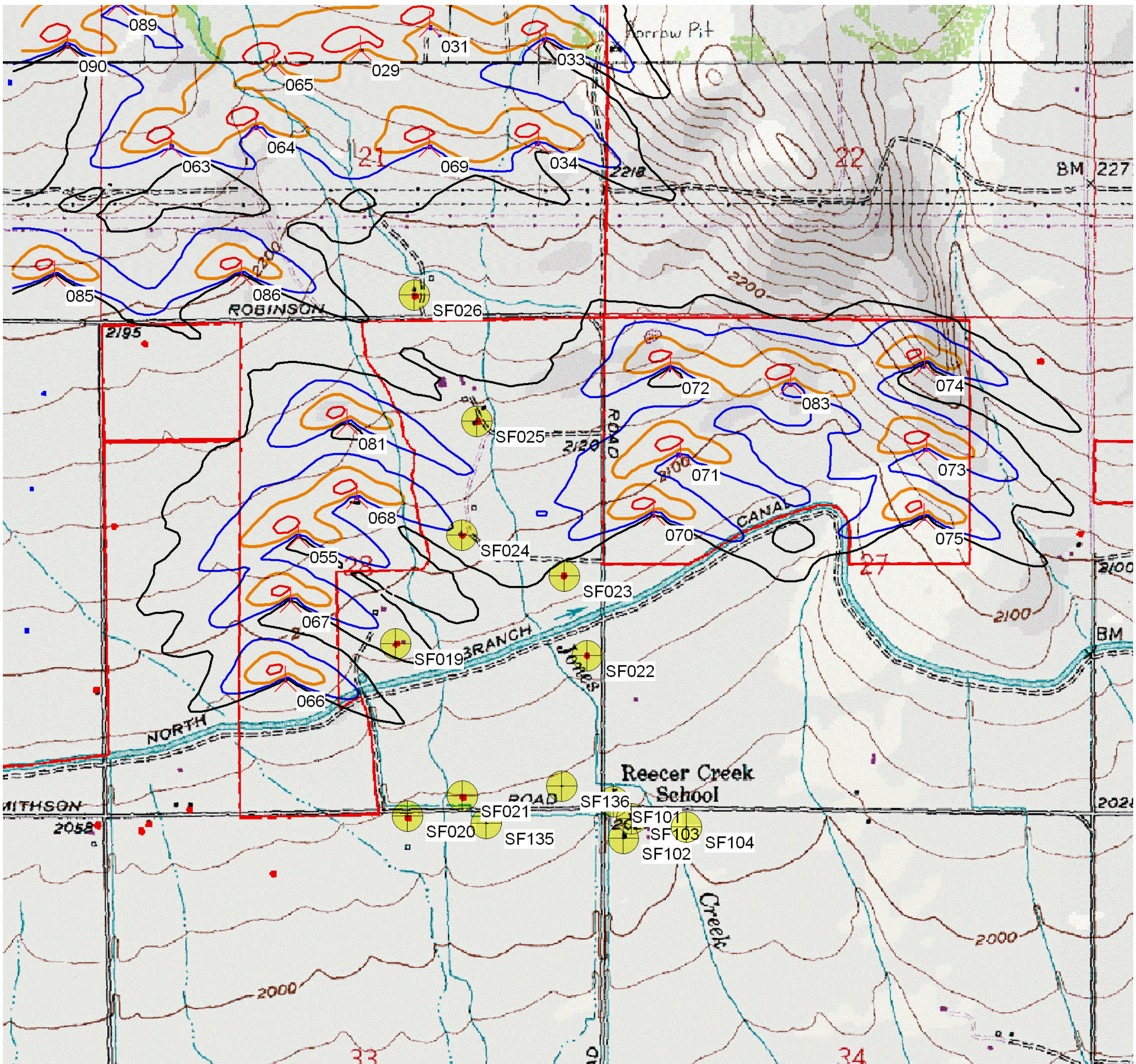
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 21:12/2.3.0.216

SHADOW - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040726 SF 019-026, 101-104, 135-136, tubines scattered **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



0 250 500 750 1000m

Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 683,382 North: 5,220,063

New WTG Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25 50 100 200

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA Huckell/Weinman Associates, Inc.	Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120, GE 1.5sle (77m diameter) at 65m hub height Monthly sunshine percentage applied Joint frequency distribution applied (for run-hours and direction) 1500 meter shadow limit applied	07/26/2004 21:38 / 1 Licensed user: **Wind Engineers, Inc.** 7660 Whitegate Avenue CA-92506 Riverside, USA Calculated: 07/26/2004 15:36/2.3.0.216

SHADOW - Main Result

Calculation: 040726 SF 027-034, 105-114, tubines skattered

Assumptions for shadow calculations

Maximum distance for influence	1,500 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes

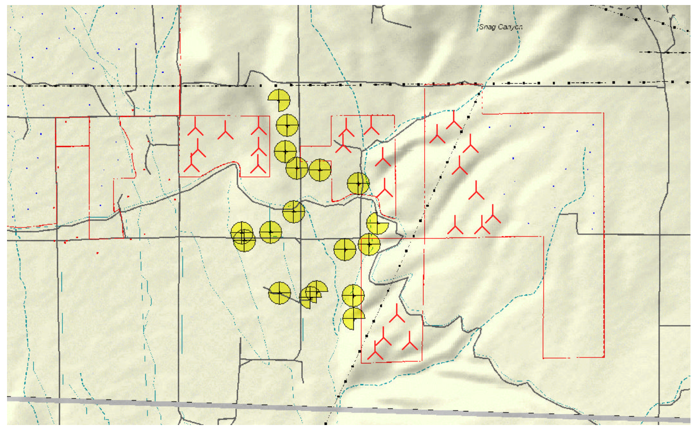
Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304



Scale 1:100,000

New WTG   Shadow Receptor

WTGs

	UTM NAD27 Zone: 10				WTG type						
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	RPM
			[m]					[kW]	[m]	[m]	[RPM]
070	683,722	5,220,210	638	070	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
071	683,802	5,220,409	641	071	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
072	683,762	5,220,692	652	072	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
073	684,611	5,220,451	655	073	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
074	684,595	5,220,725	680	074	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
075	684,609	5,220,225	644	075	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
076	685,724	5,220,530	658	076	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
077	685,764	5,220,737	664	077	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
078	686,091	5,220,775	663	078	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
079	686,261	5,220,367	678	079	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
080	686,301	5,219,957	647	080	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
083	684,158	5,220,654	651	083	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
091	687,250	5,219,497	668	091	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
092	687,601	5,219,511	680	092	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
093	687,511	5,219,965	687	093	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
098	687,421	5,220,582	700	098	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
099	687,279	5,220,288	692	099	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
113	687,186	5,220,886	700	113	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
114	686,969	5,220,695	696	114	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
115	687,742	5,219,655	684	115	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
117	686,507	5,218,310	620	117	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
118	686,696	5,217,949	620	118	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
119	686,344	5,218,001	616	119	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
120	686,235	5,217,814	600	120	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Shadow Receptor-Input

		UTM NAD27 Zone: 10							
No	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window
				[m]	[m]	[m]	[m]	[°]	[°]
SF027	SF027N	685,928	5,218,534	600	1.0	1.0	1.0	180.0	90.0
SF027	SF027E	685,928	5,218,534	600	1.0	1.0	1.0	-90.0	90.0
SF027	SF027S	685,928	5,218,534	600	1.0	1.0	1.0	0.0	90.0
SF028	SF028N	685,430	5,220,179	646	1.0	1.0	1.0	180.0	90.0
SF028	SF028E	685,430	5,220,179	646	1.0	1.0	1.0	-90.0	90.0
SF028	SF028W	685,430	5,220,179	646	1.0	1.0	1.0	90.0	90.0
SF029	SF029N	685,128	5,220,191	645	1.0	1.0	1.0	180.0	90.0

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 15:36/2.3.0.216

SHADOW - Main Result

Calculation: 040726 SF 027-034, 105-114, tubines skattered

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF029	SF029E	685,128	5,220,191	645	1.0	1.0	1.0	-90.0	90.0
SF029	SF029W	685,128	5,220,191	645	1.0	1.0	1.0	90.0	90.0
SF030	SF030S	684,977	5,220,755	668	1.0	1.0	1.0	0.0	90.0
SF030	SF030E	684,977	5,220,755	668	1.0	1.0	1.0	-90.0	90.0
SF030	SF030W	684,977	5,220,755	668	1.0	1.0	1.0	90.0	90.0
SF031	SF031N	685,798	5,219,141	616	1.0	1.0	1.0	180.0	90.0
SF031	SF031E	685,798	5,219,141	616	1.0	1.0	1.0	-90.0	90.0
SF031	SF031S	685,798	5,219,141	616	1.0	1.0	1.0	0.0	90.0
SF032	SF032N	686,117	5,219,215	620	1.0	1.0	1.0	180.0	90.0
SF032	SF032W	686,117	5,219,215	620	1.0	1.0	1.0	90.0	90.0
SF032	SF032S	686,117	5,219,215	620	1.0	1.0	1.0	0.0	90.0
SF032	SF032E	686,117	5,219,215	620	1.0	1.0	1.0	-90.0	90.0
SF033	SF033N	685,947	5,220,014	640	1.0	1.0	1.0	180.0	90.0
SF033	SF033S	685,947	5,220,014	640	1.0	1.0	1.0	0.0	90.0
SF033	SF033W	685,947	5,220,014	640	1.0	1.0	1.0	90.0	90.0
SF033	SF033E	685,947	5,220,014	640	1.0	1.0	1.0	-90.0	90.0
SF034	SF034N	686,215	5,219,502	631	1.0	1.0	1.0	180.0	90.0
SF034	SF034E	686,215	5,219,502	631	1.0	1.0	1.0	-90.0	90.0
SF105	SF105E	684,419	5,219,315	616	1.0	1.0	1.0	-90.0	90.0
SF105	SF105W	684,419	5,219,315	616	1.0	1.0	1.0	90.0	90.0
SF105	SF105N	684,419	5,219,315	616	1.0	1.0	1.0	180.0	90.0
SF106	SF106E	684,461	5,219,221	613	1.0	1.0	1.0	-90.0	90.0
SF106	SF106N	684,461	5,219,221	613	1.0	1.0	1.0	180.0	90.0
SF106	SF106W	684,461	5,219,221	613	1.0	1.0	1.0	90.0	90.0
SF107	SF107N	684,806	5,219,342	620	1.0	1.0	1.0	180.0	90.0
SF107	SF107E	684,806	5,219,342	620	1.0	1.0	1.0	-90.0	90.0
SF107	SF107W	684,806	5,219,342	620	1.0	1.0	1.0	90.0	90.0
SF108	SF108N	685,104	5,219,618	629	1.0	1.0	1.0	180.0	90.0
SF108	SF108E	685,104	5,219,618	629	1.0	1.0	1.0	-90.0	90.0
SF108	SF108W	685,104	5,219,618	629	1.0	1.0	1.0	90.0	90.0
SF109	SF109E	684,965	5,220,411	655	1.0	1.0	1.0	-90.0	90.0
SF109	SF109N	684,965	5,220,411	655	1.0	1.0	1.0	180.0	90.0
SF109	SF109S	684,965	5,220,411	655	1.0	1.0	1.0	0.0	90.0
SF109	SF109W	684,965	5,220,411	655	1.0	1.0	1.0	90.0	90.0
SF110	SF110E	685,942	5,218,236	600	1.0	1.0	1.0	-90.0	90.0
SF110	SF110S	685,942	5,218,236	600	1.0	1.0	1.0	0.0	90.0
SF111	SF111W	684,857	5,221,086	680	1.0	1.0	1.0	90.0	90.0
SF111	SF111S	684,857	5,221,086	680	1.0	1.0	1.0	0.0	90.0
SF112	SF112E	685,360	5,218,490	597	1.0	1.0	1.0	-90.0	90.0
SF112	SF112S	685,360	5,218,490	597	1.0	1.0	1.0	0.0	90.0
SF113	SF113E	685,444	5,218,569	600	1.0	1.0	1.0	-90.0	90.0
SF113	SF113S	685,444	5,218,569	600	1.0	1.0	1.0	0.0	90.0
SF114	SF114E	684,947	5,218,540	600	1.0	1.0	1.0	-90.0	90.0
SF114	SF114N	684,947	5,218,540	600	1.0	1.0	1.0	180.0	90.0
SF114	SF114W	684,947	5,218,540	600	1.0	1.0	1.0	90.0	90.0

Calculation Results

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF027	SF027N	0:00	0	0:00	0:00
SF027	SF027E	29:58	106	0:30	6:54
SF027	SF027S	29:52	106	0:30	6:52
SF028	SF028N	25:24	97	0:26	8:12
SF028	SF028E	13:52	56	0:22	4:01
SF028	SF028W	17:02	66	0:26	5:53
SF029	SF029N	84:02	138	1:06	27:11
SF029	SF029E	35:58	100	0:34	9:25

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 15:36/2.3.0.216

SHADOW - Main Result

Calculation: 040726 SF 027-034, 105-114, tubines skattered

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF029	SF029W	51:24	139	0:40	18:45
SF030	SF030S	91:50	203	0:52	17:50
SF030	SF030E	14:08	56	0:24	4:21
SF030	SF030W	83:18	182	0:46	15:19
SF031	SF031N	2:52	18	0:12	0:47
SF031	SF031E	2:52	18	0:12	0:47
SF031	SF031S	0:00	0	0:00	0:00
SF032	SF032N	4:38	24	0:16	1:16
SF032	SF032W	0:00	0	0:00	0:00
SF032	SF032S	0:00	0	0:00	0:00
SF032	SF032E	4:38	24	0:16	1:16
SF033	SF033N	6:32	39	0:22	2:02
SF033	SF033S	41:12	80	0:48	13:35
SF033	SF033W	3:22	31	0:10	1:09
SF033	SF033E	45:02	101	0:50	14:42
SF034	SF034N	6:32	41	0:14	1:50
SF034	SF034E	9:28	44	0:20	2:47
SF105	SF105E	0:00	0	0:00	0:00
SF105	SF105W	0:00	0	0:00	0:00
SF105	SF105N	0:00	0	0:00	0:00
SF106	SF106E	0:00	0	0:00	0:00
SF106	SF106N	0:00	0	0:00	0:00
SF106	SF106W	0:00	0	0:00	0:00
SF107	SF107N	0:00	0	0:00	0:00
SF107	SF107E	0:00	0	0:00	0:00
SF107	SF107W	0:00	0	0:00	0:00
SF108	SF108N	8:20	51	0:14	2:05
SF108	SF108E	8:26	52	0:14	2:07
SF108	SF108W	0:00	0	0:00	0:00
SF109	SF109E	25:30	116	0:24	7:07
SF109	SF109N	81:06	99	1:18	25:46
SF109	SF109S	35:00	98	0:50	7:04
SF109	SF109W	95:14	160	1:04	26:26
SF110	SF110E	55:12	105	0:56	15:46
SF110	SF110S	37:22	62	0:56	10:19
SF111	SF111W	33:36	86	0:40	2:51
SF111	SF111S	40:24	131	0:40	4:16
SF112	SF112E	20:34	105	0:20	4:32
SF112	SF112S	20:24	105	0:20	4:29
SF113	SF113E	13:20	69	0:18	3:05
SF113	SF113S	13:20	69	0:18	3:05
SF114	SF114E	2:44	28	0:10	0:40
SF114	SF114N	0:00	0	0:00	0:00
SF114	SF114W	0:00	0	0:00	0:00

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
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GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

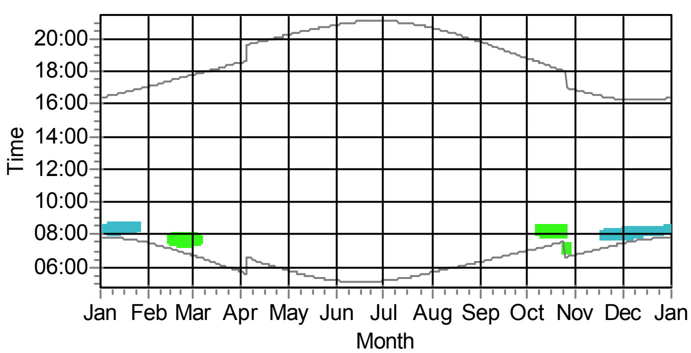
Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 15:36/2.3.0.216

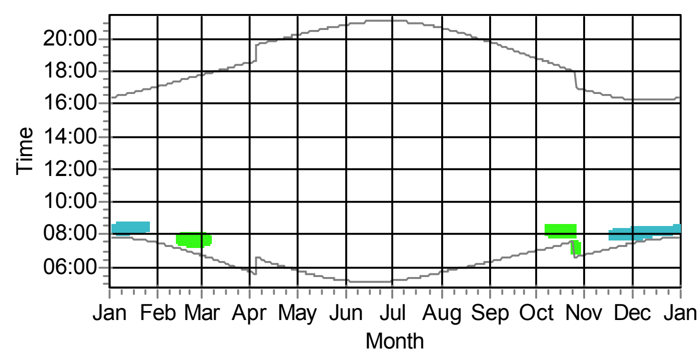
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered

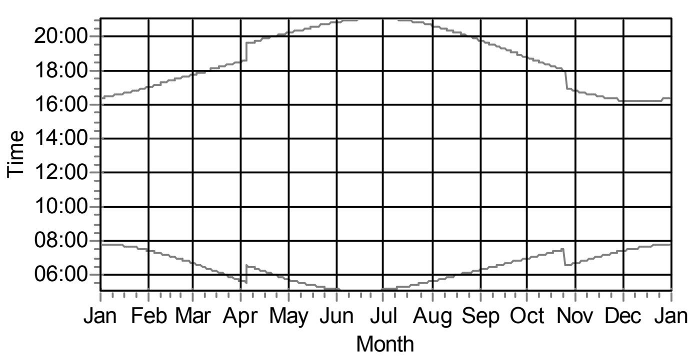
SF027S



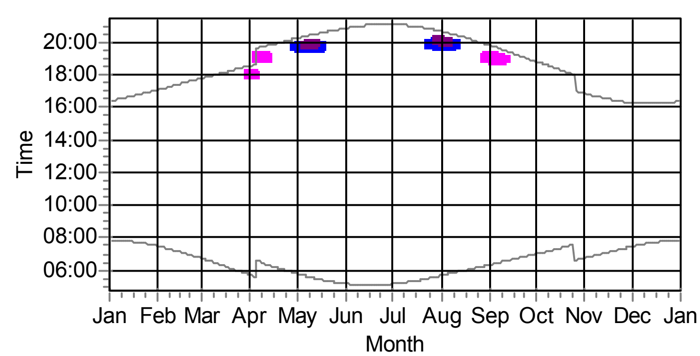
SF027E



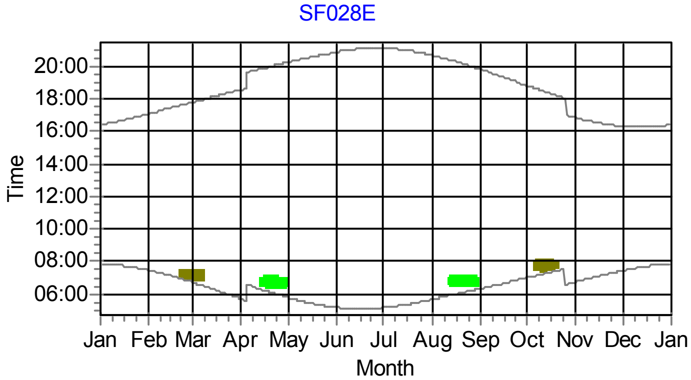
SF027N



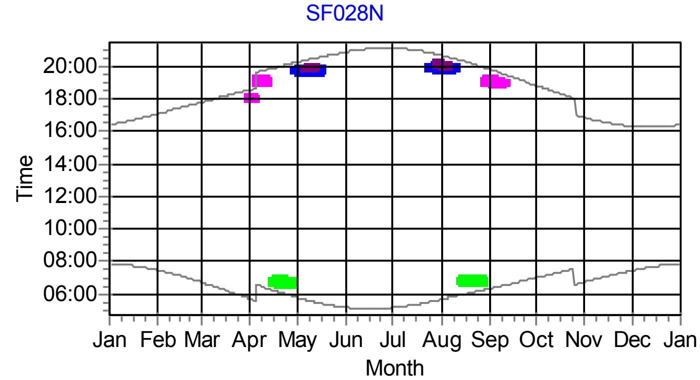
SF028W



SF028E



SF028N



WTGs

073	079	083	118
075	080	117	

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

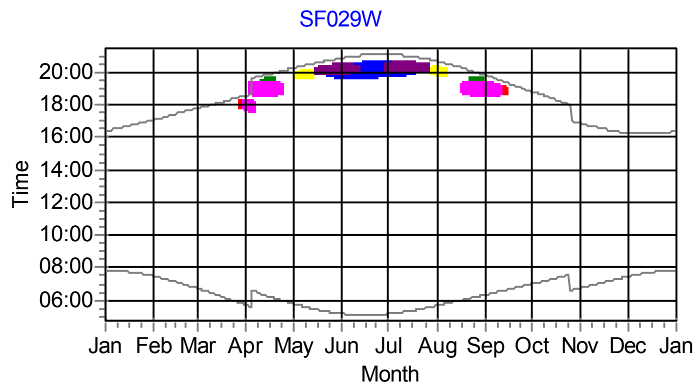
Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

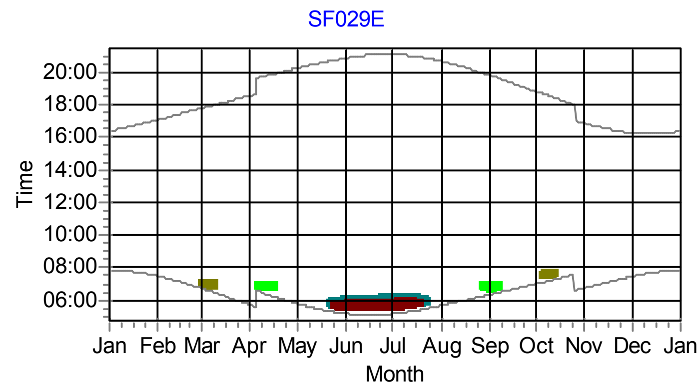
Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

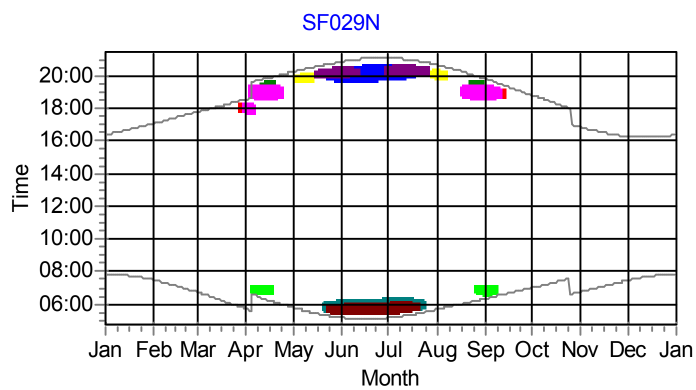
Calculated:
07/26/2004 15:36/2.3.0.216

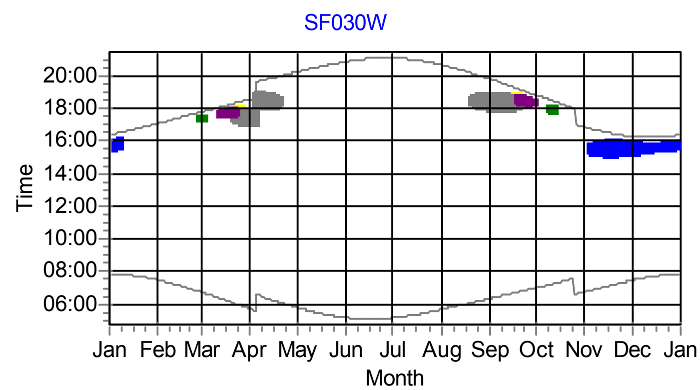
SHADOW - Calendar, graphical

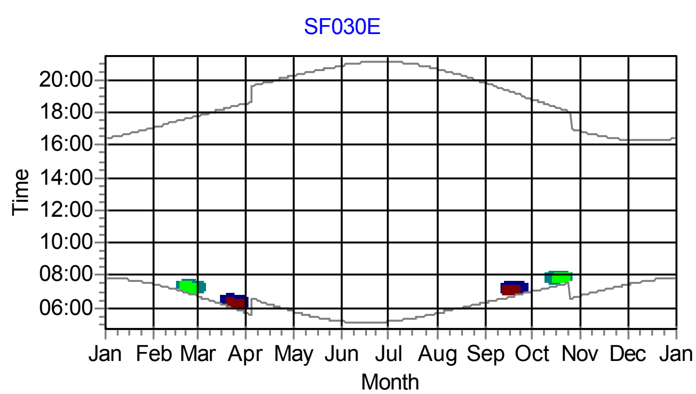
Calculation: 040726 SF 027-034, 105-114, tubines skattered

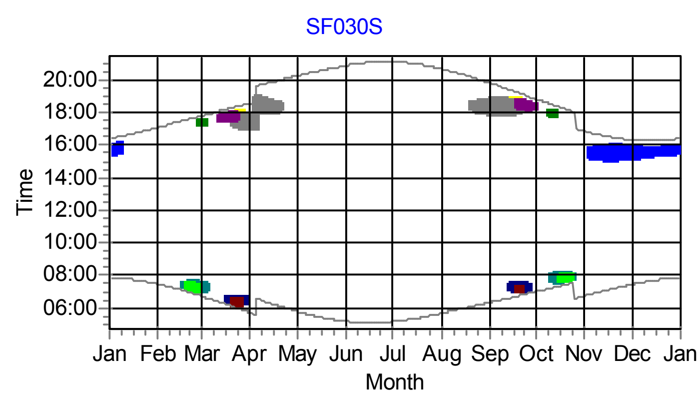












WTGs

070 071 072 073 074 075 076 077 078 079 080 083

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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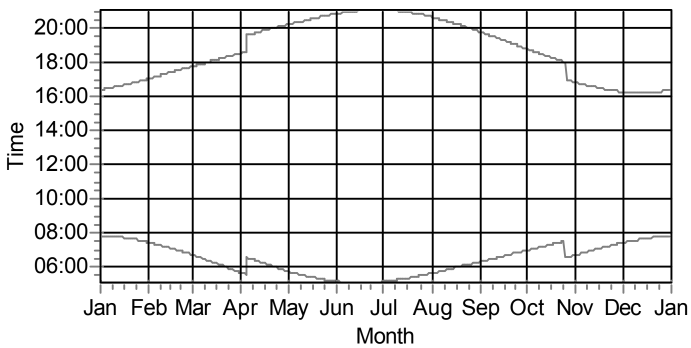
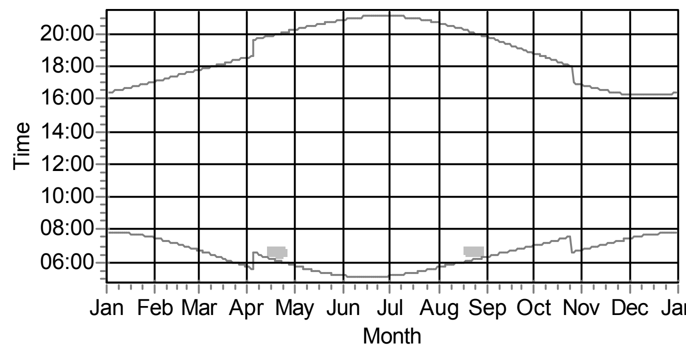
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered

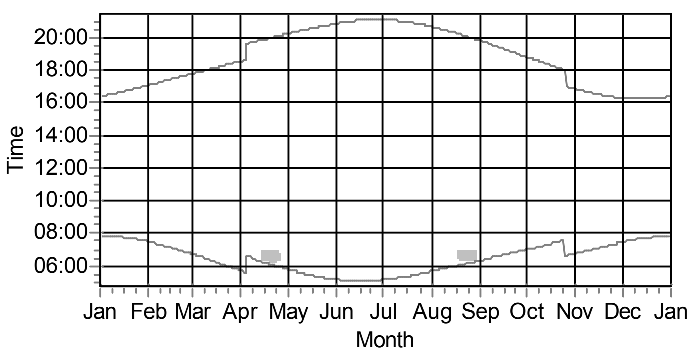
SF031S



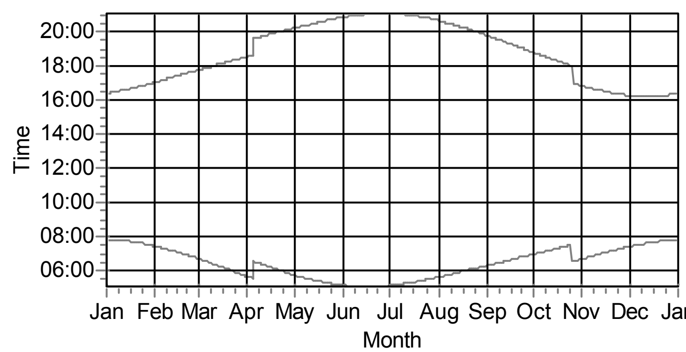
SF031E



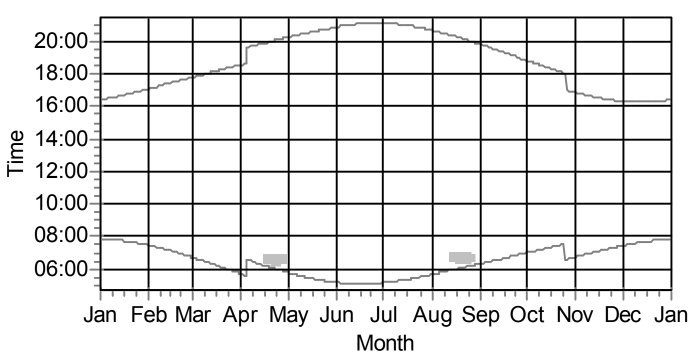
SF031N



SF032S



SF032E



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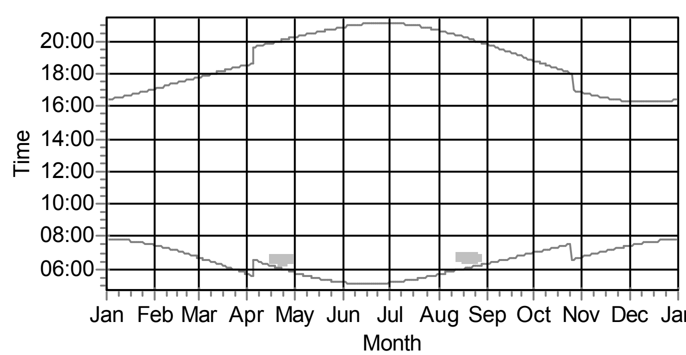

WTGs

091

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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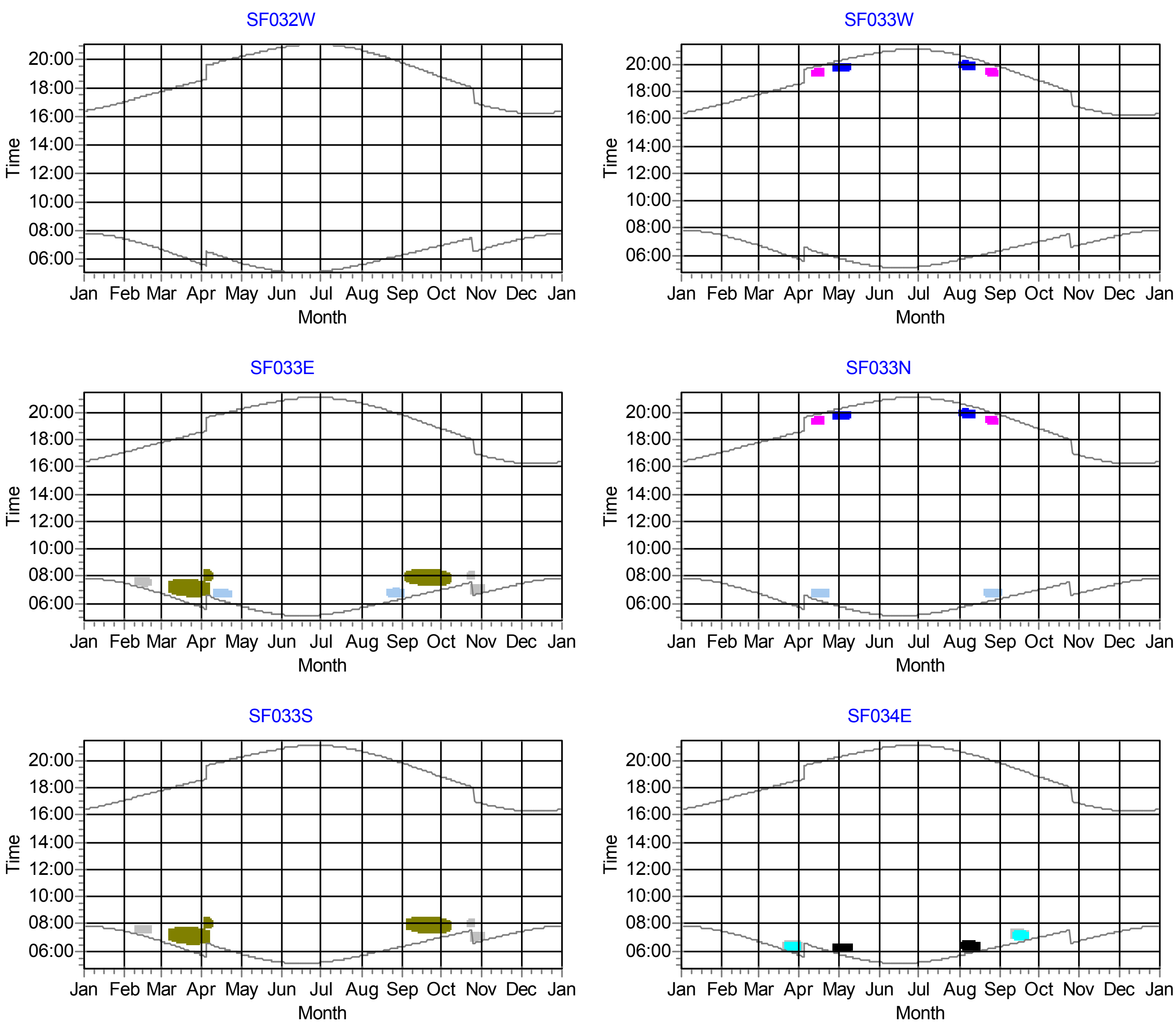
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered



WTGs

073	080	092	099
075	091	093	

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

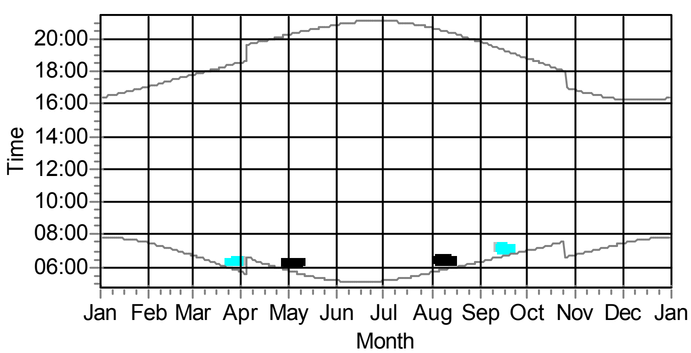
Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 15:36/2.3.0.216

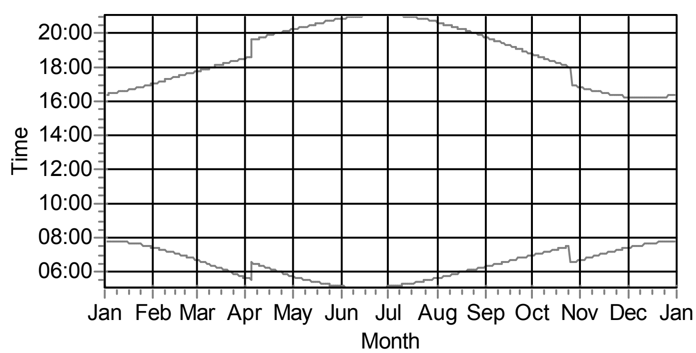
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered

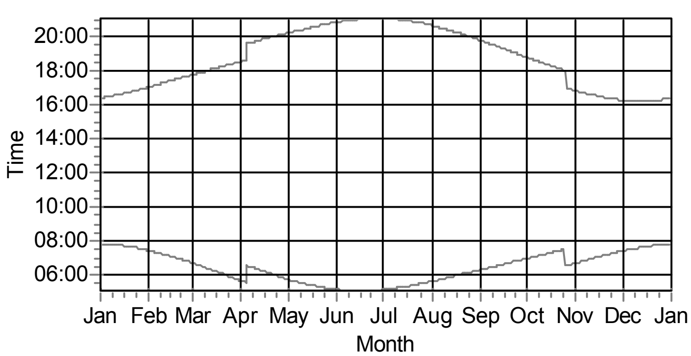
SF034N



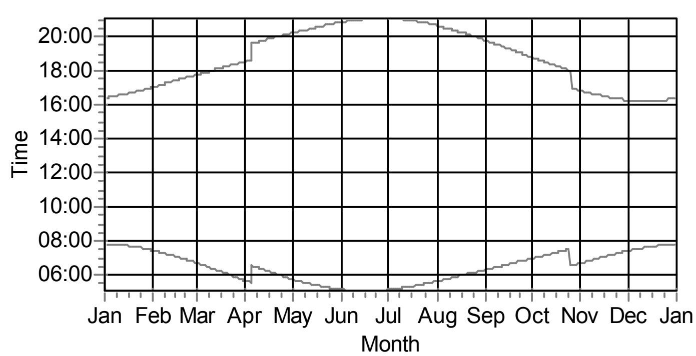
SF105N



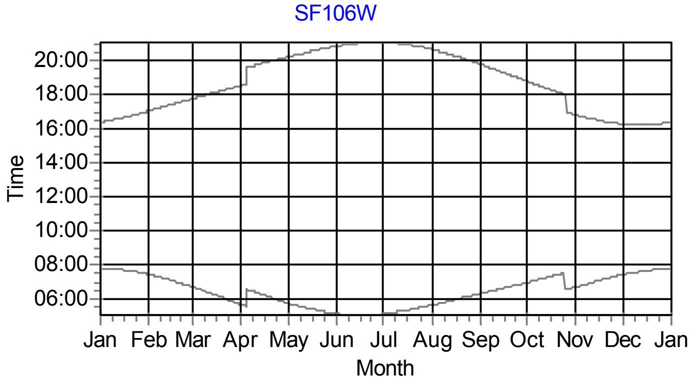
SF105W



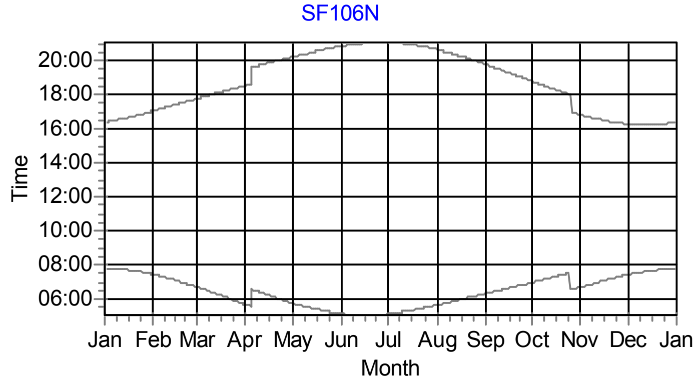
SF105E



SF106W



SF106N



WTGs

091 092 093

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
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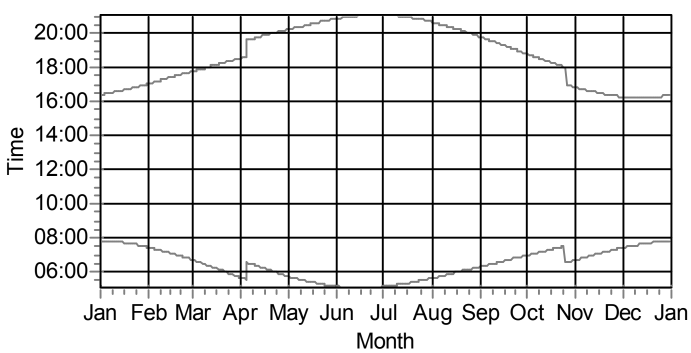
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 15:36/2.3.0.216

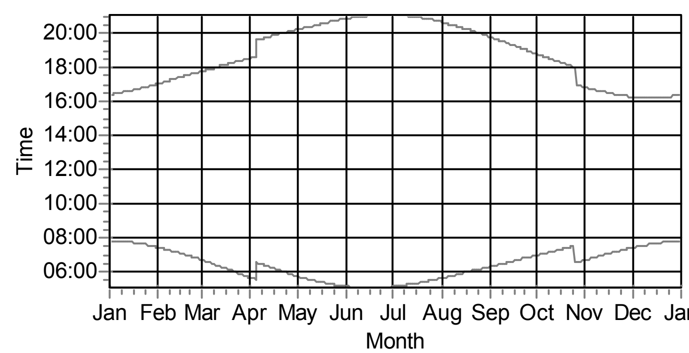
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered

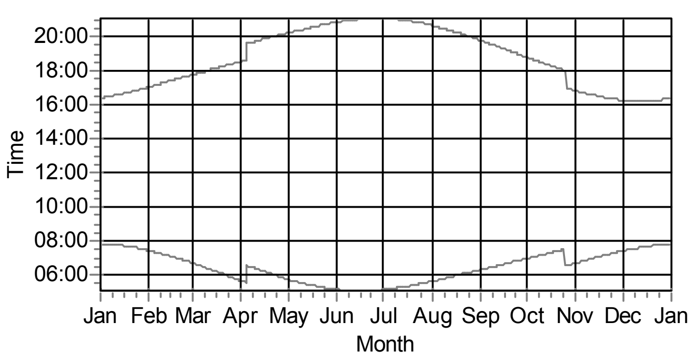
SF106E



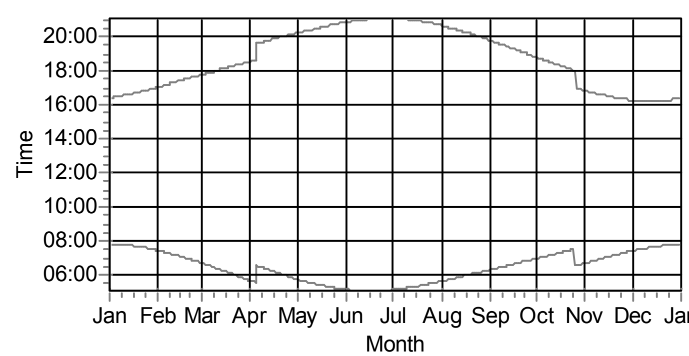
SF107W



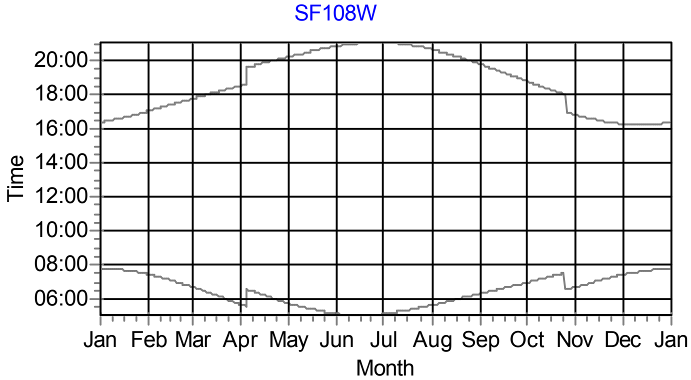
SF107E



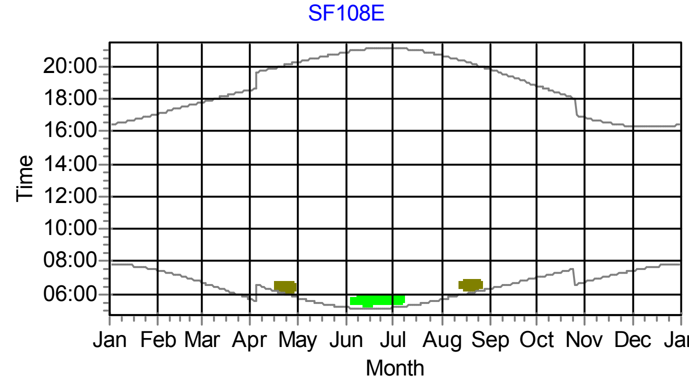
SF107N



SF108W



SF108E



WTGs

079

080

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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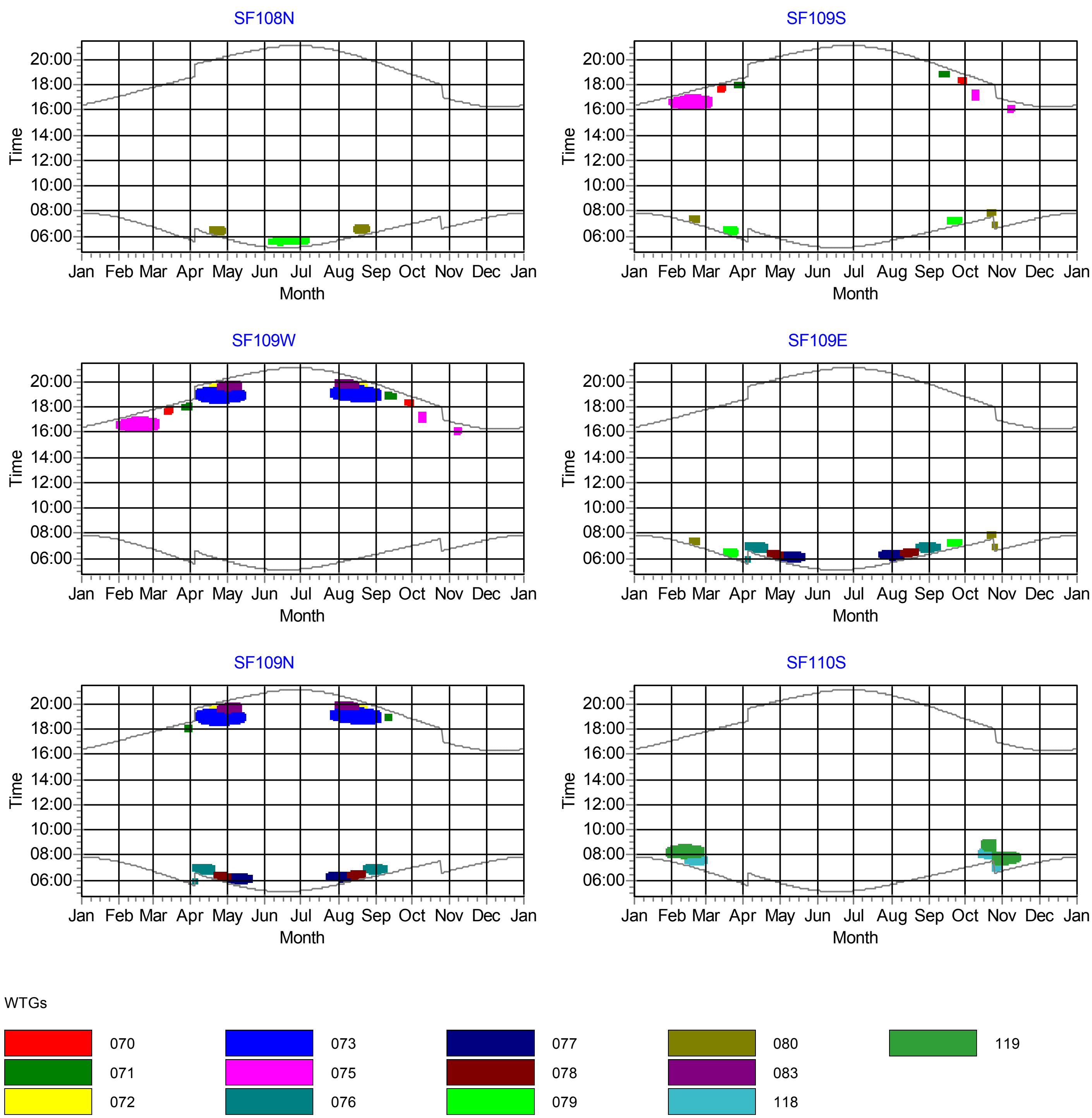
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered

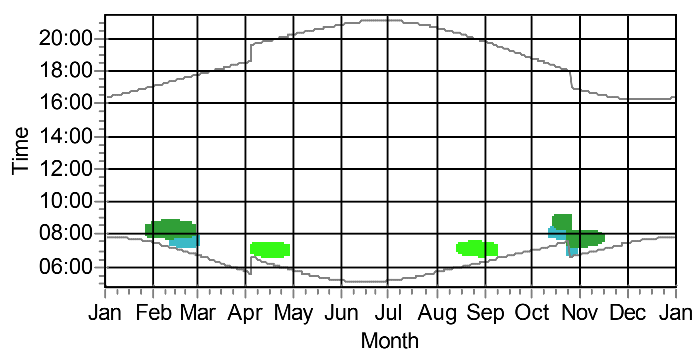


Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA	Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows	07/26/2004 21:39 / 72
Huckell/Weinman Associates, Inc.	Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120, GE 1.5sle (77m diameter) at 65m hub height Monthly sunshine percentage applied Joint frequency distribution applied (for run-hours and direction) 1500 meter shadow limit applied	Licensed user: **Wind Engineers, Inc.** 7660 Whitegate Avenue CA-92506 Riverside, USA
		Calculated: 07/26/2004 15:36/2.3.0.216

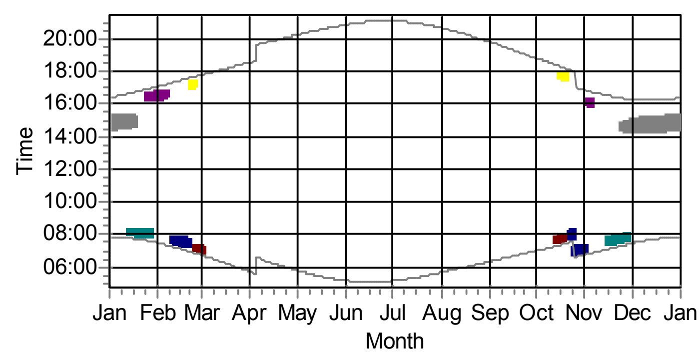
SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered

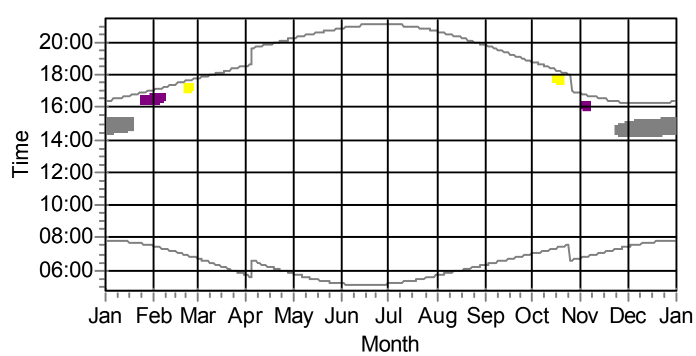
SF110E



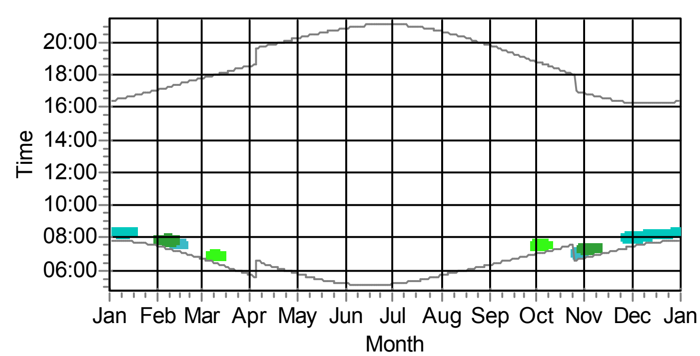
SF111S



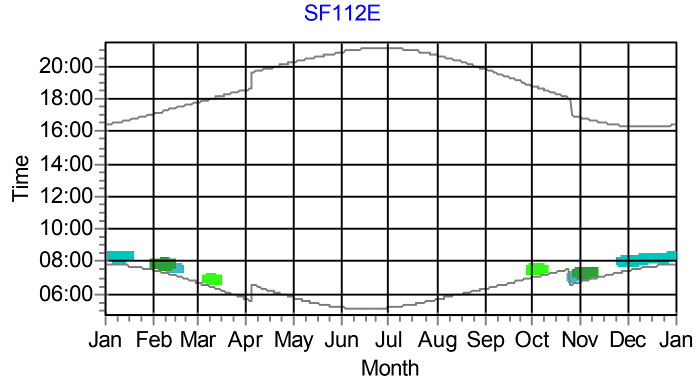
SF111W



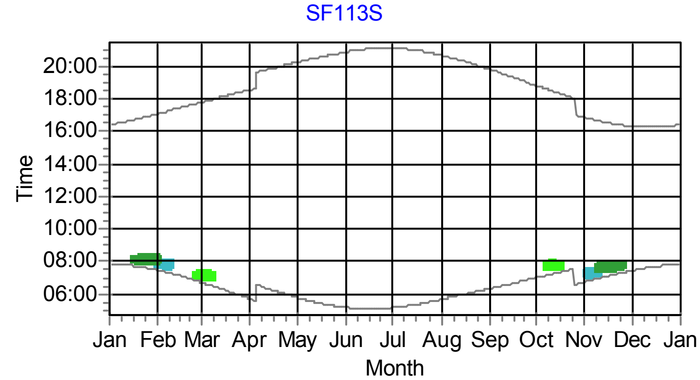
SF112S



SF112E



SF113S



WTGs

072, 074, 076, 077, 078, 083, 117, 118, 119, 120

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

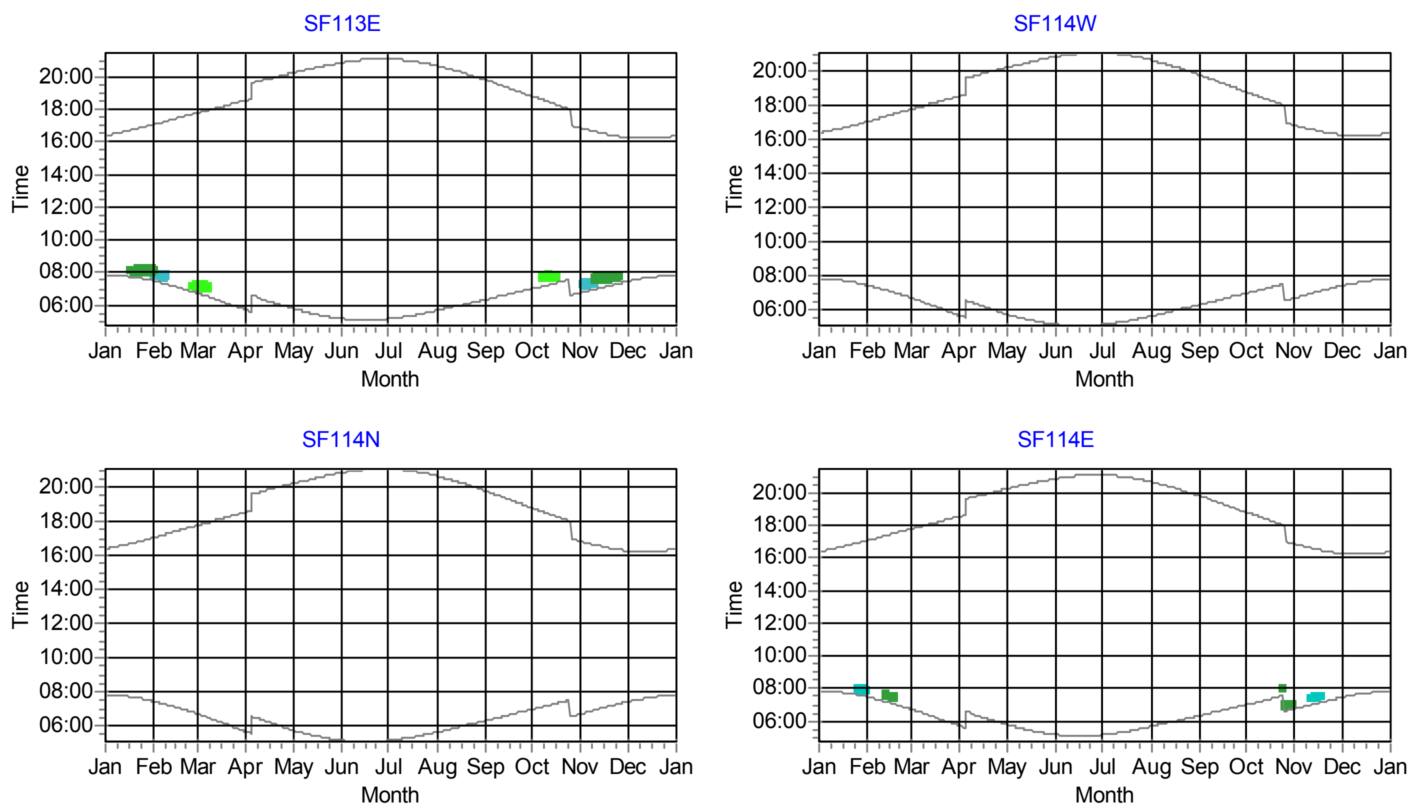
Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 15:36/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040726 SF 027-034, 105-114, tubines skattered



WTGs

117 118 119 120

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 027 through 034 - 105 through 114, selected windows
Turbines 70-80, 83, 91-93, 98, 99, 113-115, 117-120,
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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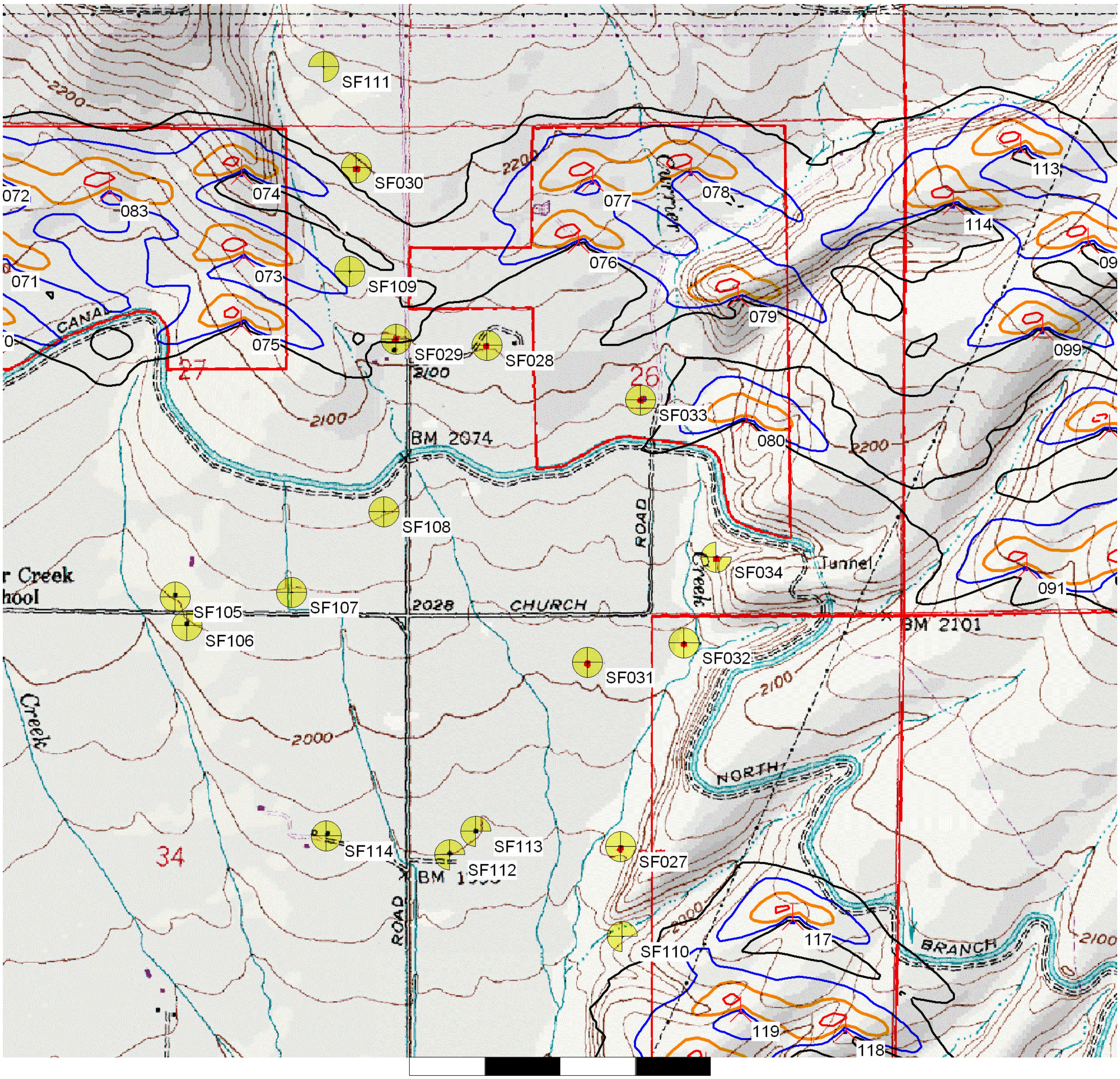
Calculated:
07/26/2004 15:36/2.3.0.216

SHADOW - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040726 SF 027-034, 105-114, tubines skattered **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 685,632 North: 5,219,514

New WTG   Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25   50   100   200

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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07/26/2004 08:46 / 1

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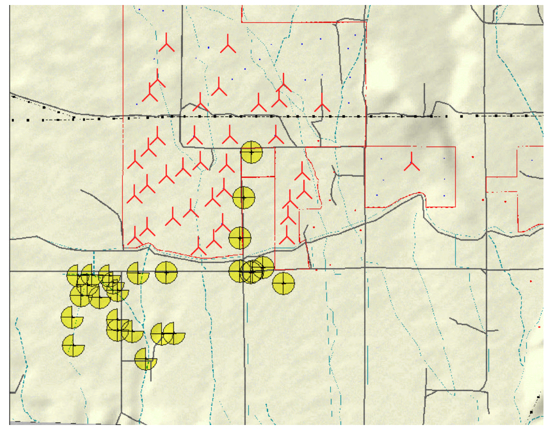
Calculated:
07/26/2004 04:43/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 010-018, 118-134, tubines scattered

Assumptions for shadow calculations

Maximum distance for influence	2,000 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes



Scale 1:100,000

New WTG   Shadow Receptor

Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304

WTGs

	UTM NAD27 Zone: 10				WTG type						
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
038	680,489	5,220,566	666	038	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
039	680,490	5,220,109	651	039	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
040	680,514	5,219,556	634	040	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
041	680,661	5,220,731	671	041	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
042	680,675	5,219,682	638	042	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
043	680,852	5,222,121	717	043	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
044	680,659	5,220,251	656	044	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
045	680,656	5,221,461	695	045	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
046	680,776	5,220,888	675	046	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
047	680,753	5,221,644	700	047	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
048	680,913	5,220,382	660	048	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
049	681,367	5,219,446	635	049	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
050	681,010	5,219,827	645	050	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
051	681,354	5,220,572	666	051	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
052	681,532	5,220,095	653	052	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
053	681,332	5,221,353	689	053	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
054	681,673	5,219,767	644	054	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
055	682,558	5,220,102	647	055	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
056	681,566	5,221,558	694	056	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
057	681,263	5,220,913	676	057	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
058	681,567	5,219,546	638	058	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
059	681,676	5,220,233	657	059	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
060	681,675	5,222,134	709	060	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
061	681,707	5,220,549	666	061	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
062	681,245	5,219,941	648	062	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
063	682,099	5,221,366	685	063	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
064	682,377	5,221,436	680	064	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
065	682,429	5,221,643	685	065	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
066	682,530	5,219,631	636	066	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
067	682,538	5,219,890	641	067	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
068	682,745	5,220,236	648	068	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
069	682,948	5,221,392	681	069	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
081	682,706	5,220,478	654	081	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
083	684,158	5,220,654	651	083	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
085	681,731	5,220,931	677	085	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
086	682,344	5,220,953	673	086	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
087	681,123	5,220,481	664	087	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 04:43/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 010-018, 118-134, tubines scattered

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF132	SF132N	680,717	5,217,946	591	1.0	1.0	1.0	180.0	90.0
SF133	SF133E	680,917	5,218,286	600	1.0	1.0	1.0	-90.0	90.0
SF133	SF133N	680,917	5,218,286	600	1.0	1.0	1.0	180.0	90.0
SF134	SF134E	681,080	5,218,296	600	1.0	1.0	1.0	-90.0	90.0
SF134	SF134N	681,080	5,218,296	600	1.0	1.0	1.0	180.0	90.0
SF14	SF014W	680,951	5,219,101	622	1.0	1.0	1.0	90.0	90.0

Calculation Results

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF010	SF010E	14:52	72	0:24	3:33
SF010	SF010N	19:12	110	0:24	6:53
SF010	SF010S	51:26	147	1:12	11:15
SF010	SF010W	66:06	216	0:52	16:23
SF011	SF011E	60:26	200	0:30	15:51
SF011	SF011N	105:16	169	1:18	37:58
SF011	SF011S	104:44	192	1:02	21:00
SF011	SF011W	151:04	260	1:08	42:33
SF012	SF012E	39:10	126	0:28	10:55
SF012	SF012N	64:52	160	0:38	20:35
SF012	SF012S	58:18	98	0:54	16:58
SF012	SF012W	84:38	189	0:56	26:44
SF013	SF013N	20:34	82	0:28	8:06
SF013	SF013E	0:00	0	0:00	0:00
SF013	SF013W	20:50	83	0:28	8:13
SF014	SF014N	4:24	54	0:06	1:07
SF014	SF014E	4:26	54	0:06	1:08
SF014	SF014S	0:00	0	0:00	0:00
SF015	SF015E	0:00	0	0:00	0:00
SF015	SF015N	27:18	97	0:26	10:41
SF015	SF015W	27:22	97	0:26	10:43
SF016	SF016E	0:00	0	0:00	0:00
SF016	SF016N	18:56	78	0:24	7:15
SF016	SF016W	19:08	78	0:24	7:19
SF017	SF017N	27:52	95	0:26	10:40
SF017	SF017E	0:00	0	0:00	0:00
SF017	SF017W	28:02	96	0:26	10:44
SF018	SF018N	9:14	65	0:14	3:34
SF018	SF018E	0:00	0	0:00	0:00
SF018	SF018W	9:18	65	0:14	3:35
SF118	SF118E	21:56	90	0:24	5:34
SF118	SF118N	21:50	90	0:24	5:33
SF119	SF119E	7:44	56	0:16	1:58
SF119	SF119N	7:44	56	0:16	1:58
SF120	SF120E	12:24	66	0:16	3:06
SF120	SF120N	12:18	66	0:16	3:05
SF121	SF121E	5:34	42	0:14	1:26
SF121	SF121N	5:34	42	0:14	1:26
SF122	SF122E	4:08	47	0:10	1:02
SF122	SF122N	4:08	47	0:10	1:02
SF123	SF123E	2:26	28	0:08	0:37
SF123	SF123N	2:26	28	0:08	0:37
SF124	SF124E	1:18	14	0:08	0:19
SF124	SF124N	1:16	14	0:08	0:18
SF125	SF125E	6:16	58	0:10	1:33
SF125	SF125N	6:12	58	0:10	1:32
SF126	SF126E	6:46	65	0:12	1:39

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 04:43/2.3.0.216

SHADOW - Main Result

Calculation: 040725 SF 010-018, 118-134, tubines scattered

No	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
SF126	SF126N	6:44	65	0:12	1:39
SF127	SF127E	1:42	21	0:06	0:25
SF127	SF127N	1:42	21	0:06	0:25
SF128	SF128E	0:00	0	0:00	0:00
SF128	SF128N	0:00	0	0:00	0:00
SF129	SF129E	0:00	0	0:00	0:00
SF129	SF129N	0:00	0	0:00	0:00
SF130	SF130E	0:00	0	0:00	0:00
SF130	SF130N	0:00	0	0:00	0:00
SF131	SF131E	0:00	0	0:00	0:00
SF131	SF131N	0:00	0	0:00	0:00
SF132	SF132E	0:00	0	0:00	0:00
SF132	SF132N	0:00	0	0:00	0:00
SF133	SF133E	0:00	0	0:00	0:00
SF133	SF133N	0:00	0	0:00	0:00
SF134	SF134E	0:00	0	0:00	0:00
SF134	SF134N	0:00	0	0:00	0:00
SF14	SF014W	0:00	0	0:00	0:00

Project:
030415 Desert Claim Wind Power Project, WA

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Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
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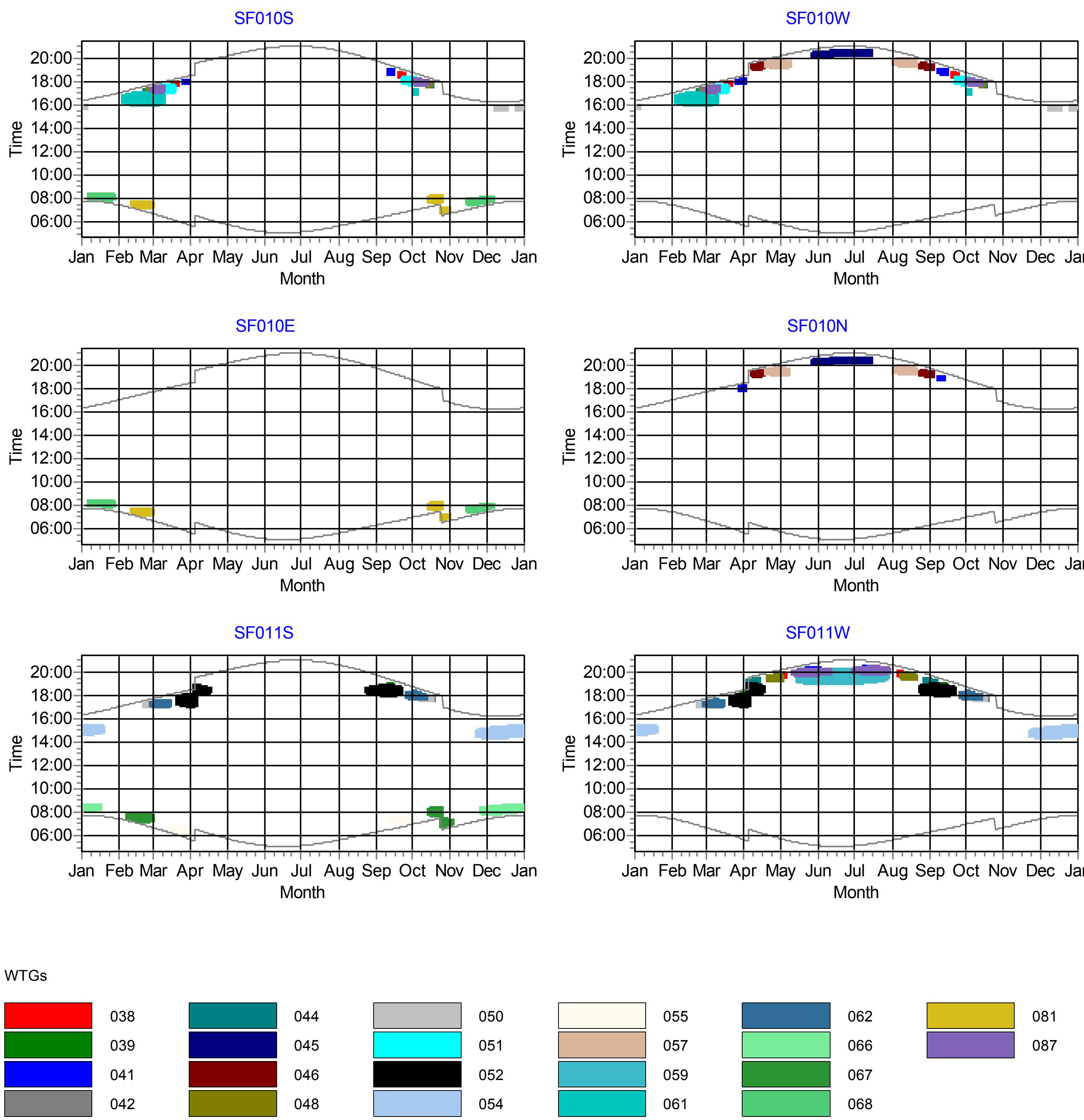
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered



Project:
030415 Desert Claim Wind Power Project, WA

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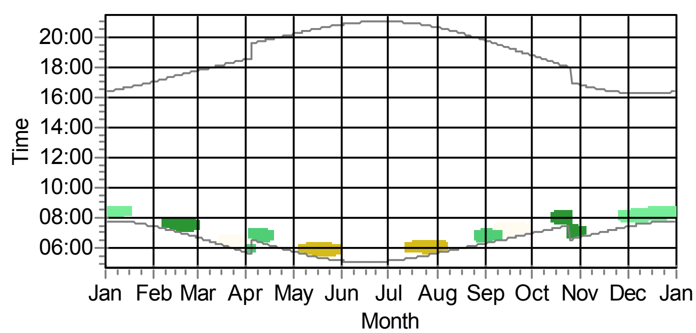
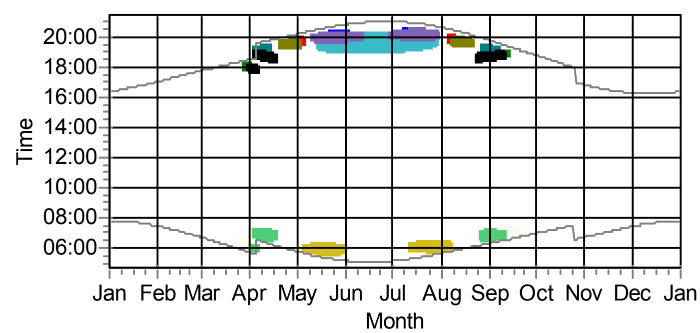
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

SF011E



SF011N



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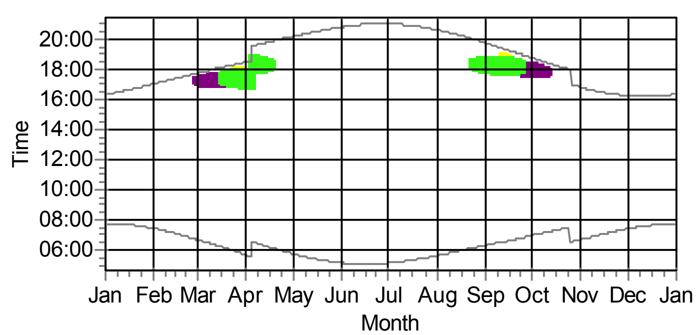

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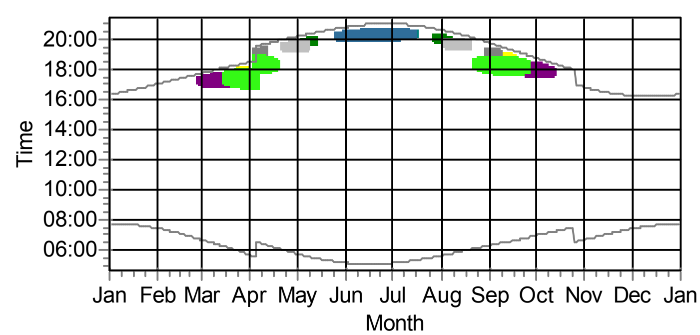

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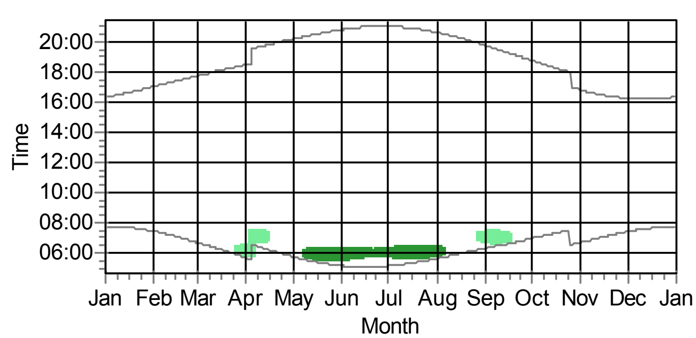

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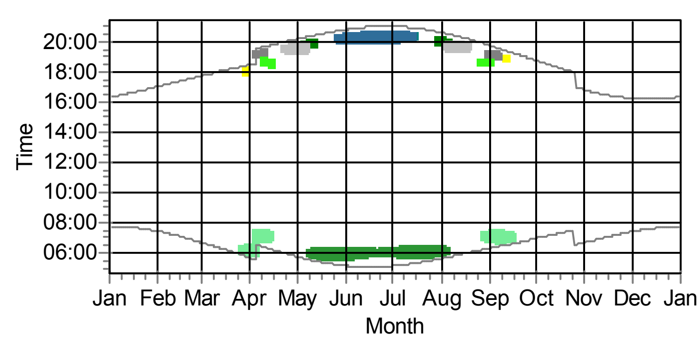

WTGs

038	042	050	059	068
039	044	052	062	081
040	048	055	066	087
041	049	058	067	

Project:
030415 Desert Claim Wind Power Project, WA

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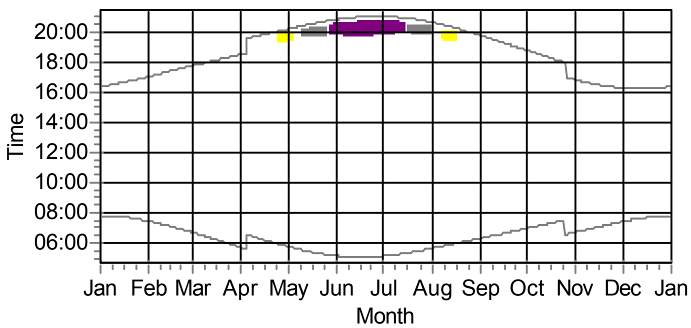
Calculated:
07/26/2004 04:43/2.3.0.216

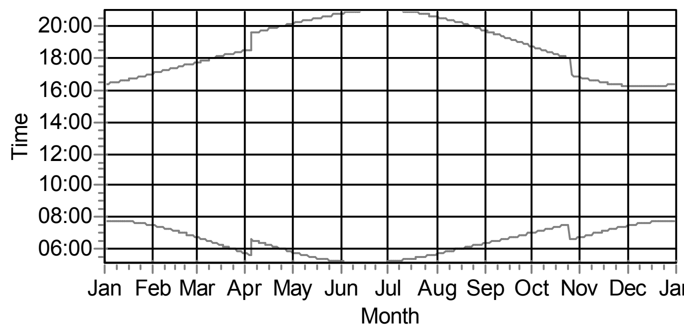
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

SF013W



SF013E



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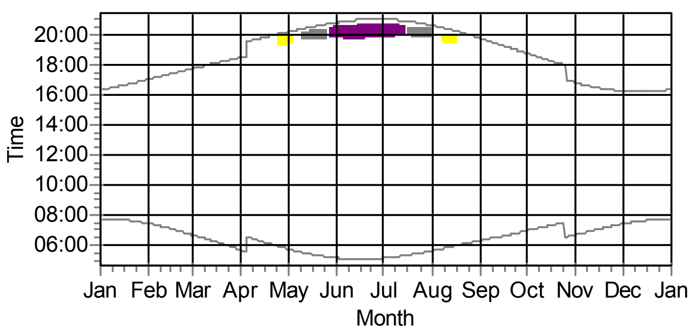

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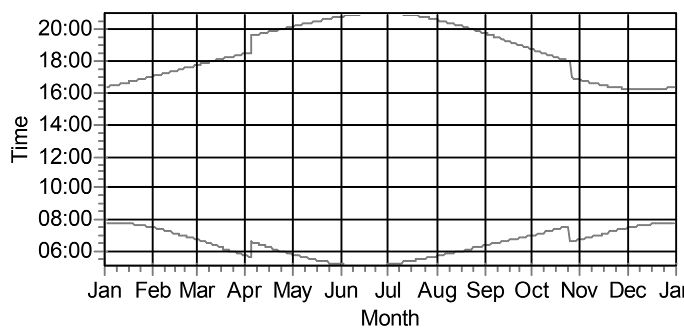

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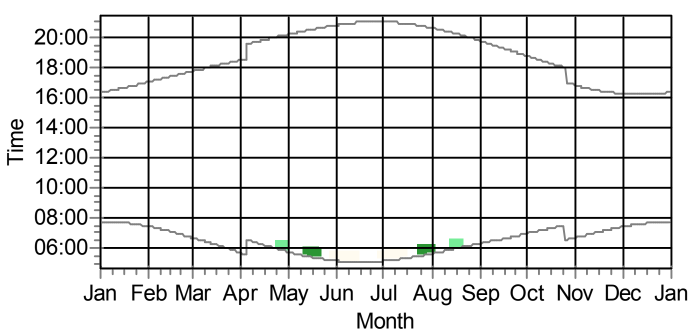
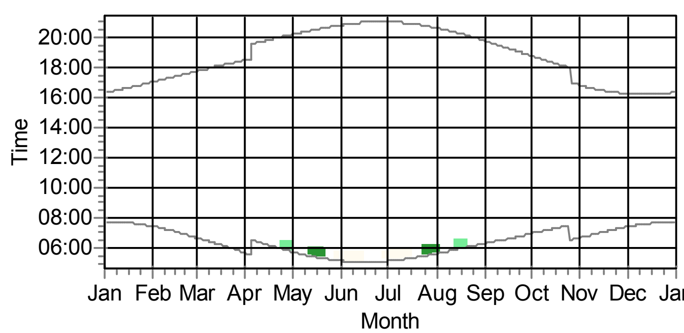


SF014N



WTGs

040 042 049 055 066 067

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
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7660 Whitegate Avenue
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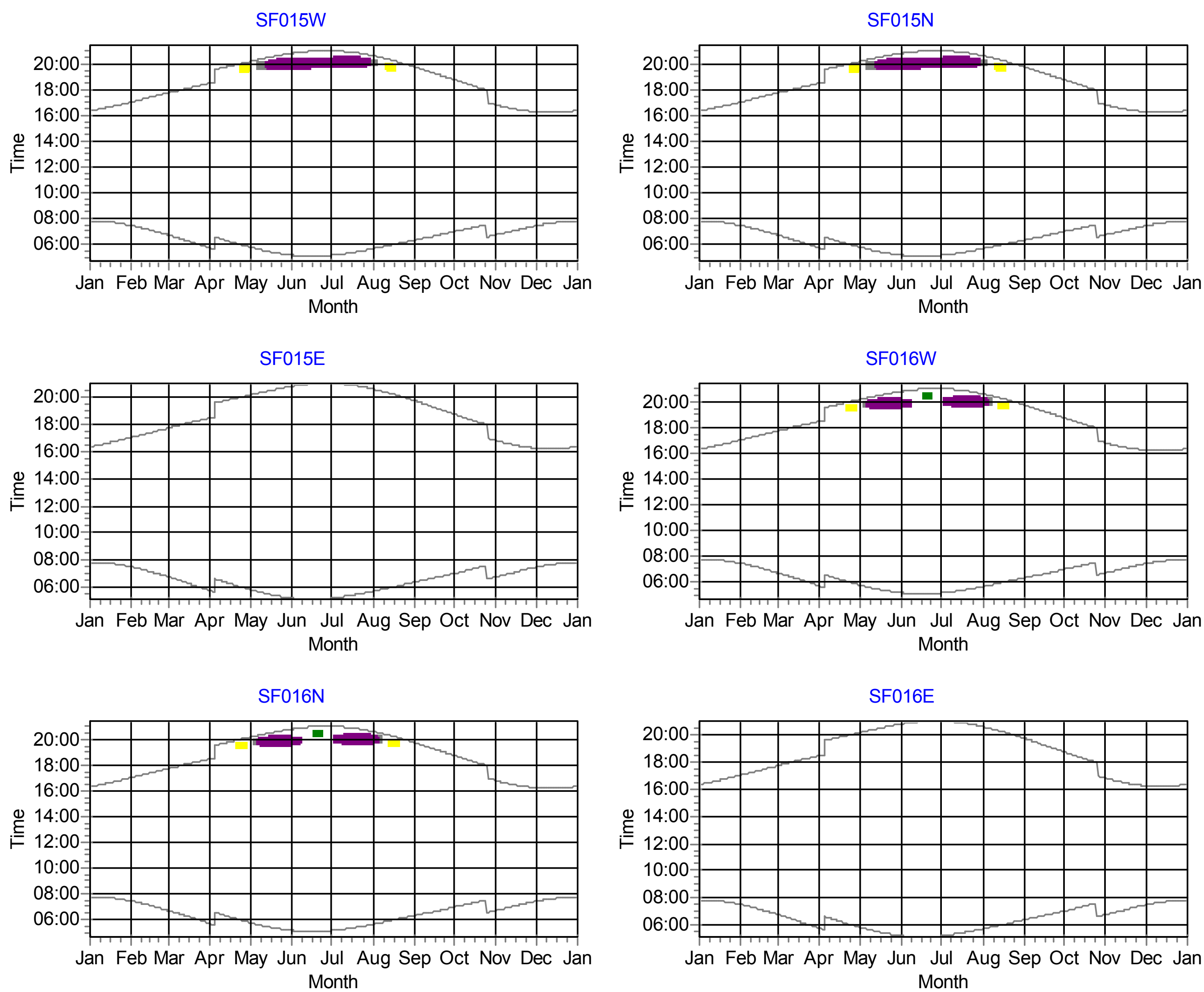
Calculated:
07/26/2004 04:43/2.3.0.216

SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered



WTGs

039 040 042 049

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
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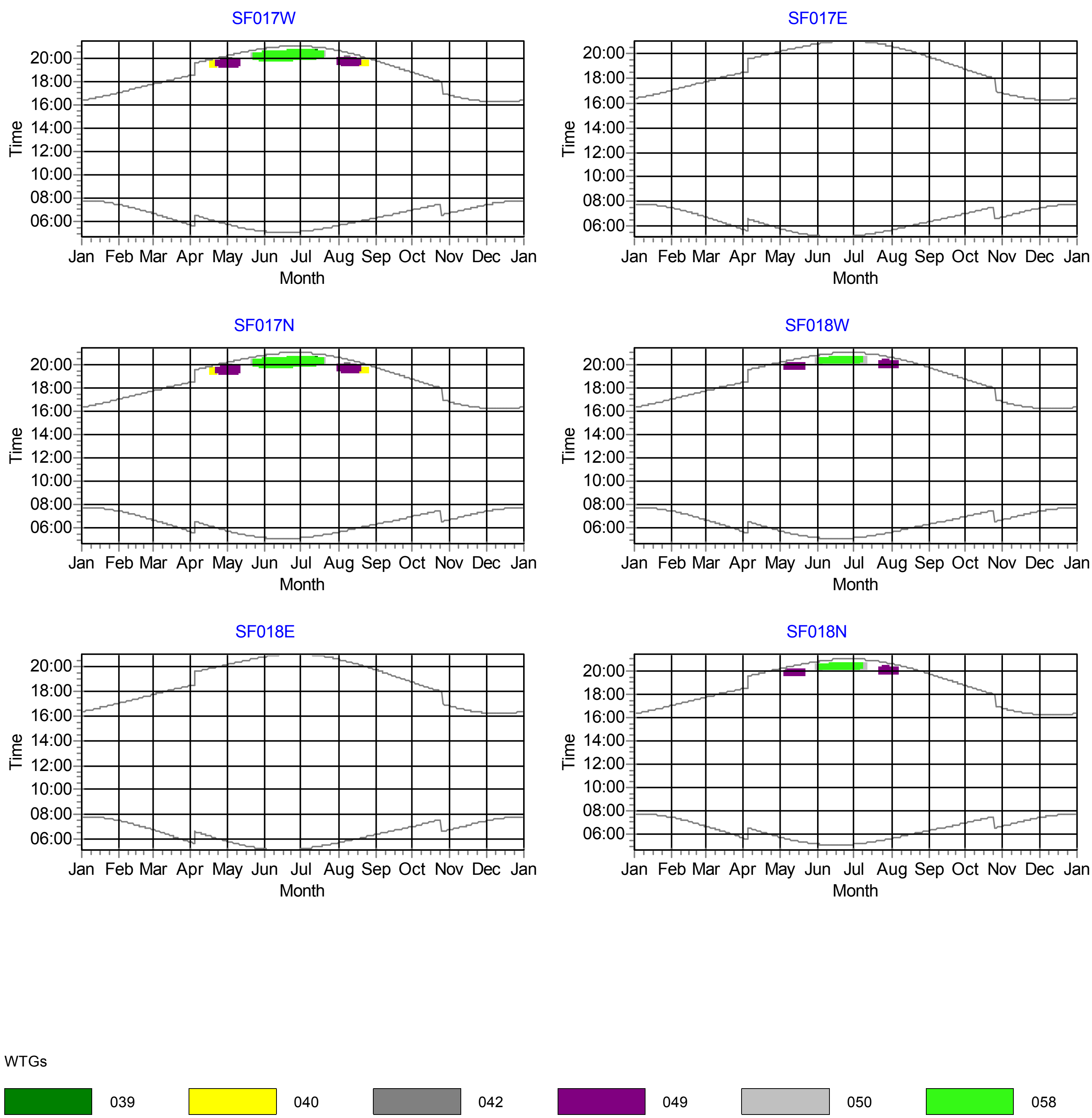
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered



Project:
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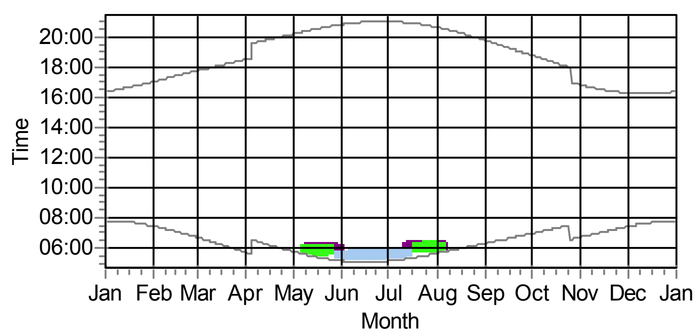
Calculated:
07/26/2004 04:43/2.3.0.216

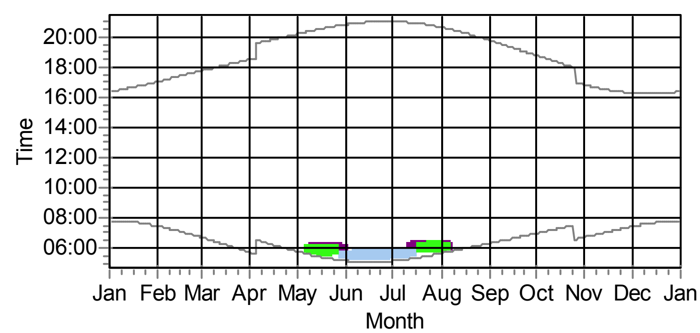
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

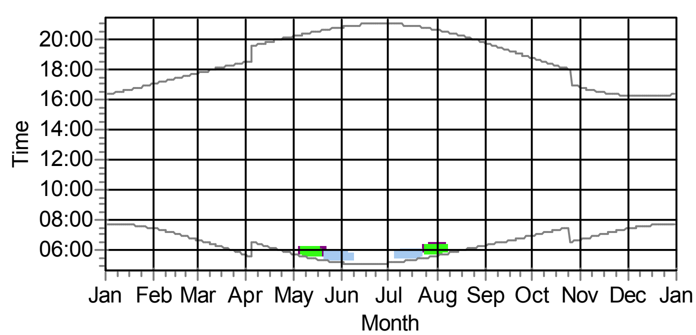
SF118N



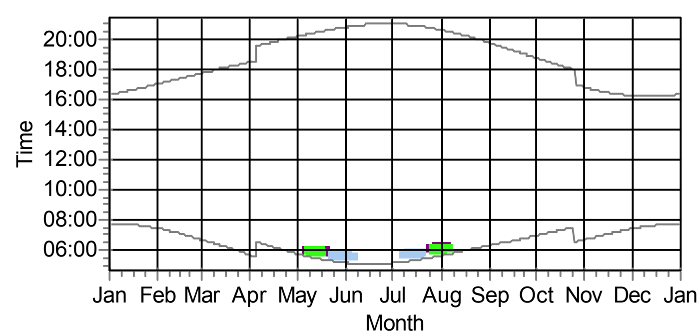
SF118E



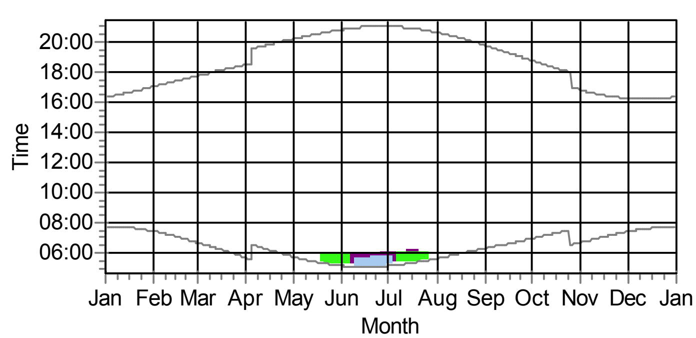
SF119N



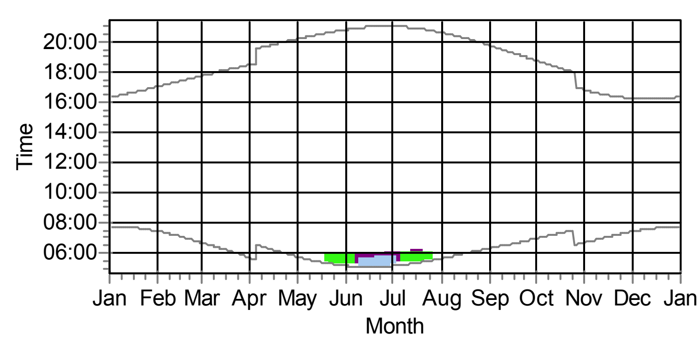
SF119E



SF120N



SF120E



WTGs

049 054 058

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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07/26/2004 08:35 / 85

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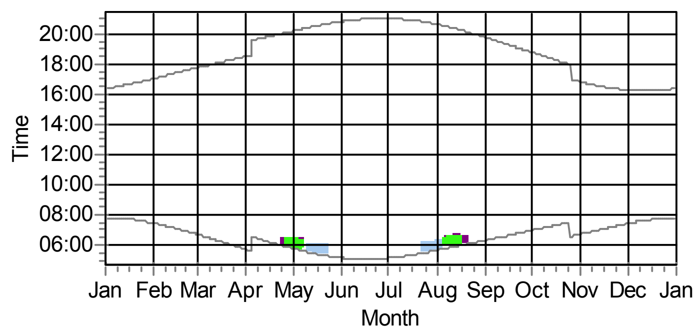
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 04:43/2.3.0.216

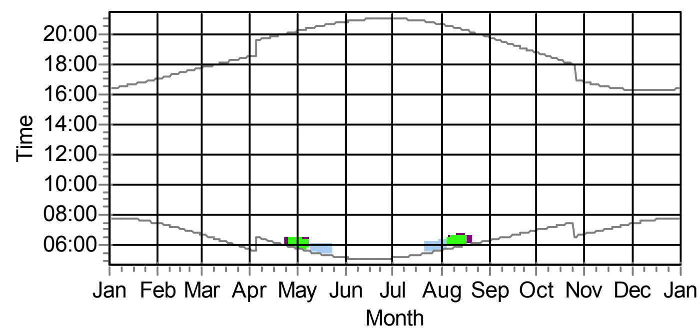
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

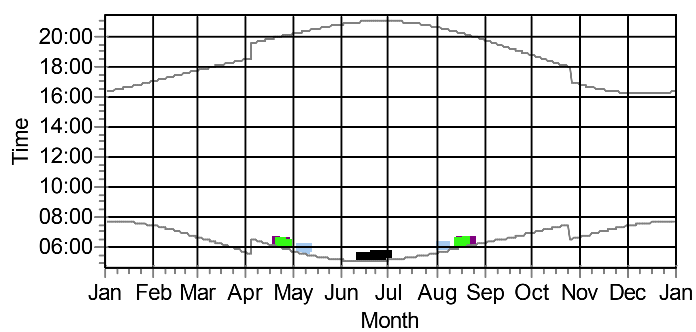
SF121N



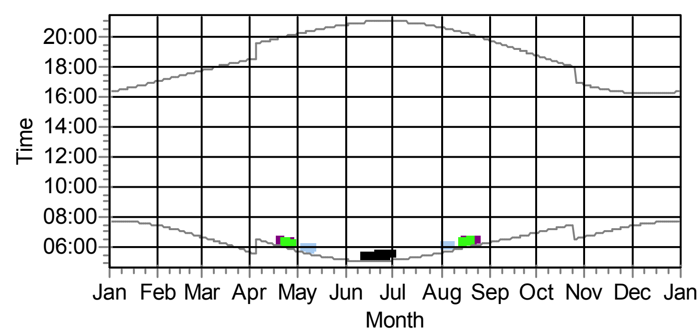
SF121E



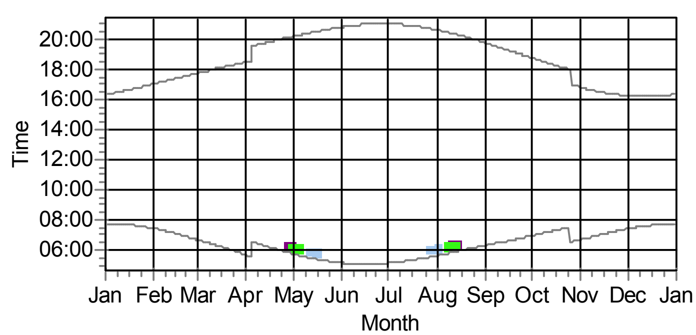
SF122N



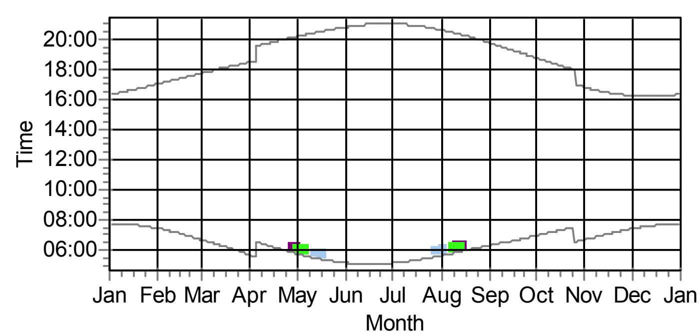
SF122E



SF123N



SF123E



WTGs

049 052 054 058

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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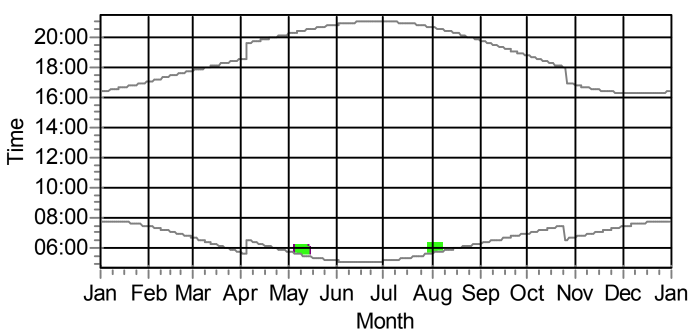
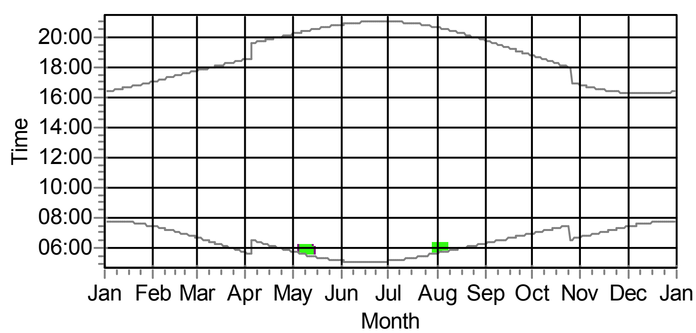
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

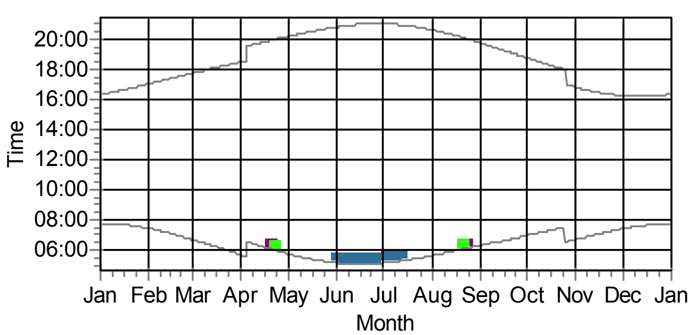
SF124N



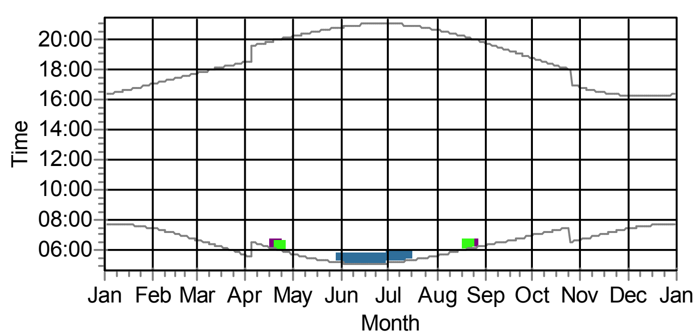
SF124E



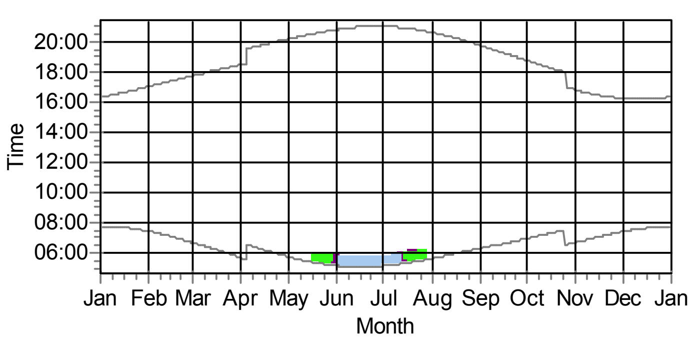
SF125N



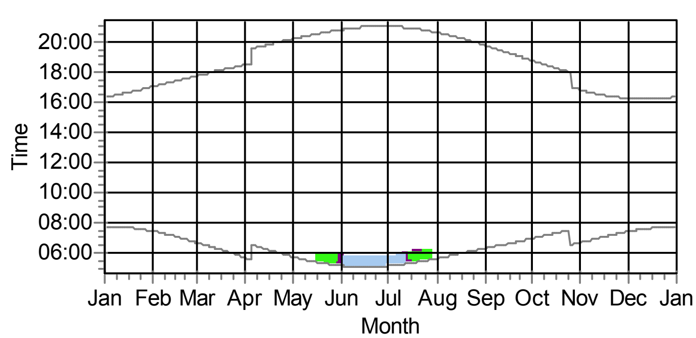
SF125E



SF126N



SF126E



WTGs

049 050 054 058 062

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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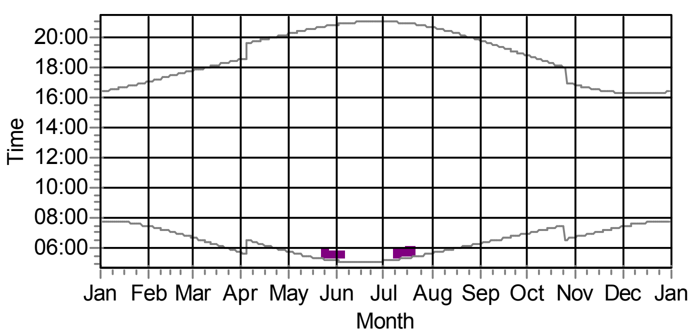
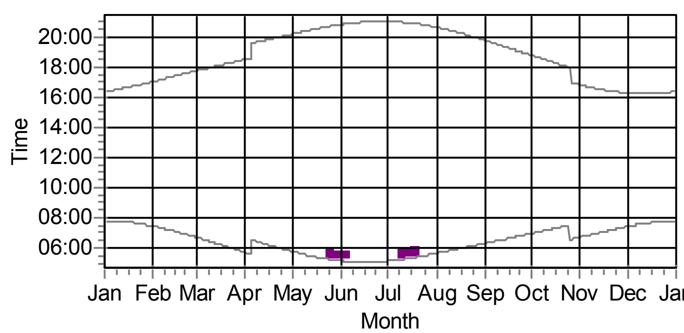
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

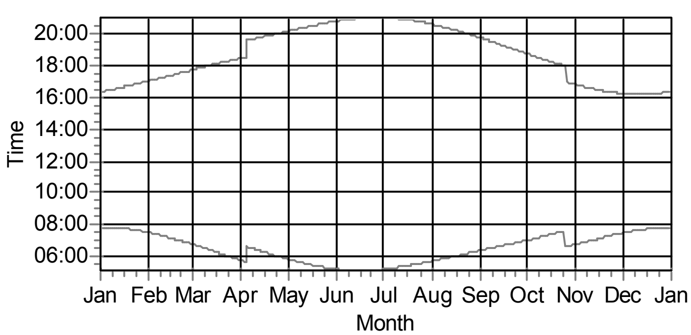
SF127N



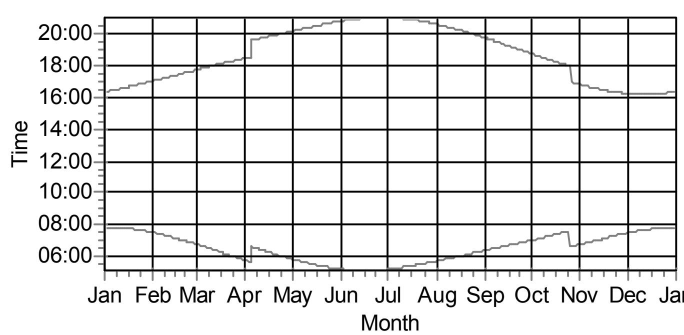
SF127E



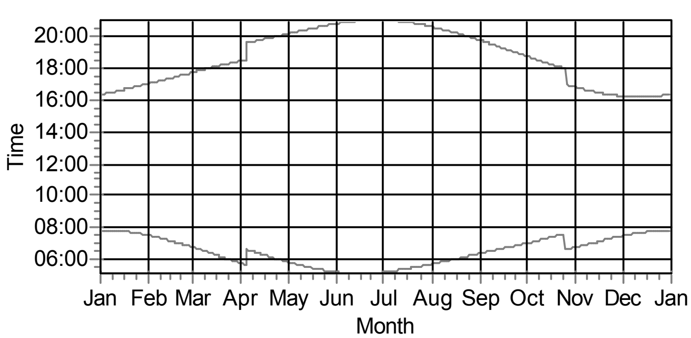
SF128N



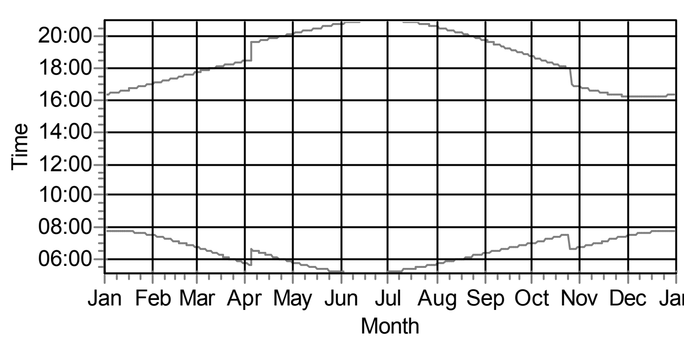
SF128E



SF129N



SF129E



WTGs

049

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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CA-92506 Riverside, USA

Calculated:
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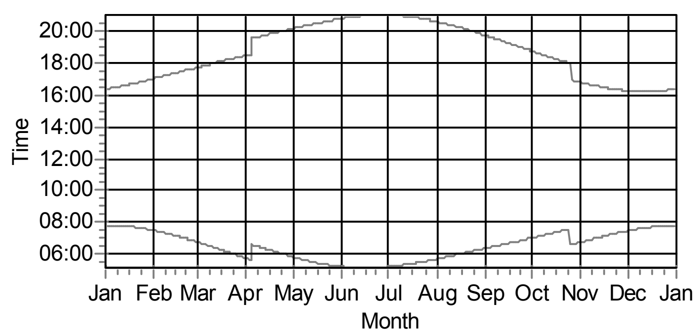
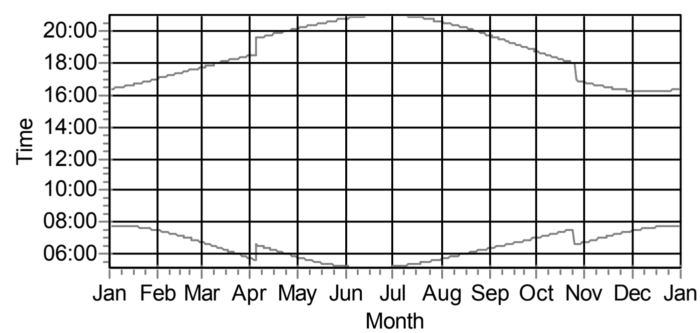
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

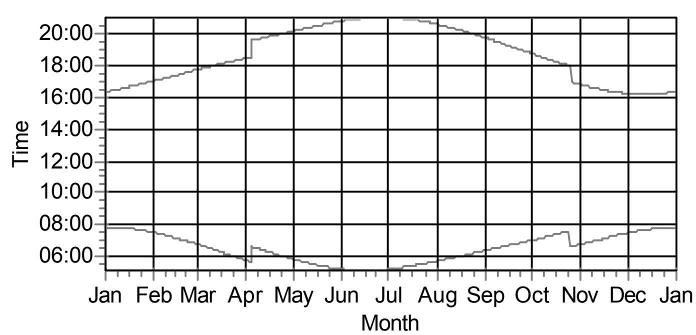
SF130N



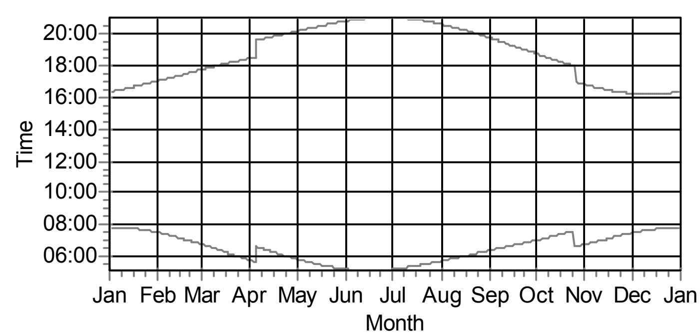
SF130E



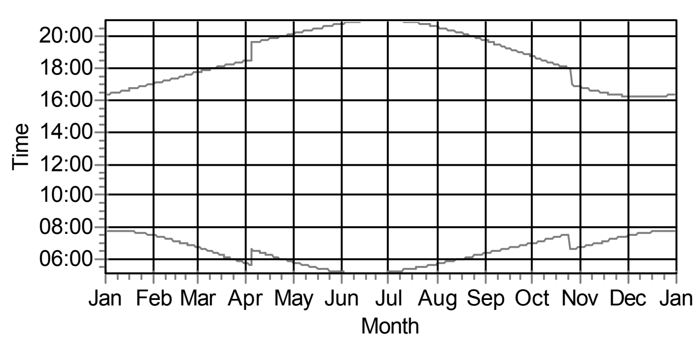
SF131N



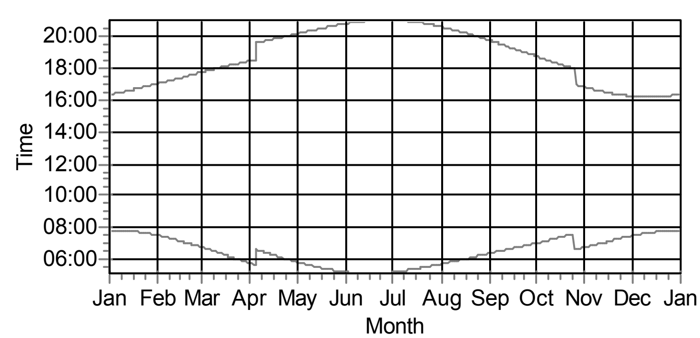
SF131E



SF132N



SF132E



WTGs

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

Licensed user:
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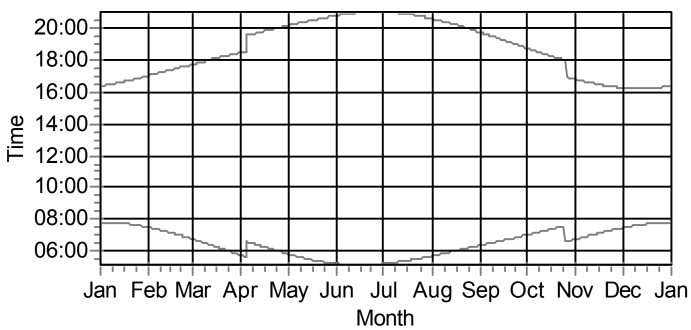
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 04:43/2.3.0.216

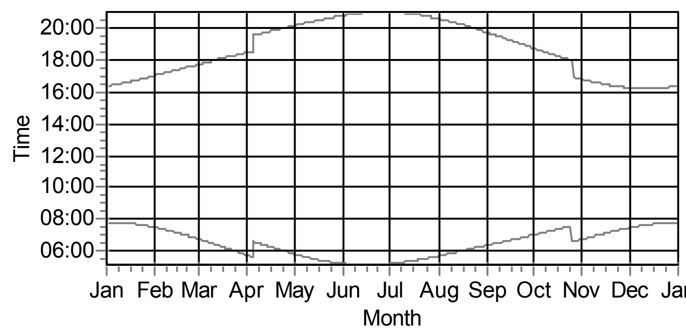
SHADOW - Calendar, graphical

Calculation: 040725 SF 010-018, 118-134, tubines scattered

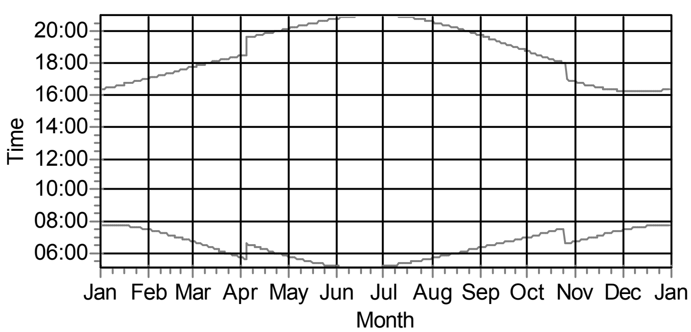
SF133N



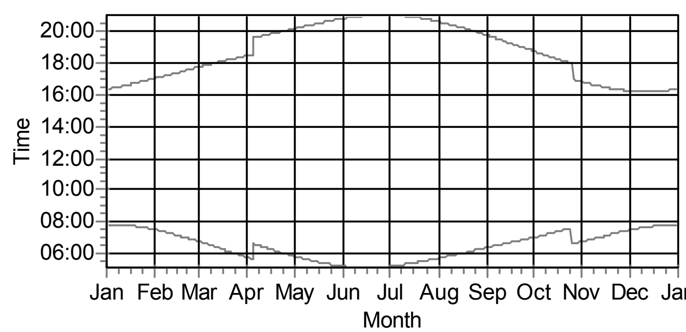
SF133E



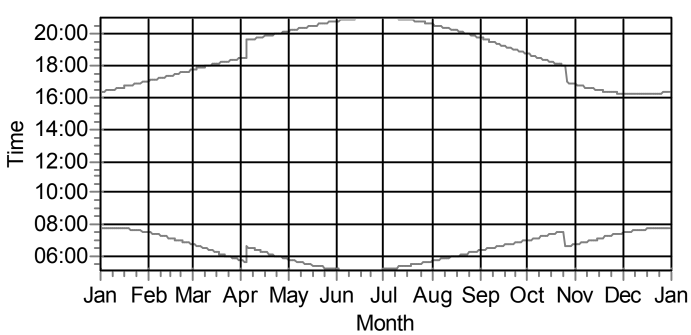
SF134N



SF134E



SF014W



WTGs

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 010 through 018, 118 through 134 - all windows
Turbines 038-069, 081, 083, 085-087
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

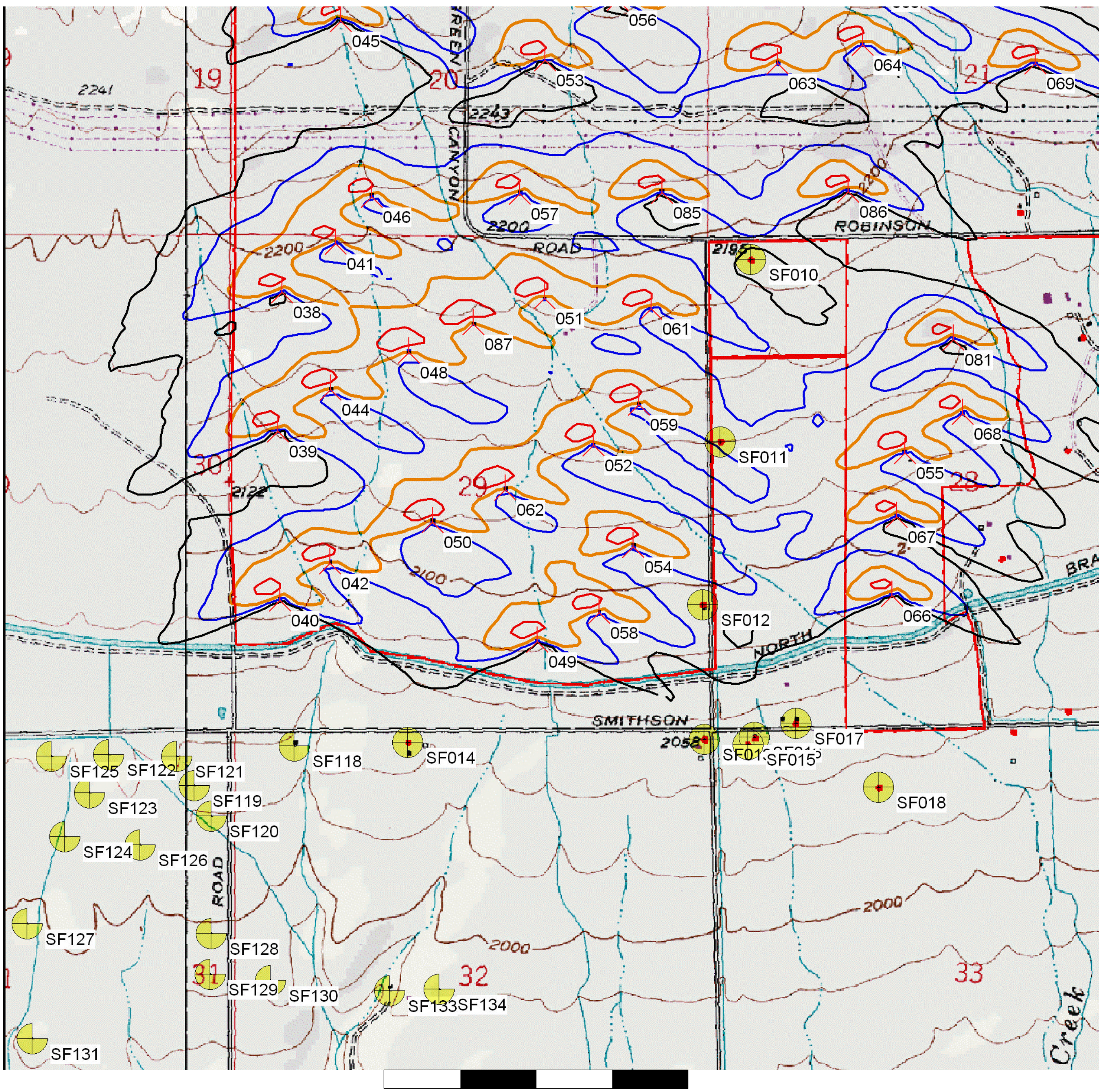
Printed/Page
07/26/2004 08:35 / 90

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/26/2004 04:43/2.3.0.216

SHADOW - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040725 SF 010-018, 118-134, tubines scattered **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 681,292 North: 5,219,724

New WTG   Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25   50   100   200

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA	Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows	07/28/2004 21:40 / 1
Huckell/Weinman Associates, Inc.	Tubines 091-116	Licensed user:
	GE 1.5sle (77m diameter) at 65m hub height	**Wind Engineers, Inc.**
	Monthly sunshine percentage applied	7660 Whitegate Avenue
	Joint frequency distribution applied (for run-hours and direction)	CA-92506 Riverside, USA
	1500 meter shadow limit applied	Calculated:
		07/28/2004 08:14/2.3.0.216

SHADOW - Main Result

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

Assumptions for shadow calculations

Maximum distance for influence	1,500 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	2 minutes

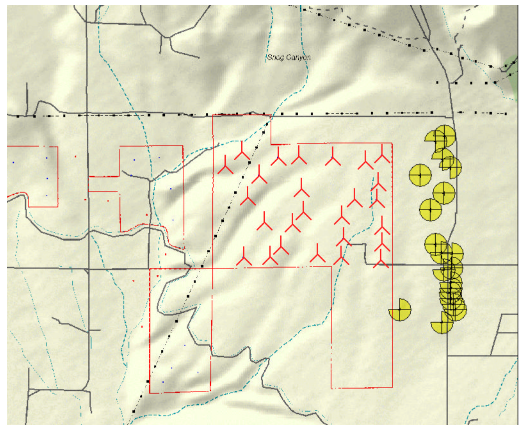
Sun shine probabilities (part of time from sun rise to sun set with sun shine)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.25	0.46	0.56	0.56	0.56	0.65	0.75	0.65	0.65	0.56	0.35	0.25

Operational time

N	NNE	ENE	E	ESE	SSE
164	95	84	187	562	515

S	SSW	WSW	W	WNW	NNW	Sum
373	322	402	281	1,171	2,147	6,304



Scale 1:100,000

New WTG   Shadow Receptor

WTGs

	UTM NAD27 Zone: 10				WTG type						
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	RPM
			[m]					[kW]	[m]	[m]	[RPM]
091	687,250	5,219,497	668	091	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
092	687,601	5,219,511	680	092	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
093	687,511	5,219,965	687	093	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
094	687,945	5,220,852	720	094	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
095	688,830	5,220,812	741	095	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
096	687,669	5,220,826	715	096	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
097	689,042	5,220,901	748	097	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
098	687,421	5,220,582	700	098	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
099	687,279	5,220,288	692	099	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
100	687,888	5,219,951	699	100	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
101	688,026	5,220,123	702	101	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
102	687,992	5,220,421	709	102	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
103	688,697	5,220,308	720	103	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
104	688,391	5,220,848	731	104	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
105	688,993	5,220,311	724	105	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
106	689,076	5,219,960	714	106	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
107	688,537	5,220,075	711	107	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
108	688,567	5,219,790	703	108	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
109	688,546	5,219,547	698	109	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
110	688,227	5,219,566	694	110	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
111	689,071	5,219,520	700	111	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
112	689,083	5,219,735	706	112	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
113	687,186	5,220,886	700	113	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
114	686,969	5,220,695	696	114	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
115	687,742	5,219,655	684	115	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0
116	689,009	5,220,533	733	116	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	18.0

Shadow Receptor-Input

No	Name	UTM NAD27 Zone: 10 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window
				[m]	[m]	[m]	[m]	[°]	[°]
SF149	SF149W	689,915	5,218,715	677	1.0	1.0	1.0	90.0	90.0
SF149	SF149N	689,915	5,218,715	677	1.0	1.0	1.0	180.0	90.0
SF150	SF150W	690,087	5,218,888	681	1.0	1.0	1.0	90.0	90.0
SF150	SF150N	690,087	5,218,888	681	1.0	1.0	1.0	180.0	90.0
SF151	SF151W	690,061	5,218,959	683	1.0	1.0	1.0	90.0	90.0

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
07/28/2004 08:14/2.3.0.216

SHADOW - Main Result

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]
SF151	SF151N	690,061	5,218,959	683	1.0	1.0	1.0	180.0	90.0
SF152	SF152W	689,345	5,218,869	682	1.0	1.0	1.0	90.0	90.0
SF152	SF152N	689,345	5,218,869	682	1.0	1.0	1.0	180.0	90.0
SF153	SF153W	690,022	5,219,029	687	1.0	1.0	1.0	90.0	90.0
SF153	SF153N	690,022	5,219,029	687	1.0	1.0	1.0	180.0	90.0
SF154	SF154W	690,015	5,219,117	689	1.0	1.0	1.0	90.0	90.0
SF154	SF154N	690,015	5,219,117	689	1.0	1.0	1.0	180.0	90.0
SF155	SF155W	690,016	5,219,167	691	1.0	1.0	1.0	90.0	90.0
SF155	SF155N	690,016	5,219,167	691	1.0	1.0	1.0	180.0	90.0
SF156	SF156W	690,013	5,219,246	694	1.0	1.0	1.0	90.0	90.0
SF156	SF156N	690,013	5,219,246	694	1.0	1.0	1.0	180.0	90.0
SF157	SF157W	689,917	5,219,412	702	1.0	1.0	1.0	90.0	90.0
SF157	SF157N	689,917	5,219,412	702	1.0	1.0	1.0	180.0	90.0
SF158	SF158W	690,021	5,219,440	701	1.0	1.0	1.0	90.0	90.0
SF158	SF158N	690,021	5,219,440	701	1.0	1.0	1.0	180.0	90.0
SF159	SF159W	689,878	5,219,636	709	1.0	1.0	1.0	90.0	90.0
SF159	SF159N	689,878	5,219,636	709	1.0	1.0	1.0	180.0	90.0
SF160	SF160W	690,025	5,219,621	708	1.0	1.0	1.0	90.0	90.0
SF160	SF160N	690,025	5,219,621	708	1.0	1.0	1.0	180.0	90.0
SF161	SF161N	689,710	5,220,198	727	1.0	1.0	1.0	180.0	90.0
SF161	SF161W	689,710	5,220,198	727	1.0	1.0	1.0	90.0	90.0
SF161	SF161S	689,710	5,220,198	727	1.0	1.0	1.0	0.0	90.0
SF162	SF162N	689,884	5,220,423	737	1.0	1.0	1.0	180.0	90.0
SF162	SF162W	689,884	5,220,423	737	1.0	1.0	1.0	90.0	90.0
SF162	SF162S	689,884	5,220,423	737	1.0	1.0	1.0	0.0	90.0
SF163	SF163N	689,561	5,220,647	743	1.0	1.0	1.0	180.0	90.0
SF163	SF163W	689,561	5,220,647	743	1.0	1.0	1.0	90.0	90.0
SF163	SF163S	689,561	5,220,647	743	1.0	1.0	1.0	0.0	90.0
SF164	SF164W	689,964	5,220,765	751	1.0	1.0	1.0	90.0	90.0
SF164	SF164S	689,964	5,220,765	751	1.0	1.0	1.0	0.0	90.0
SF165	SF165W	689,856	5,220,867	755	1.0	1.0	1.0	90.0	90.0
SF165	SF165S	689,856	5,220,867	755	1.0	1.0	1.0	0.0	90.0
SF166	SF166W	689,757	5,221,102	765	1.0	1.0	1.0	90.0	90.0
SF166	SF166S	689,757	5,221,102	765	1.0	1.0	1.0	0.0	90.0
SF62o	SF62oN	689,799	5,219,740	712	1.0	1.0	1.0	180.0	90.0
SF62o	SF62oW	689,799	5,219,740	712	1.0	1.0	1.0	90.0	90.0
SF62o	SF62oS	689,799	5,219,740	712	1.0	1.0	1.0	0.0	90.0
SF64o	SF64oW	689,867	5,221,179	769	1.0	1.0	1.0	90.0	90.0
SF64o	SF64oS	689,867	5,221,179	769	1.0	1.0	1.0	0.0	90.0

Calculation Results

No	Name	Shadow, worst case: Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values: Shadow hours per year [h/year]
SF149	SF149W	0:00	0	0:00	0:00
SF149	SF149N	0:00	0	0:00	0:00
SF150	SF150W	0:00	0	0:00	0:00
SF150	SF150N	0:00	0	0:00	0:00
SF151	SF151W	6:00	39	0:14	2:23
SF151	SF151N	5:54	39	0:12	2:21
SF152	SF152W	0:00	0	0:00	0:00
SF152	SF152N	0:00	0	0:00	0:00
SF153	SF153W	13:14	57	0:18	5:17
SF153	SF153N	13:08	57	0:18	5:15
SF154	SF154W	8:20	41	0:18	3:11
SF154	SF154N	8:14	41	0:18	3:09
SF155	SF155W	7:48	49	0:18	2:54
SF155	SF155N	7:48	49	0:18	2:54

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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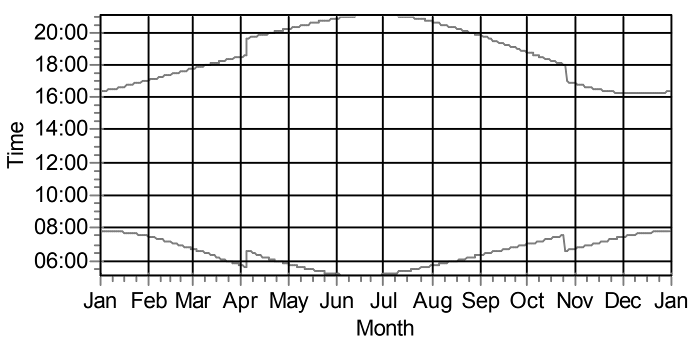
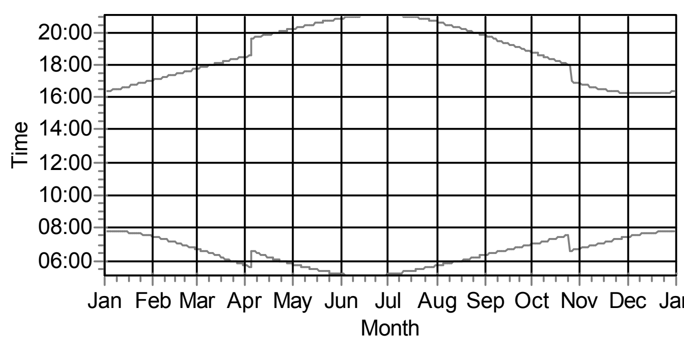
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

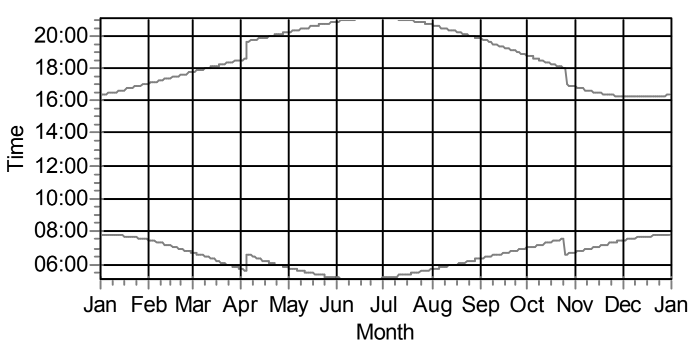
SF149N



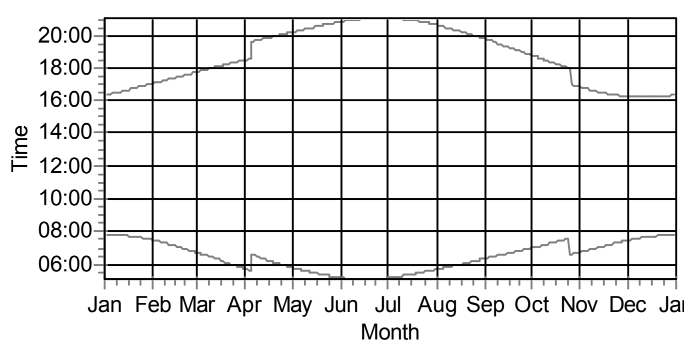
SF149W



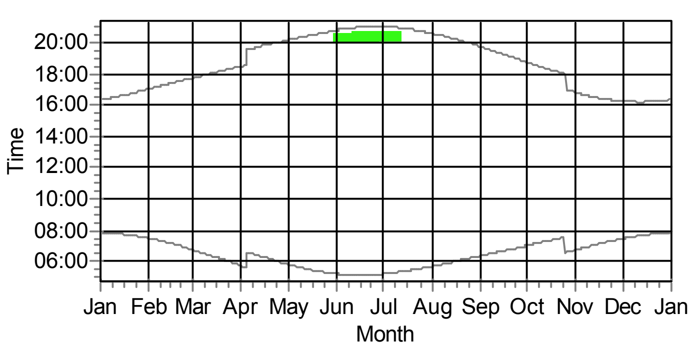
SF150N



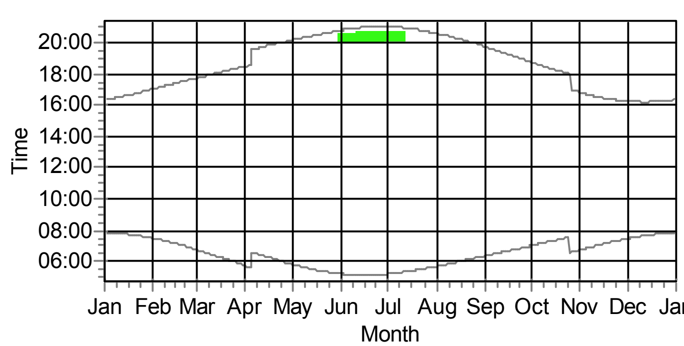
SF150W



SF151N



SF151W



WTGs

111

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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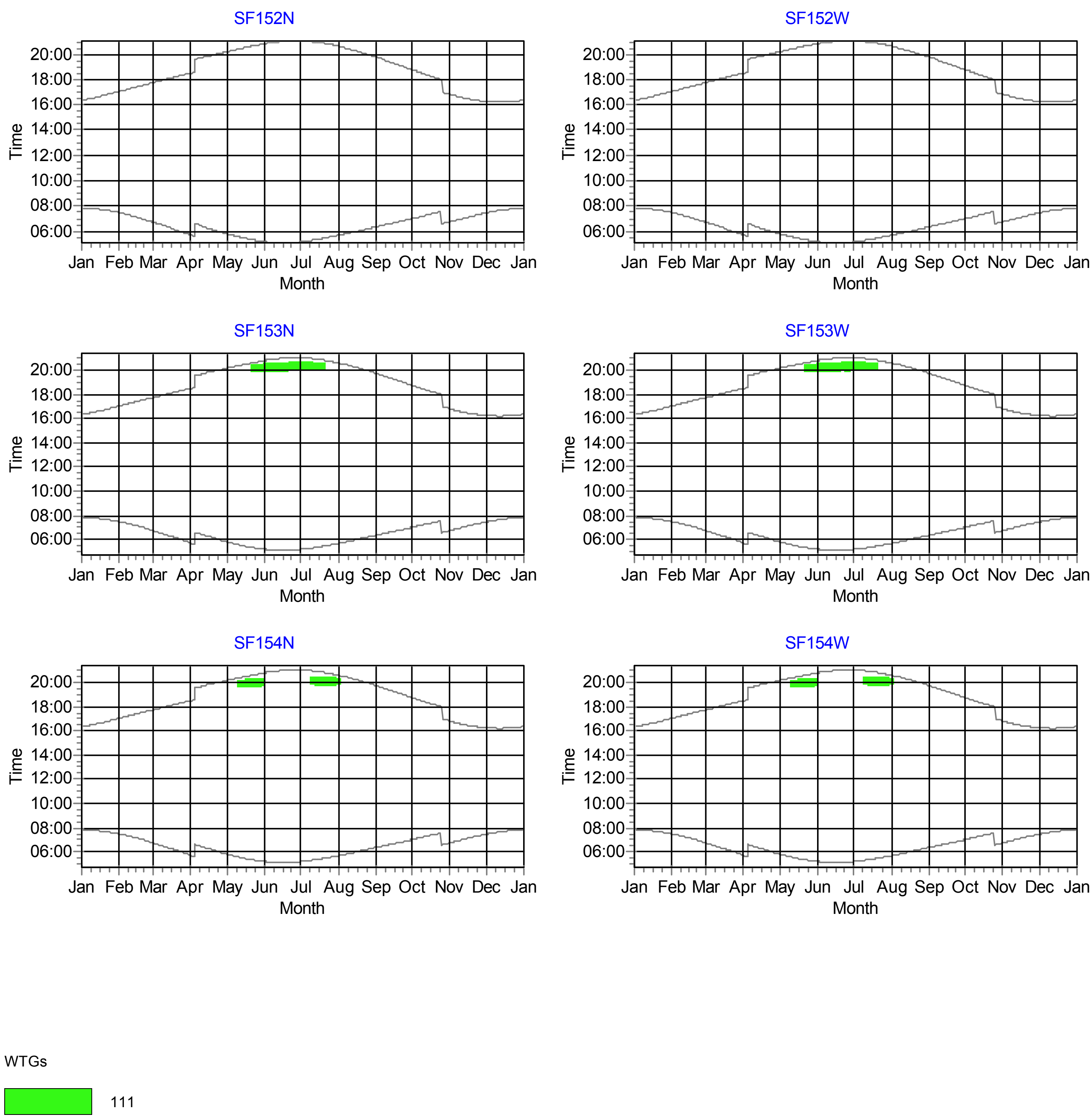
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116



Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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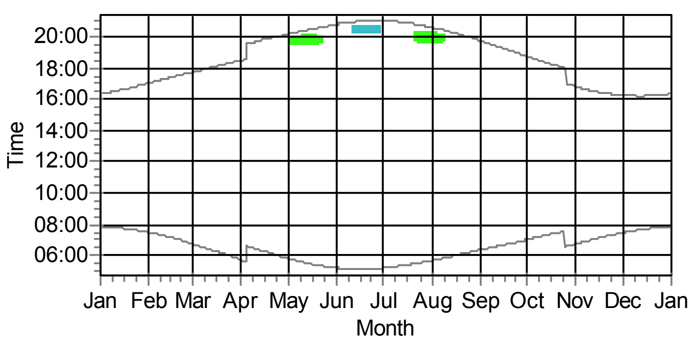
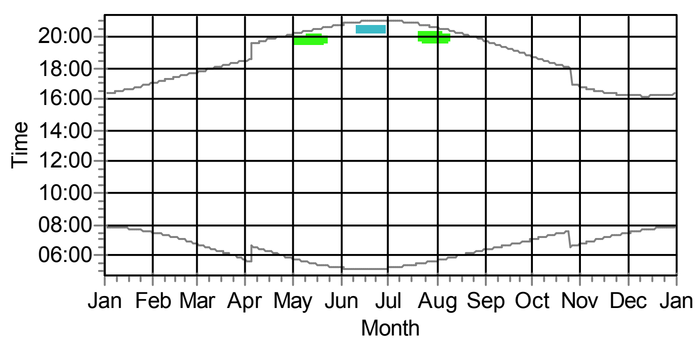
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

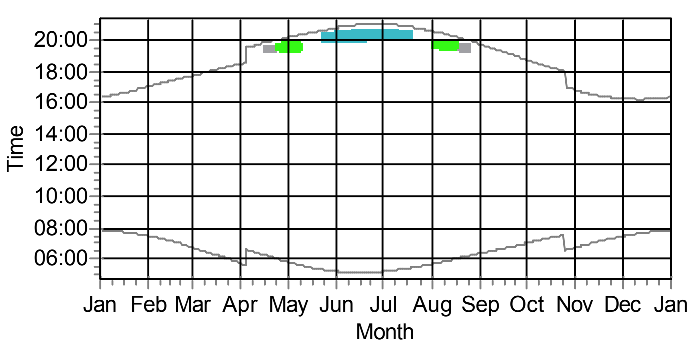
SF155N



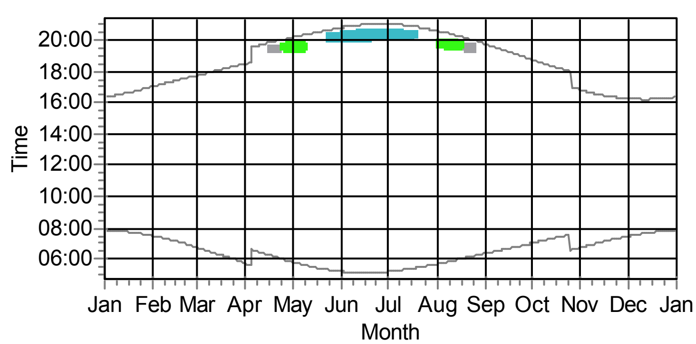
SF155W



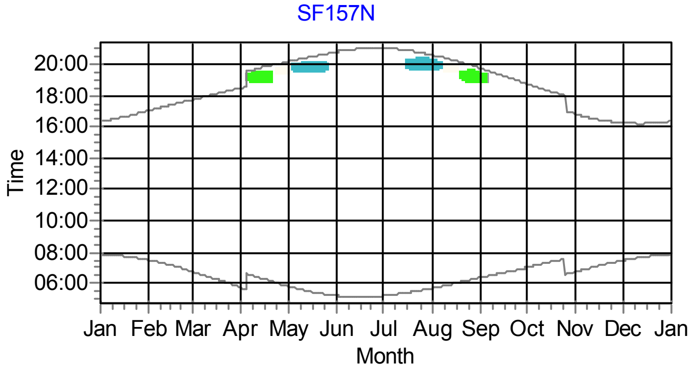
SF156N



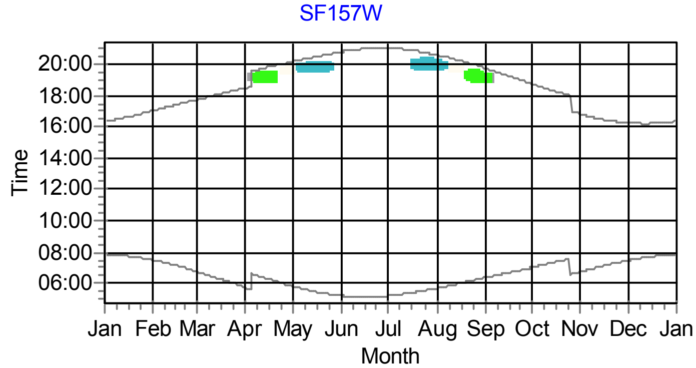
SF156W



SF157N



SF157W



WTGs

108 109 111 112

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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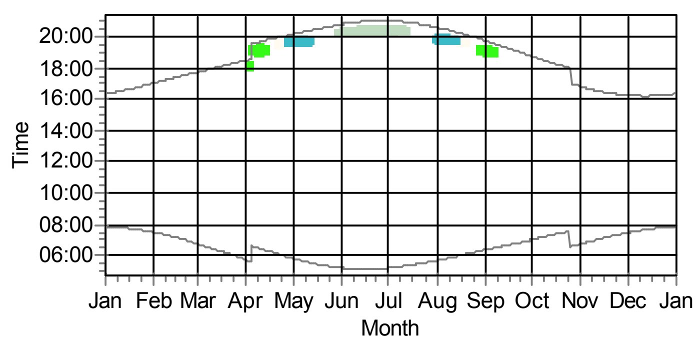
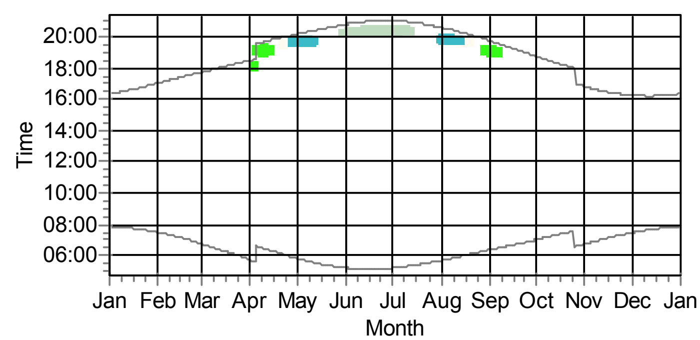
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

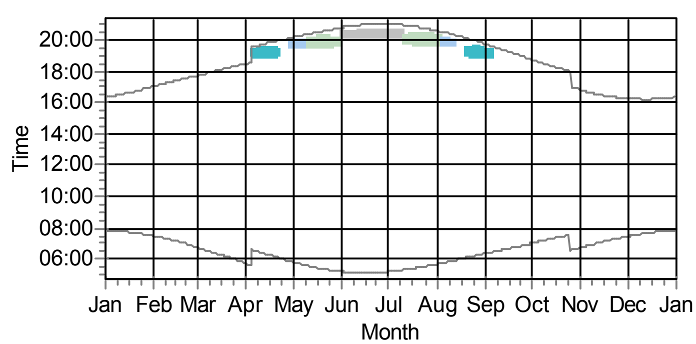
SF158N



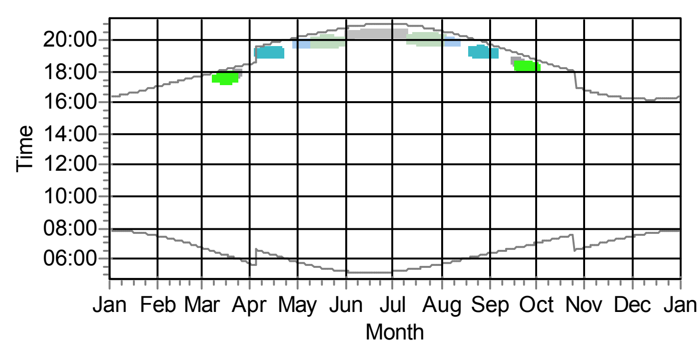
SF158W



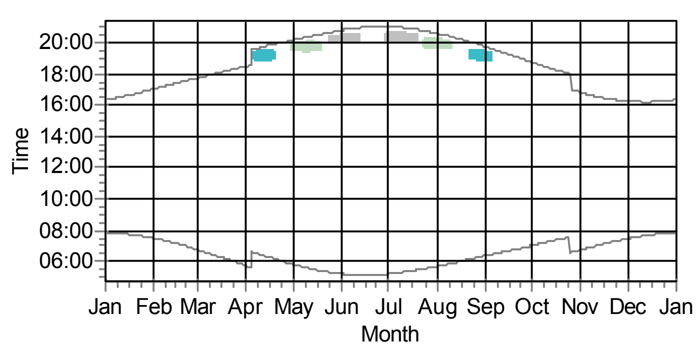
SF159N



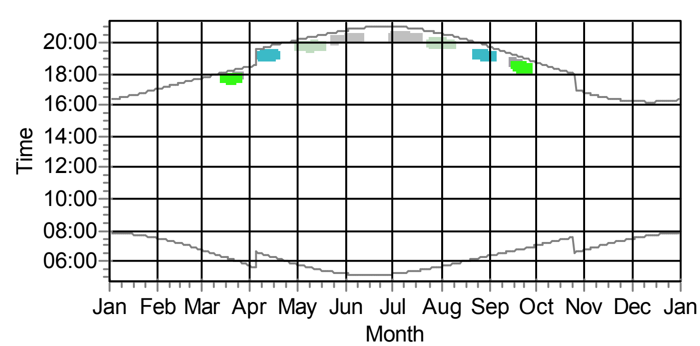
SF159W



SF160N



SF160W



WTGs

103
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Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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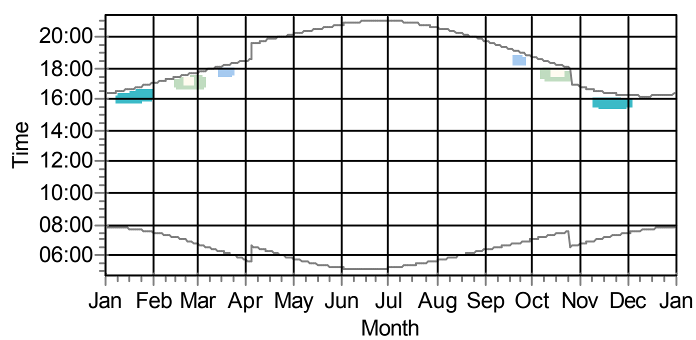
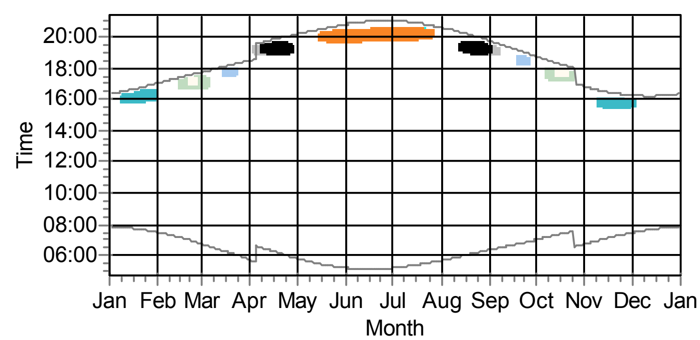
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

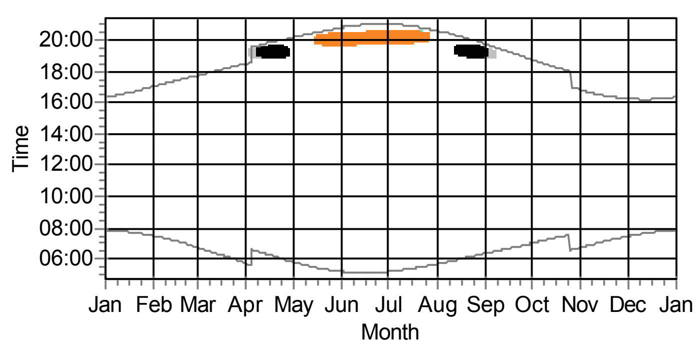
SF161S



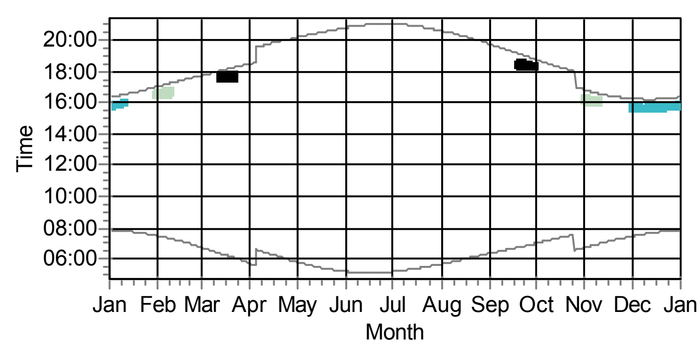
SF161W



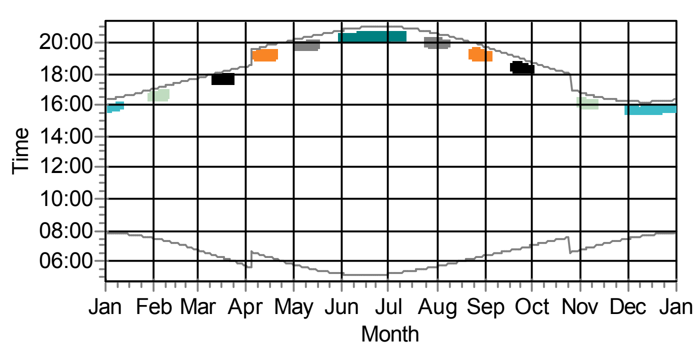
SF161N



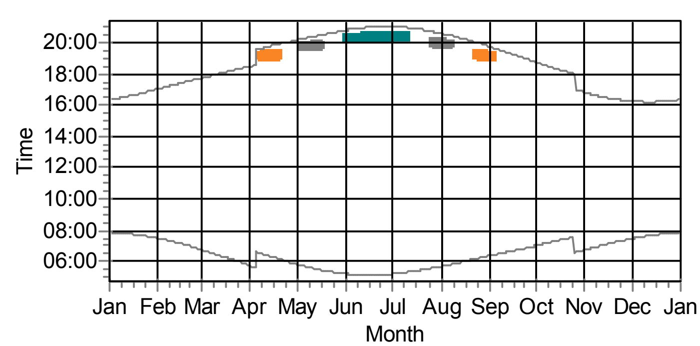
SF162S



SF162W



SF162N



WTGs

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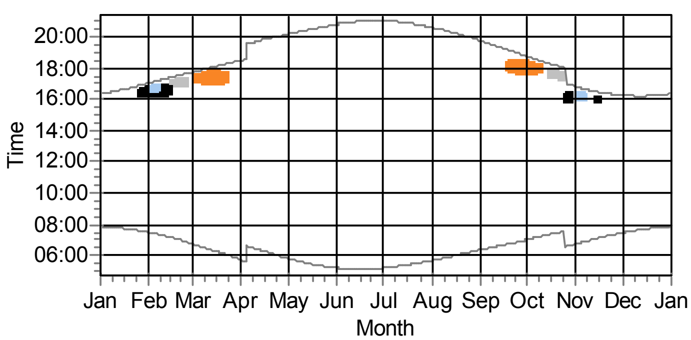
Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA	Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows	07/28/2004 21:35 / 63
Huckell/Weinman Associates, Inc.	Tubines 091-116	Licensed user:
	GE 1.5sle (77m diameter) at 65m hub height	**Wind Engineers, Inc.**
	Monthly sunshine percentage applied	7660 Whitegate Avenue
	Joint frequency distribution applied (for run-hours and direction)	CA-92506 Riverside, USA
	1500 meter shadow limit applied	Calculated:
		07/28/2004 08:14/2.3.0.216

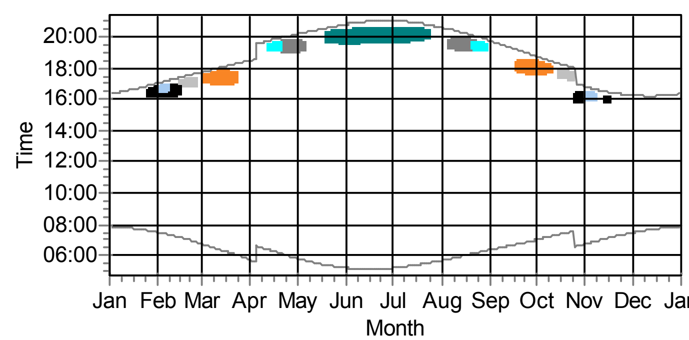
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

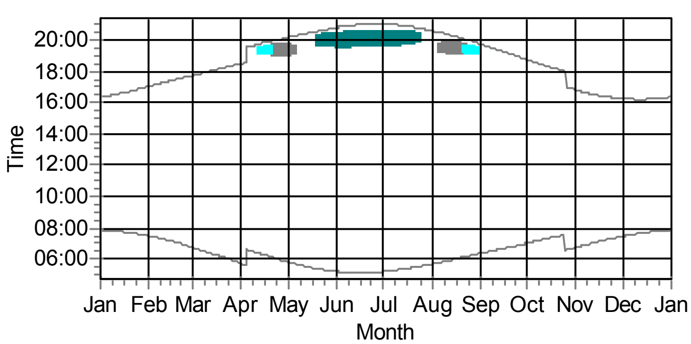
SF163S



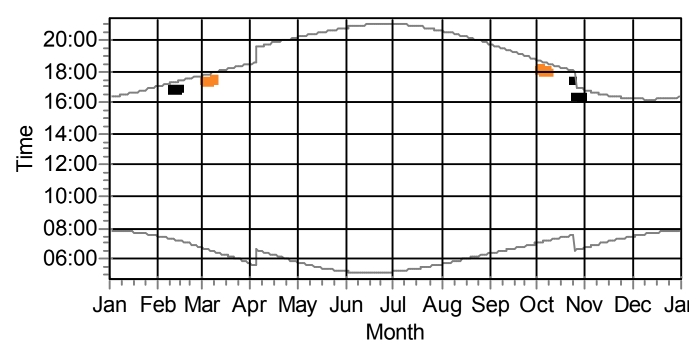
SF163W



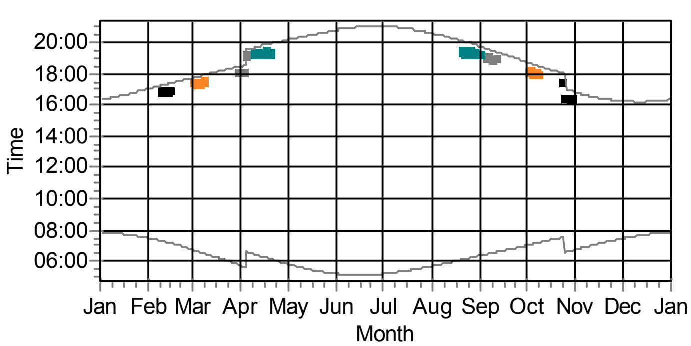
SF163N



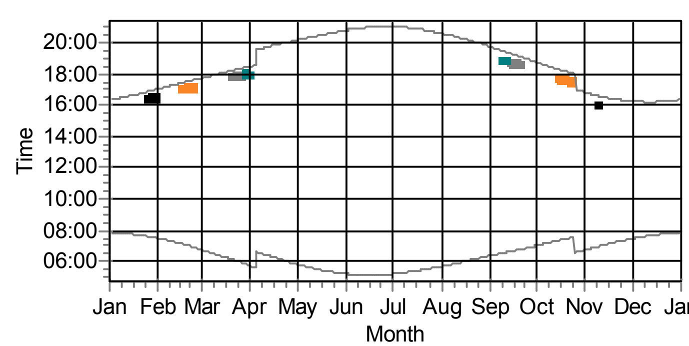
SF164S



SF164W



SF165S



WTGs

095
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116

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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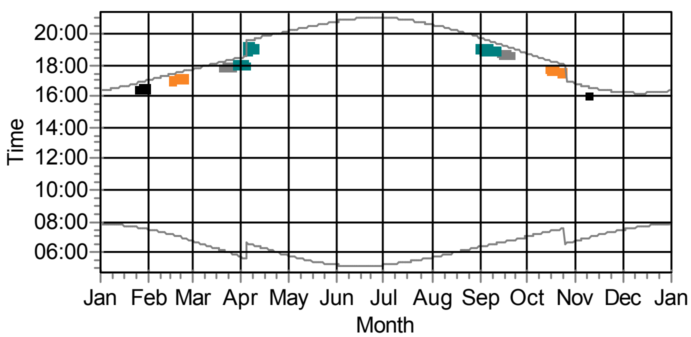
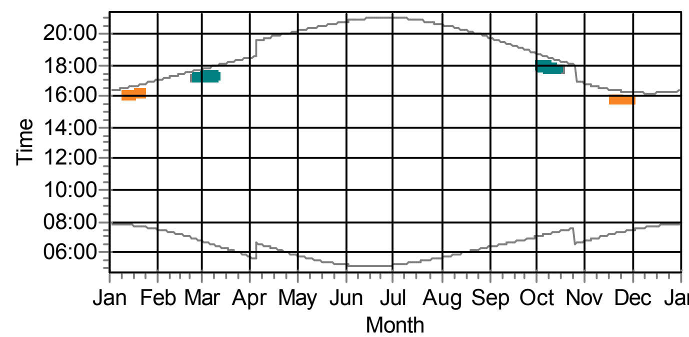
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116

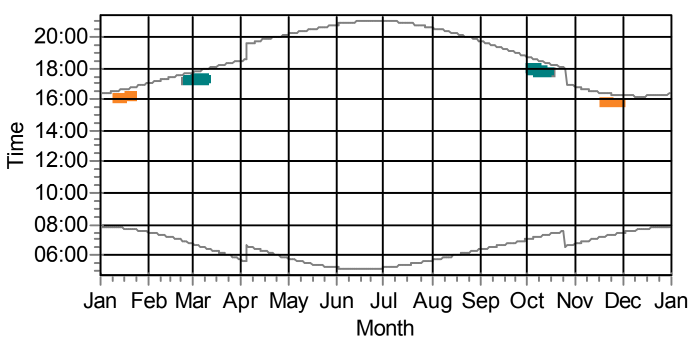
SF165W



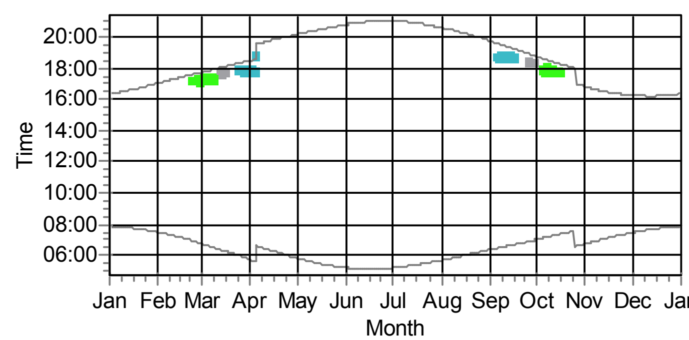
SF166S



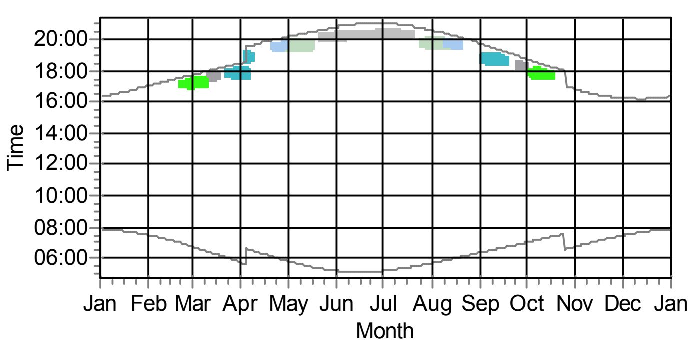
SF166W



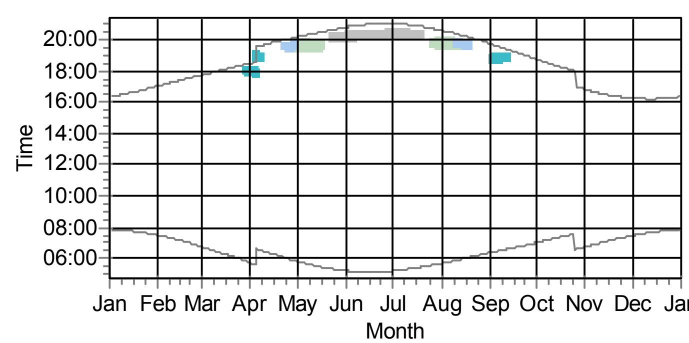
SF62oS



SF62oW



SF62oN



WTGs

095
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116

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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Calculated:
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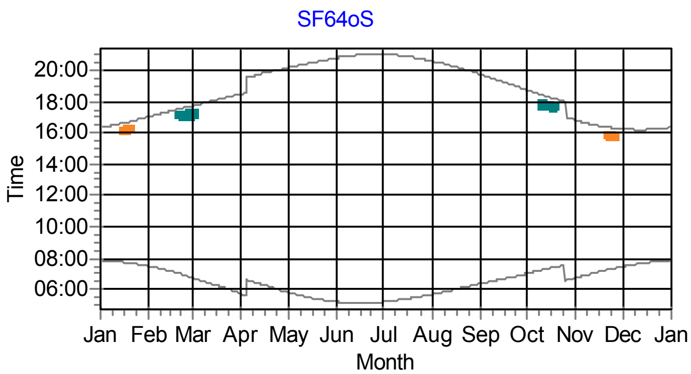
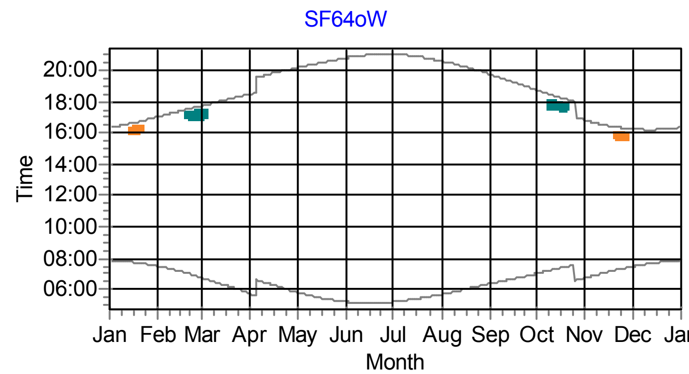
SHADOW - Calendar, graphical

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116





WTGs

095 097 116

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Shadow-Flicker receptor 149 through 166, 64o, 62o, selected windows
Tubines 091-116
GE 1.5sle (77m diameter) at 65m hub height
Monthly sunshine percentage applied
Joint frequency distribution applied (for run-hours and direction)
1500 meter shadow limit applied

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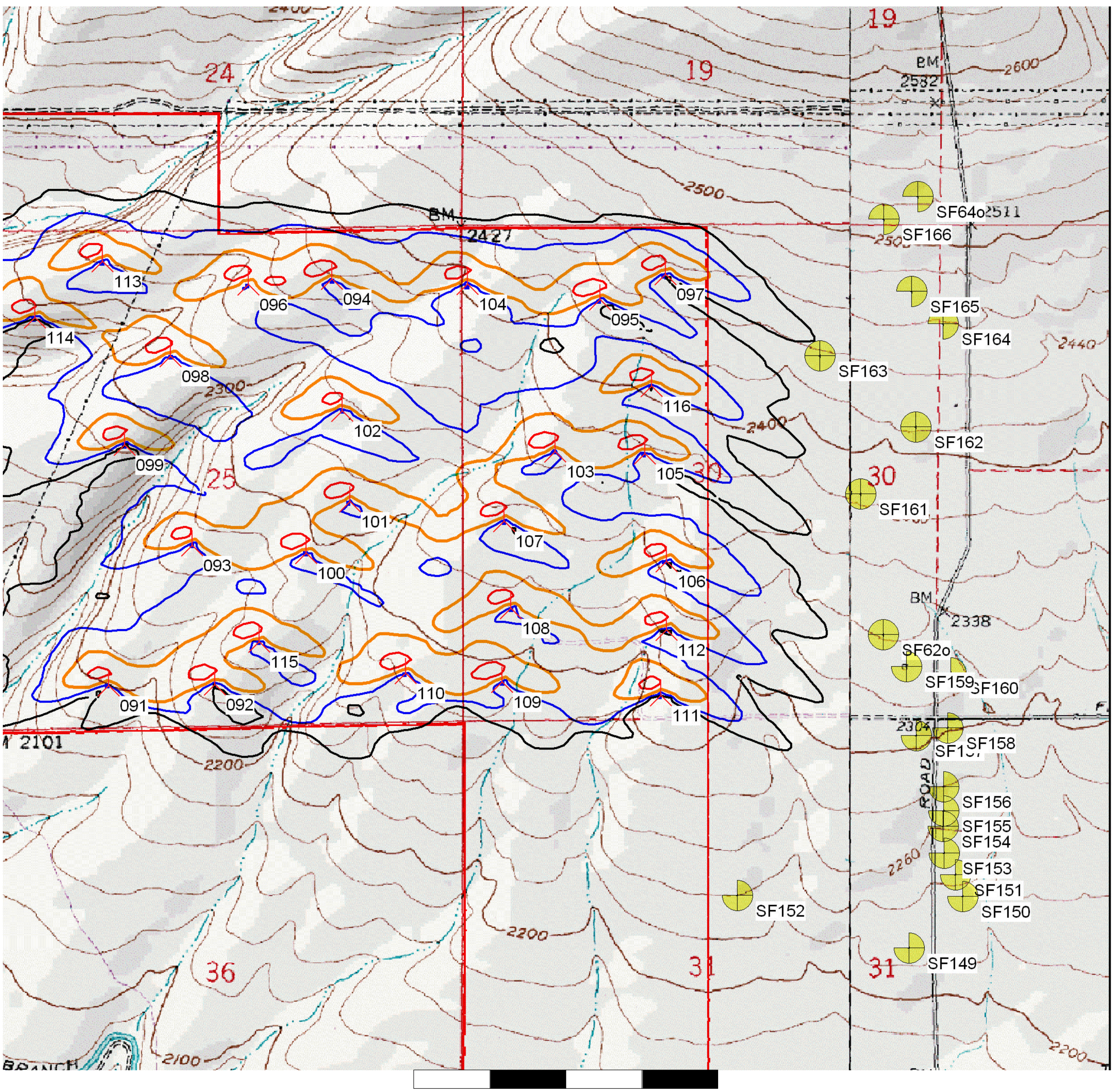
SHADOW - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040727 SF 149-166, 64o, 62o, tubines 091-116 **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:20,000, Map center UTM NAD27 Zone: 10 East: 688,682 North: 5,219,964

New WTG   Shadow Receptor

Isolines showing shadow in Shadow hours per year. Real value calculation.

25   50   100   200

APPENDIX F

Noise

Contents

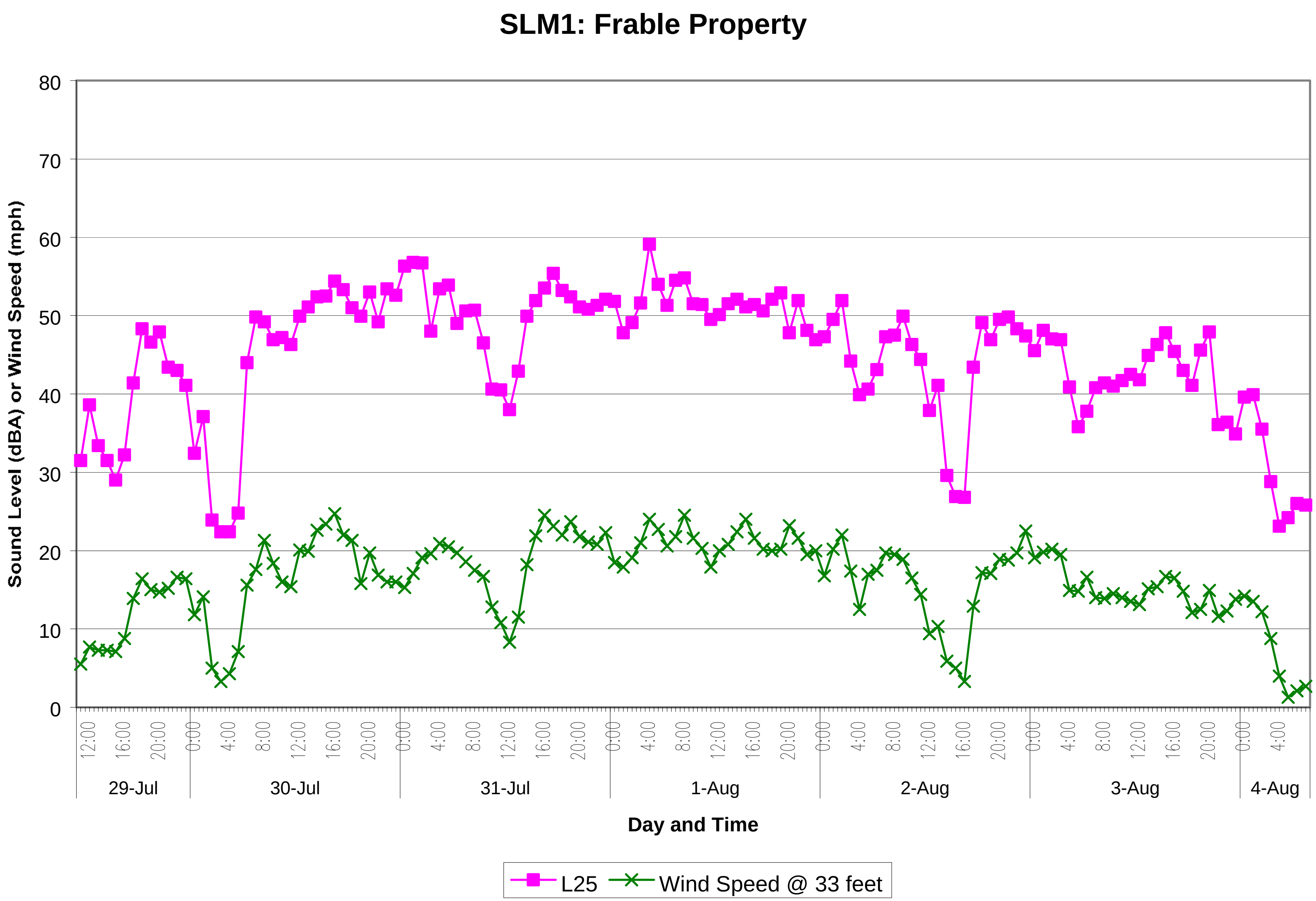
Appendix F, Exhibit 1
Sound Level Measurement Data/Description

SLM1 – Frable Property, Northern Parcel									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
29-Jul	12:00:00	5.5	44.1	72.4	20.9	47.4	39.1	31.5	22.7
	13:00:00	7.7	39	62	20.8	46.2	42.6	38.6	23.6
	14:00:00	7.3	40	67.5	20.6	46.8	40.9	33.4	21.9
	15:00:00	7.3	34.3	58.4	20.5	44	39.2	31.5	21.3
	16:00:00	7.1	30.9	49.9	20.4	40.5	35.5	29	21.3
	17:00:00	8.8	33.7	55	20.4	42.9	38.2	32.2	21.8
	18:00:00	13.9	41.5	65.9	20.6	49.8	46	41.4	26.1
	19:00:00	16.4	48.7	66.7	25.3	57.5	53	48.3	33.4
	20:00:00	15	46.8	66.6	23.2	55.3	51.3	46.6	31.2
	21:00:00	14.7	48.1	66.8	29.3	56.7	52.5	47.9	34.7
	22:00:00	15.2	44	65.1	27.3	52.8	48.5	43.4	31.4
	23:00:00	16.6	43.3	67.5	26.6	51.7	47.7	43	30.9
30-Jul	0:00:00	16.4	41.8	62.4	22.9	50.8	46.5	41.1	27.4
	1:00:00	11.8	34.5	55.9	21.3	43.7	38.8	32.4	24
	2:00:00	14.1	37.7	56	22	46.5	42.6	37.1	25.6
	3:00:00	5	27.5	49.6	19.7	37.4	29.3	23.9	20.2
	4:00:00	3.3	27.7	58.8	19.7	35.1	26	22.4	20.2
	5:00:00	4.3	22.7	42.9	19.9	28	24.1	22.4	20.4
	6:00:00	7.1	29.8	64.3	20.6	33.6	28.2	24.8	22
	7:00:00	15.6	46.3	67.9	21.4	56	50.6	44	24.1
	8:00:00	17.6	50.3	71.9	28.6	58.8	54.5	49.8	36.1
	9:00:00	21.3	49.4	74.4	28.3	57.3	53.6	49.2	36.3
	10:00:00	18.4	46.6	65.5	27.3	54.7	51.1	46.9	33.5
	11:00:00	16	47	68.1	24.3	55.1	51.3	47.2	32.7
	12:00:00	15.4	46.2	68	24.8	54.6	50.7	46.3	32.4
	13:00:00	20.1	50.2	72.7	24.8	58.4	54.5	49.9	36
	14:00:00	19.9	51.2	71	26.2	59.7	55.8	51.1	36.5
	15:00:00	22.6	52.4	70.8	30.5	60.6	56.8	52.4	39.2
	16:00:00	23.4	53	75.7	28.9	61.3	57.1	52.5	39
	17:00:00	24.7	55.2	75.3	33.6	64	59.4	54.4	41.4
	18:00:00	22	53.9	72.4	29.9	62.8	58.3	53.3	39.8
	19:00:00	21.3	52	72.2	29	60.9	56.1	51	37
	20:00:00	15.8	51	73.8	25.1	60.3	55.3	49.9	33.3
	21:00:00	19.7	54.5	75.4	30.8	63.8	58.6	53	39.3
	22:00:00	16.9	49.9	70.4	30	58.8	54.5	49.2	36.6
	23:00:00	16	54.1	75.8	32.6	62.8	58.2	53.4	42.4
31-Jul	0:00:00	16	53.1	73.1	32.6	61.7	57.4	52.6	41.4
	1:00:00	15.3	56.6	73.7	32.9	65.3	61.1	56.3	44
	2:00:00	17.1	57	77.8	33.1	65.6	61.5	56.8	44.5

SLM1 – Frable Property, Northern Parcel									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	3:00:00	19.1	57.5	75.6	29.6	66.6	62	56.7	41.8
	4:00:00	19.6	50.7	74	27.2	60.6	54.4	48	32.8
	5:00:00	20.9	55.2	77.6	27.2	64.7	59.3	53.4	38.4
	6:00:00	20.5	55	75.2	31.3	64	59	53.9	40
	7:00:00	19.7	50.1	70.8	26.6	59.2	54.3	49	34.2
	8:00:00	18.6	51	75.3	29.1	59.4	55.2	50.6	37.9
	9:00:00	17.5	51.5	71.2	29.1	60.4	55.7	50.7	37.6
	10:00:00	16.7	46.4	65.2	25	54.7	51	46.5	33.3
	11:00:00	12.8	41.6	63.6	23.2	50.6	45.8	40.6	26.7
	12:00:00	10.8	41.4	62.2	21.3	50.3	46	40.5	25
	13:00:00	8.3	41.7	68.2	20.8	50.9	44.5	38	23.1
	14:00:00	11.5	43.9	65.5	20.9	53.1	48.4	42.9	25.8
	15:00:00	18.2	50.2	70.8	27.1	58.6	54.6	49.9	36.7
	16:00:00	21.9	52.4	72.2	32	60.7	56.6	51.9	39.3
	17:00:00	24.5	53.5	71.8	34.2	61.8	58	53.5	42
	18:00:00	23.1	56.2	77	32.8	65	60.4	55.4	42.1
	19:00:00	22	53.8	72.4	32.2	62.7	58.3	53.2	39.8
	20:00:00	23.7	53.2	75.1	32	61.8	57.3	52.4	39
	21:00:00	21.8	50.9	68.2	32.7	58.8	54.9	51.1	40.4
	22:00:00	21.1	50.8	69.8	31.8	58.2	54.6	50.8	42.6
	23:00:00	20.8	51.4	68.9	30.3	59.5	55.8	51.3	40.4
1-Aug	0:00:00	22.3	52.8	75.9	32.4	61	56.8	52.1	42.1
	1:00:00	18.5	52.8	73.5	29.9	61.8	56.9	51.8	38.3
	2:00:00	17.9	48.5	68.7	28.9	57.1	52.8	47.8	34.7
	3:00:00	19.1	48.8	66.3	29.1	56.8	53.3	49.1	37.4
	4:00:00	21	51.9	73.8	33.3	60.4	56.1	51.6	39.9
	5:00:00	24	60.3	79.9	35.9	69.5	64.9	59.1	45.5
	6:00:00	22.7	55.7	78.5	29.8	65	59.6	54	38.7
	7:00:00	20.6	53.2	77.6	30.5	61.7	56.6	51.3	37.7
	8:00:00	21.8	54.8	75	33.1	63.3	59.1	54.5	41.9
	9:00:00	24.5	55.3	74.1	33.8	64	59.6	54.8	42.1
	10:00:00	21.6	51.6	71.3	30.3	60.1	56.2	51.5	37.9
	11:00:00	20.3	51.4	71.6	31.5	59.4	55.8	51.4	38.7
	12:00:00	17.9	49.8	74.9	28.4	57.9	54.1	49.5	35.3
	13:00:00	20	50.6	69.9	28.5	59.3	55	50.1	35.4
	14:00:00	20.8	53	75.7	27.7	62.3	56.9	51.5	36.3
	15:00:00	22.4	53.1	76.7	29.9	61.8	57.1	52.1	38.5
	16:00:00	24	51.4	71.9	30.7	59.6	55.7	51.1	38.5
	17:00:00	21.6	52.4	72.3	30.4	61.5	56.8	51.4	37.9
	18:00:00	20.2	51.3	74	30.2	60.1	55.6	50.6	36.8

SLM1 – Frable Property, Northern Parcel									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	19:00:00	20	53.1	74	32.4	61.7	57.4	52.1	38.7
	20:00:00	20.2	53.6	76.5	31	62.5	57.8	52.9	38.8
	21:00:00	23.2	48.5	68.8	31.6	57.4	52.8	47.8	37.4
	22:00:00	21.6	53	74.2	33.5	62	57	51.9	39
	23:00:00	19.5	48.4	71	31	56.5	52.5	48.1	36.4
2-Aug	0:00:00	20	46.6	65.7	30.1	54.6	51.1	46.9	34.6
	1:00:00	16.8	47.3	65.9	28.2	55.7	51.8	47.3	34.1
	2:00:00	20.2	49.6	68.4	30.5	57.9	54	49.5	36.3
	3:00:00	22	52.1	72.1	30.7	60.5	56.5	51.9	39.7
	4:00:00	17.4	44.4	64.4	23.4	52.9	49	44.2	30.1
	5:00:00	12.5	42.7	64	21.2	52.4	47	39.9	24.3
	6:00:00	17	40.8	60.3	21.4	49.3	45.4	40.6	26.1
	7:00:00	17.5	42.9	60.5	21.8	51.4	47.6	43.1	28.3
	8:00:00	19.7	47.1	66.5	27.8	55.2	51.6	47.3	34.1
	9:00:00	19.5	47.2	68	26	55.3	51.7	47.5	34.6
	10:00:00	18.9	50.5	70.5	27.7	59.2	54.9	49.9	36.6
	11:00:00	16.5	45.8	62	24.3	54	50.6	46.3	31.8
	12:00:00	14.4	44.1	62.5	23.7	52.5	48.8	44.4	30.5
	13:00:00	9.4	40.9	62.1	21.6	50.5	44.7	37.9	24.1
	14:00:00	10.3	41.2	59.6	21.1	50.3	46.4	41.1	23.3
	15:00:00	5.9	31.5	52.6	20.4	41.1	36.1	29.6	21.6
	16:00:00	5	30.1	50	20.3	39.6	34	26.9	21.3
	17:00:00	3.3	35	64.4	20.2	44.4	32.9	26.8	21.1
	18:00:00	12.9	44.8	66.6	20.6	54.1	49.6	43.4	24.5
	19:00:00	17.2	49.8	70	26.2	58.6	53.9	49.1	34.3
	20:00:00	17.1	47.7	68.6	26	56.8	52	46.9	32.5
	21:00:00	18.9	50.2	72	30.7	58.8	54.2	49.5	37.8
	22:00:00	18.8	50.3	69.9	32.4	58.9	54.6	49.8	38.5
	23:00:00	19.7	48.2	66	31.5	56.3	52.5	48.3	37.4
3-Aug	0:00:00	22.5	47.3	66.8	29.4	55.6	51.8	47.4	35
	1:00:00	19.1	45.8	66.2	30.1	54	50.1	45.5	33.5
	2:00:00	19.8	48	68.3	29.4	56.3	52.5	48.1	35
	3:00:00	20.2	47.3	71.6	28.4	55.8	51.7	47	33.8
	4:00:00	19.5	47.6	69.8	27.1	56.3	51.8	46.9	33.4
	5:00:00	14.9	42.9	66.1	21	52.2	47	40.9	25.1
	6:00:00	14.8	36.4	58.3	21.4	44.9	40.8	35.8	23.6
	7:00:00	16.6	38.3	56.5	21.7	47.1	43.1	37.8	24.8
	8:00:00	14	42.9	64.2	21.1	52.4	47.1	40.8	25.6
	9:00:00	13.9	41.3	61	22.7	49.7	45.9	41.4	27.8
	10:00:00	14.5	40.8	58.8	22.4	49.2	45.7	41	27.4

SLM1 – Frable Property, Northern Parcel									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	11:00:00	14	42.5	64.4	22.3	51.6	46.9	41.7	27.6
	12:00:00	13.5	43	63.2	23	51.9	47.6	42.5	28.2
	13:00:00	13.1	43.3	65	21.8	52.1	46.8	41.8	27.4
	14:00:00	15.1	44.8	63.4	24.4	53	49.2	44.9	31.7
	15:00:00	15.4	46.7	66	24.5	55.4	51.1	46.3	31.6
	16:00:00	16.7	48.2	66.9	25.8	56.8	52.7	47.8	32.9
	17:00:00	16.5	45.4	65.6	24.6	53.8	50	45.4	31.3
	18:00:00	14.8	43.2	60.7	22.3	51.9	48	43	29.1
	19:00:00	12.1	41.7	61.8	21.9	50.5	46.4	41.1	26.2
	20:00:00	12.5	46.5	68.1	21.7	55.5	50.9	45.6	28.8
	21:00:00	14.9	48.5	68	27.1	57.4	53.2	47.9	34.1
	22:00:00	11.6	37.1	58.5	24.1	46.2	41.3	36.1	27.3
	23:00:00	12.3	39.3	62.8	21.8	48.7	43.3	36.4	25
4-Aug	0:00:00	13.8	35.7	55.5	21.4	44.6	40.2	34.9	24
	1:00:00	14.2	39.7	61.8	22.4	48.3	44.5	39.6	26
	2:00:00	13.5	40.6	60	21.1	49.4	45.3	39.9	25
	3:00:00	12.2	37.3	56.8	20.4	46.8	42.2	35.5	22.4
	4:00:00	8.8	31.8	51.1	20.2	41.9	36.2	28.8	21.3
	5:00:00	4	24	44	19.7	30.2	25.5	23.1	20.4
	6:00:00	1.3	24.3	46.9	20.1	30.1	27.2	24.2	21
	7:00:00	2.1	35	60	20.9	44.6	33.3	26	22.2
	8:00:00	2.7	46.3	85.1	20.3	46.7	32.5	25.8	21.4
The internal time and date were incorrect when the sound level meter was retrieved, but the meter calibrated correctly and the measured sound levels closely correspond to the varying wind speeds. Therefore, the data is considered accurate and is presented here.									


SLM1: Frable Property
Sound Level (dBA) or Wind Speed (mph)
80
70
60
50
40
30
20
10
0
12:00
16:00
20:00
0:00
4:00
8:00
29-Jul
30-Jul
31-Jul
1-Aug
2-Aug
3-Aug
4-Aug
Day and Time
L25
Wind Speed @ 33 feet

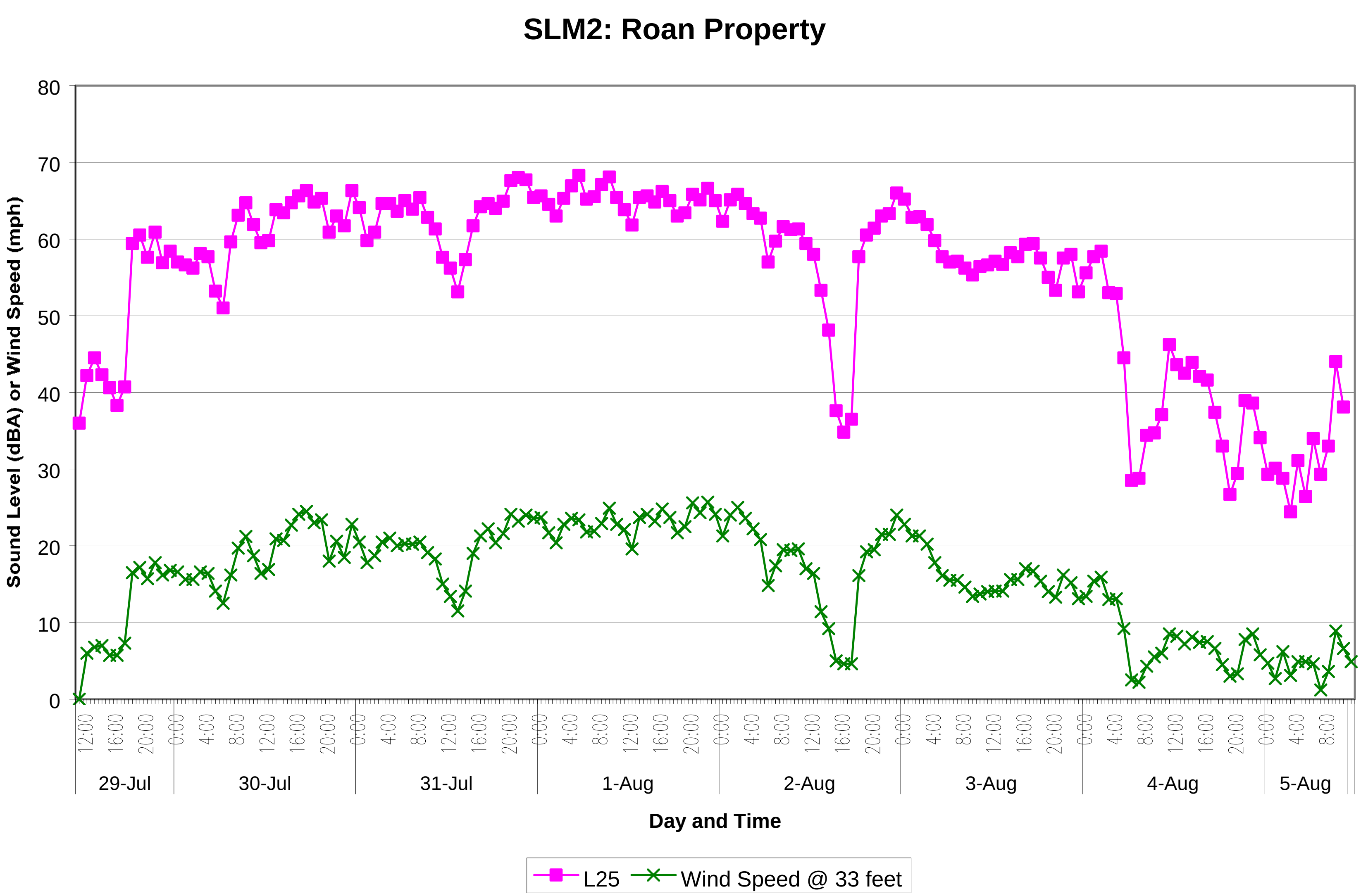
SLM2 – Roan Property, North of Western Parcels									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
29-Jul	11:00:00		42.5	70.6	22.6	48	42.3	36	24.9
	12:00:00	6	51.7	80.3	22.1	54	48.6	42.2	25.9
	13:00:00	6.8	45.6	64.6	21.4	54.9	50.7	44.5	26.2
	14:00:00	7	44.3	70.4	21.4	53.2	48.5	42.3	24.5
	15:00:00	5.7	43.9	71.1	21.2	52.6	47.3	40.6	23.6
	16:00:00	5.7	41.9	67.9	21.6	50.8	44.9	38.3	23.2
	17:00:00	7.3	44.5	69.8	22.4	53.4	48.3	40.7	25
	18:00:00	16.5	58.3	73.2	23.2	65.2	62.6	59.4	45.8
	19:00:00	17.2	59.5	73.4	35.1	66.4	63.7	60.5	48.5
	20:00:00	15.7	57.1	72.9	31.4	65.2	61.7	57.6	43.8
	21:00:00	17.8	60.3	76	40.4	67.8	64.6	60.9	49.7
	22:00:00	16.2	56	71.7	36.7	63.1	60.3	56.9	45.9
	23:00:00	16.8	57.2	70.4	38.7	63.6	61.2	58.4	48.7
30-Jul	0:00:00	16.6	55.9	71.7	38.4	62.7	60	57	47
	1:00:00	15.6	55.7	71.7	37.1	62.8	60	56.6	46
	2:00:00	15.6	55.5	72.1	35.7	62.8	59.8	56.2	45.1
	3:00:00	16.6	57.2	73.1	36.4	64.1	61.3	58.1	47.4
	4:00:00	16.4	56.8	72	36.2	63.9	61	57.7	47
	5:00:00	14.1	52.9	72.2	32.9	60.7	57.4	53.2	41.7
	6:00:00	12.5	51	71.1	29.4	59.5	55.7	51	38.2
	7:00:00	16.2	59.3	77.1	31.8	67.6	64.2	59.6	43.9
	8:00:00	19.7	62.3	76.5	38	69.2	66.4	63.1	52.3
	9:00:00	21.2	63.8	78.7	43.3	70.3	67.6	64.7	55.9
	10:00:00	18.7	60.9	75.7	41.9	66.8	64.6	61.9	53.7
	11:00:00	16.4	58.5	73.6	34.6	64.9	62.4	59.5	49.6
	12:00:00	16.9	58.9	75.5	28.7	65.4	62.9	59.8	50
	13:00:00	20.9	62.7	76.2	37.3	69.1	66.6	63.8	55.3
	14:00:00	20.7	62.5	76.8	36.7	68.9	66.3	63.4	54.8
	15:00:00	22.7	63.9	78.2	44.9	70.6	67.8	64.7	56.7
	16:00:00	24.1	64.7	80.1	47.4	71.3	68.6	65.6	57.6
	17:00:00	24.5	65.5	79.2	45.1	72.2	69.5	66.3	58.2
	18:00:00	23	64	78	43.7	70.7	67.8	64.8	57
	19:00:00	23.4	64.6	78.2	47.3	71.4	68.5	65.3	57.1
	20:00:00	18	60.2	77.4	36.1	67.6	64.5	60.9	49.4
	21:00:00	20.6	62.2	78.3	42.2	69	66.2	63	53.5
	22:00:00	18.5	60.8	76.8	38.4	67.7	64.8	61.7	50.7
	23:00:00	22.8	65.6	81.1	45.1	72.9	69.8	66.3	56.7
31-Jul	0:00:00	20.5	63.6	78.8	42.1	71.4	68	64.1	53.2
	1:00:00	17.8	59.8	78.7	39.7	67.8	63.9	59.8	49.7

SLM2 – Roan Property, North of Western Parcels									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	2:00:00	18.7	60.2	75	42.6	67.5	64.4	60.9	51.4
	3:00:00	20.5	64	79.9	43	71.6	68.5	64.6	54.3
	4:00:00	21	64.1	78.2	42.2	71.8	68.6	64.6	54.9
	5:00:00	20	63.3	78.1	41	71.1	67.7	63.6	53.1
	6:00:00	20.3	64.6	81.8	42.6	72.5	69.2	65	53.3
	7:00:00	20.2	63.2	79.1	42.2	70.6	67.5	63.9	53.7
	8:00:00	20.5	64.8	80.1	38.6	72.3	69.2	65.4	54.9
	9:00:00	19.1	62.1	78	40.7	69.4	66.2	62.8	53.4
	10:00:00	18.3	60.5	77.2	38.8	67	64.2	61.3	52.7
	11:00:00	15	56.6	71.5	27.7	63.2	60.5	57.6	47
	12:00:00	13.4	55.3	72.8	25.3	62.4	59.5	56.2	43.1
	13:00:00	11.5	52.2	67.9	21.7	59.8	56.9	53.1	35.2
	14:00:00	14.1	56.6	72.5	22.9	64.2	60.9	57.3	43.8
	15:00:00	19	60.9	75.8	39.3	67.6	64.8	61.7	53.1
	16:00:00	21.3	63.5	78	43.8	70.4	67.3	64.2	56
	17:00:00	22.2	63.9	79.9	43.3	70.6	67.7	64.6	56.6
	18:00:00	20.4	63.3	78.2	42.6	70.7	67.5	64	54.4
	19:00:00	21.6	64.4	81.4	45.3	71.8	68.6	64.9	55.7
	20:00:00	24.1	66.8	80.4	47.4	74	71.2	67.6	57.5
	21:00:00	23.2	67	80.6	47.7	73.9	71.4	68	57.9
	22:00:00	24	67	81.6	47.8	74.2	71.4	67.7	58
	23:00:00	23.6	64.9	80.1	44.3	72.1	68.9	65.4	57.3
1-Aug	0:00:00	23.7	64.8	81.7	48.3	71.5	68.7	65.6	57.8
	1:00:00	21.7	64.1	79.4	44.1	71.9	68.6	64.5	54.8
	2:00:00	20.4	62.6	79.6	43	69.7	66.5	63	54.9
	3:00:00	22.8	64.9	81.1	45.2	72.5	69.3	65.3	56.1
	4:00:00	23.6	66.1	81.9	45	73.3	70.6	66.9	56.8
	5:00:00	23.4	67.5	83.3	47.8	74.6	71.8	68.3	58.1
	6:00:00	21.8	64.6	79.5	40.9	72.1	68.8	65.2	55.4
	7:00:00	21.9	64.7	79.3	40.9	71.7	68.9	65.5	56.1
	8:00:00	22.9	66.3	80.3	43.6	73.6	70.8	67.1	56.2
	9:00:00	24.9	67.2	80.8	48.2	74	71.3	68.1	59.2
	10:00:00	22.8	64.7	79.7	42.3	71.6	68.7	65.4	57.1
	11:00:00	22.1	62.8	76.4	45.1	68.8	66.4	63.8	56.5
	12:00:00	19.6	60.9	79	39.4	67.1	64.5	61.8	54
	13:00:00	23.7	64.7	79.6	45.1	71.1	68.3	65.4	58
	14:00:00	24.1	64.7	78.1	46.5	70.8	68.3	65.6	58.7
	15:00:00	23.2	63.9	78.4	46.8	70	67.6	64.8	58
	16:00:00	24.8	65.3	79.1	49.4	71.5	69.1	66.2	59.3
	17:00:00	23.7	64.1	78.6	45.8	70.2	67.7	65	57.9

SLM2 – Roan Property, North of Western Parcels									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	18:00:00	21.7	62.1	75.3	44.4	68	65.8	63	55.6
	19:00:00	22.5	62.3	76	42.5	68.6	66.2	63.4	55.2
	20:00:00	25.6	65	78.2	47.6	71.2	68.8	65.8	58.1
	21:00:00	24.3	64.5	82.9	47.9	71.2	68.4	65.1	57
	22:00:00	25.7	65.8	80.8	50.4	72.5	69.7	66.6	58.4
	23:00:00	24.1	64.3	79.8	44.8	71.4	68.3	65	56.4
2-Aug	0:00:00	21.3	61.3	74.6	44.9	67.3	65	62.3	54.6
	1:00:00	24	64.4	78.7	42	71.4	68.5	65.1	56
	2:00:00	25	64.8	77.6	47.3	71.2	68.7	65.8	57.5
	3:00:00	23.6	63.7	76.9	48.5	70.1	67.6	64.6	56.9
	4:00:00	22.2	62.4	76.6	45.4	68.7	66.1	63.3	56
	5:00:00	20.8	62	78.7	37.5	69.4	66.3	62.7	52
	6:00:00	14.8	56.4	73.7	29	63.8	60.7	57	44.2
	7:00:00	17.4	58.6	73.1	34.6	64.2	62	59.7	51.6
	8:00:00	19.5	60.5	73.7	41.9	66.7	64.3	61.6	53.4
	9:00:00	19.4	60.3	76	40	66.6	64	61.2	52.6
	10:00:00	19.6	60.3	77	41.1	66.4	63.9	61.3	53.5
	11:00:00	17	58.2	73.7	34.1	64	61.8	59.4	50.5
	12:00:00	16.4	56.9	69.6	33.4	62.7	60.6	58	49
	13:00:00	11.4	52	68.4	22.1	58.7	56.5	53.3	38.1
	14:00:00	9.2	47.9	68.6	21.4	56.3	53	48.1	30.3
	15:00:00	5	38.7	58.7	20.9	48.2	44.1	37.6	22.4
	16:00:00	4.6	34.9	51	20.8	43.3	39.8	34.8	23.1
	17:00:00	4.6	43.5	62.2	20.6	54.7	48.4	36.5	21.6
	18:00:00	16.1	56.6	71.3	28.2	63.3	60.7	57.7	46.5
	19:00:00	19.2	59.7	74.4	41.7	66.4	63.6	60.5	51.2
	20:00:00	19.5	60.5	73.6	40.2	67.2	64.6	61.4	52.3
	21:00:00	21.5	62	76	44.2	68.5	65.9	63	54.3
	22:00:00	21.5	62.5	79.8	42.2	69.3	66.6	63.3	54.2
	23:00:00	24	65.3	81.6	46.4	72.2	69.3	66	57.3
3-Aug	0:00:00	22.8	64.3	78.7	44.6	71.4	68.5	65.2	55.8
	1:00:00	21.3	62	78.6	45.2	68.7	65.9	62.8	54.5
	2:00:00	21.3	62	75.7	45.4	68.6	65.9	62.9	54.8
	3:00:00	20.2	61.2	76.4	44	67.8	64.9	61.9	53.4
	4:00:00	17.8	59.1	73.8	35.9	66.2	62.9	59.8	50.6
	5:00:00	16.1	56.7	70.4	30.1	63.8	61	57.7	45.9
	6:00:00	15.5	55.9	70.9	32	62.4	59.8	57	46.5
	7:00:00	15.5	55.8	68.4	31	61.9	59.7	57.1	46.7
	8:00:00	14.6	54.9	67	31	61.1	58.9	56.2	45.9
	9:00:00	13.4	54	67.3	28.8	60.2	58.1	55.3	43.9

SLM2 – Roan Property, North of Western Parcels									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
	10:00:00	13.7	55	65.5	28.7	60.6	58.7	56.4	45.8
	11:00:00	14	55.2	67.8	28.8	60.8	58.9	56.6	46.6
	12:00:00	14.1	55.9	69.7	29.3	61.4	59.4	57.1	47.1
	13:00:00	14.1	55.4	69.4	27.8	61	58.9	56.7	47
	14:00:00	15.6	57.1	72.7	31.3	62.8	60.6	58.2	49.5
	15:00:00	15.6	56.6	70.1	35.5	62.3	60.2	57.7	49
	16:00:00	17	58.2	72.1	36	64.2	61.9	59.3	50.1
	17:00:00	16.7	58.4	74.8	33.2	64.4	62	59.4	50.7
	18:00:00	15.4	56.4	71.6	35.2	61.8	59.8	57.5	49.2
	19:00:00	14	53.7	68.2	27.8	60.4	57.9	55	41.9
	20:00:00	13.3	52.1	68	25.2	59.1	56.7	53.3	39.3
	21:00:00	16.2	56.6	71.8	36.2	63.4	60.5	57.5	47.4
	22:00:00	15.2	57	71.8	29.5	64.6	61.7	58	43.2
	23:00:00	13.1	52.1	66.8	27.1	59.7	56.8	53.1	39.6
4-Aug	0:00:00	13.4	54.2	67.8	31.3	60.4	58.3	55.6	44.1
	1:00:00	15.4	56.4	67.9	34.9	62.2	60.1	57.7	48
	2:00:00	15.9	57.2	69.8	34	63.6	61.2	58.4	48
	3:00:00	13	52.1	66.1	28.6	59.5	56.8	53	40.8
	4:00:00	13.1	52	67.1	27.7	59.4	56.5	52.9	39.2
	5:00:00	9.2	44.5	62.2	21.8	53.2	49.6	44.5	24.2
	6:00:00	2.5	34.2	68.6	21	42.6	35.5	28.5	22.4
	7:00:00	2.2	36.8	55.9	21.3	48.1	38.8	28.8	23.1
	8:00:00	4.3	37.1	64.9	20.6	46.9	41.4	34.4	22.3
	9:00:00	5.5	35.3	52.6	20.7	44.2	40.3	34.7	22.9
	10:00:00	6	39.1	62	20.8	48.5	44	37.1	23.5
	11:00:00	8.5	45.7	64.3	21.7	53.9	50.5	46.2	27.1
	12:00:00	8.2	44	68.3	20.8	52.4	48.6	43.6	25.4
	13:00:00	7.2	44.4	66.1	21	54.5	48.6	42.5	25.8
	14:00:00	8.1	45.3	66.8	21.1	54.9	50	43.9	24.9
	15:00:00	7.4	42.5	62.1	21	51.5	47.6	42.1	23.7
	16:00:00	7.5	42.7	61.4	20.9	52.1	47.4	41.6	23.8
	17:00:00	6.6	38	57.1	20.8	47	42.8	37.4	23.7
	18:00:00	4.5	35.6	59.7	20.5	45	40.1	33	21.4
	19:00:00	3	32.6	56.5	20.5	41.6	32.5	26.7	21.2
	20:00:00	3.3	37.9	61.4	21.2	48.4	39.7	29.4	22.1
	21:00:00	7.8	40.7	59.1	26.9	49.8	44.1	38.9	32.2
	22:00:00	8.5	42	64.4	30.2	52.1	43.1	38.6	33.3
	23:00:00	5.8	38.9	63.8	24.5	45.4	38.8	34.1	26.5
5-Aug	0:00:00	4.7	32.5	57.3	23.7	34.2	31.1	29.3	25.8
	1:00:00	2.7	36	65.1	22	38.4	31.8	30.1	25.8

SLM2 – Roan Property, North of Western Parcels									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	2:00:00	6.2	29.5	57.2	22.9	34.3	31.5	28.8	24.4
	3:00:00	3.1	33.3	58.6	20.9	32.8	26	24.4	21.8
	4:00:00	4.9	38.7	63.5	21.6	45.7	36.5	31.1	23.5
	5:00:00	4.9	35	57.5	22	45.5	33.2	26.4	23.3
	6:00:00	4.6	41.6	60.2	23.8	53.2	42.7	34	25.4
	7:00:00	1.2	37.7	64.3	22.4	45.5	37.3	29.3	24.3
	8:00:00	3.6	37.1	61.8	20.9	46.1	39.9	33	23.3


SLM2: Roan Property
Sound Level (dBA) or Wind Speed (mph)
80
70
60
50
40
30
20
10
0
12:00
16:00
20:00
0:00
4:00
8:00
29-Jul
30-Jul
31-Jul
1-Aug
2-Aug
3-Aug
4-Aug
5-Aug
Day and Time
L25
Wind Speed @ 33 feet

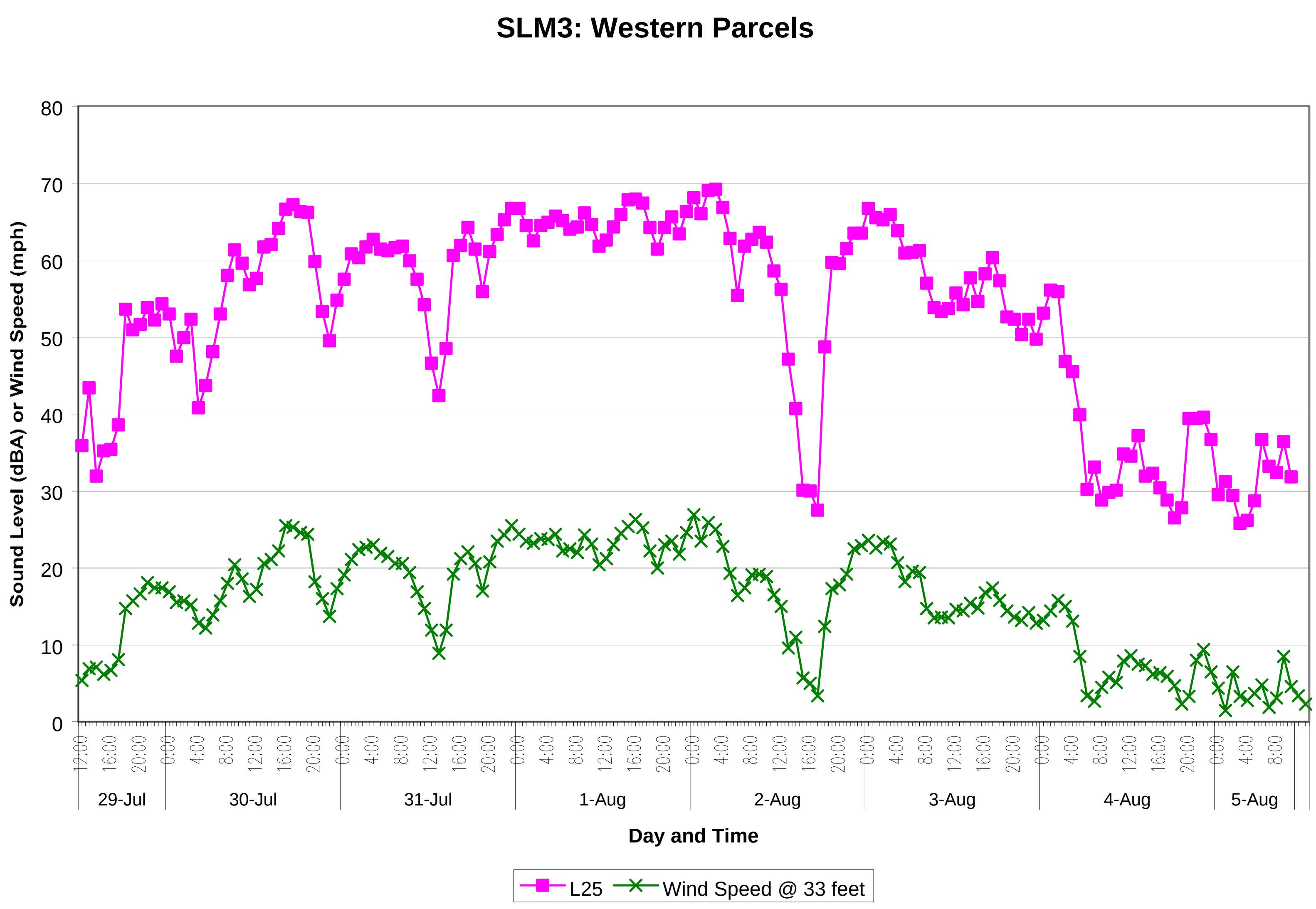
SLM3 – Western Parcels, East of Lower Green Canyon Road and North of Smithson Road									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
29-Jul	12:00:00	5.4	41.7	64.8	22.1	48.9	40.5	35.9	25.4
	13:00:00	6.9	46.8	71	23.6	56.5	51.5	43.4	29.7
	14:00:00	7.1	32.7	53.3	21.2	41.2	36	31.9	24.3
	15:00:00	6.2	37.8	59.5	29.9	46.5	38.6	35.2	33.7
	16:00:00	6.7	35.8	51	33.5	41.5	38	35.4	33.6
	17:00:00	8.1	38	54.4	25.4	44.6	41.8	38.6	30.4
	18:00:00	14.7	52.7	66.7	24.5	60.5	57.5	53.6	29.6
	19:00:00	15.7	50.7	68.5	30.4	58.8	55.4	50.9	40.1
	20:00:00	16.6	51.1	67.2	28.8	58.9	55.7	51.6	41.6
	21:00:00	18.1	53.2	67.9	38.8	60.5	57.3	53.8	45.2
	22:00:00	17.4	52	67.9	37.3	59.7	56.3	52.2	44.1
	23:00:00	17.4	53.6	68	38	60.7	57.8	54.3	45.6
30-Jul	0:00:00	16.9	52.7	68.8	37.3	60.7	57.1	53	44.2
	1:00:00	15.5	47	63.6	35.5	53.5	50.4	47.5	41.7
	2:00:00	15.7	50	67.3	37.7	57.7	53.9	49.9	43.4
	3:00:00	15.2	51.8	68.2	33.6	59.9	56.5	52.3	39.2
	4:00:00	12.8	40.5	59.9	32.8	47.5	44.2	40.8	34.3
	5:00:00	12.2	43.2	61.7	33.1	50.3	47	43.7	35.6
	6:00:00	13.9	48.4	68.2	33.7	56.6	52.3	48.1	39.3
	7:00:00	15.7	52.7	70.7	35.5	60.6	57.1	53	43.9
	8:00:00	18	57.3	72.4	37.2	65	61.9	58	46.4
	9:00:00	20.4	60.4	78.4	39.3	67.3	64.6	61.3	51
	10:00:00	18.6	58.6	74.7	38.6	65.4	62.7	59.6	49.4
	11:00:00	16.3	55.6	69.2	37.2	62.5	60.1	56.8	45.8
	12:00:00	17.2	56.5	70.4	35.3	63.4	60.9	57.6	46.4
	13:00:00	20.6	60.6	76.4	39.2	67.3	64.6	61.7	51.9
	14:00:00	21.1	61	74	39.3	67.7	65.1	62	51.9
	15:00:00	22.2	63.1	76.2	39.9	69.6	67.1	64.1	53.8
	16:00:00	25.5	65.7	80.5	44.7	72.3	69.7	66.6	57.7
	17:00:00	25.3	66.3	79.2	43.4	73	70.4	67.2	57.6
	18:00:00	24.6	65.3	78.8	41.7	71.9	69.5	66.3	56.5
	19:00:00	24.4	65.2	78.9	40.4	72	69.4	66.2	55.6
	20:00:00	18.2	59.3	74.8	35.8	67.4	64.3	59.8	45.6
	21:00:00	16	52.7	69.3	37.2	60.2	57.1	53.3	43.5
	22:00:00	13.7	49.2	64.5	37.1	56.6	53.2	49.5	42
	23:00:00	17.3	54.1	69.1	37.5	61.5	58.5	54.8	44.3
31-Jul	0:00:00	19.1	56.9	72.7	38	64.5	61.2	57.5	47.1
	1:00:00	21.1	59.8	74	42.4	66.7	64	60.8	50.5
	2:00:00	22.4	59.3	73.5	41.3	66.4	63.7	60.3	50.3

SLM3 – Western Parcels, East of Lower Green Canyon Road and North of Smithson Road									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
	3:00:00	22.7	60.9	77.4	39.7	68	65	61.7	51.2
	4:00:00	23	61.6	77.4	42.4	68.2	65.7	62.7	52.2
	5:00:00	21.9	60.4	77.3	41.2	67.3	64.6	61.4	50.6
	6:00:00	21.5	60.3	74.7	41.3	67.3	64.7	61.2	50.1
	7:00:00	20.6	60.5	76	40.2	67	64.6	61.6	50.4
	8:00:00	20.6	60.6	76.4	40.3	67.2	64.8	61.8	50.6
	9:00:00	19.4	58.6	74.3	39	65.2	62.9	59.9	48.8
	10:00:00	16.9	56.6	70.6	35.7	64	61.4	57.5	45.9
	11:00:00	14.7	53.8	68.2	34	61.7	58.7	54.2	42.7
	12:00:00	11.9	46.8	64.6	33.2	55.5	51.3	46.6	35.3
	13:00:00	8.9	44.8	70.6	22.1	53.6	48.3	42.4	28.6
	14:00:00	11.9	48.6	66.3	22.6	57.5	53.7	48.5	34.2
	15:00:00	19.2	59.6	73.7	37.1	66.6	63.8	60.6	49.8
	16:00:00	21.2	60.9	74.9	40.8	67.7	65	61.9	51
	17:00:00	22.1	63.1	76.8	41.6	69.8	67.2	64.2	53.8
	18:00:00	20.6	60.3	75.7	38.4	67.1	64.7	61.4	49.5
	19:00:00	17	55.3	70.5	37	62.9	59.9	55.9	45.7
	20:00:00	20.8	60	73.8	39.6	67	64.5	61.1	49.4
	21:00:00	23.5	62.1	74.8	43.2	68.4	66	63.3	53.3
	22:00:00	24.3	64.1	77.5	43.9	70.6	68.1	65.2	54.8
	23:00:00	25.5	65.9	79.9	46	72.9	69.9	66.7	57.5
1-Aug	0:00:00	24.4	65.8	79.8	46	72.5	69.7	66.7	58
	1:00:00	23.5	63.5	78.9	40.1	70.5	67.7	64.5	52.9
	2:00:00	23.2	61.4	76.2	42.7	68.2	65.7	62.5	51.9
	3:00:00	23.8	63.3	77.4	43.5	69.5	67.2	64.5	54.5
	4:00:00	23.7	63.6	76.7	42.8	70	67.7	64.9	53.7
	5:00:00	24.4	64.5	81.3	42.6	70.7	68.2	65.7	55.5
	6:00:00	22.2	64	77.5	42.1	70.5	67.9	65.1	55
	7:00:00	22.5	62.8	76.1	42.3	69.4	66.9	64	53
	8:00:00	22	63.3	79	40.9	70	67.3	64.3	53.8
	9:00:00	24.3	65.2	79.1	41.6	72.3	69.3	66.1	55.7
	10:00:00	23.1	63.6	77.2	39.2	70.4	67.7	64.6	54
	11:00:00	20.4	60.7	77.4	35.4	67.6	64.9	61.8	50.9
	12:00:00	21.2	61.5	77.2	38.5	68	65.6	62.6	52.6
	13:00:00	23	63.2	80.2	42.9	69.7	67.2	64.3	54.4
	14:00:00	24.5	64.9	79.4	42.3	71.3	68.8	65.9	56.5
	15:00:00	25.4	66.7	81.5	47	72.9	70.6	67.8	58.7
	16:00:00	26.3	66.7	81.4	46.6	73	70.7	67.9	58.5
	17:00:00	25.2	66.4	80.8	45.1	73.1	70.5	67.4	57.8
	18:00:00	22.2	63	76.9	41.4	69.1	66.9	64.2	54.8

SLM3 – Western Parcels, East of Lower Green Canyon Road and North of Smithson Road									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	19:00:00	20	60.4	78.1	30.9	67.6	65	61.4	48.1
	20:00:00	23	63.1	77.7	42.5	69.8	67.3	64.2	53.7
	21:00:00	23.5	64.6	77.4	41.3	71	68.5	65.6	56
	22:00:00	21.8	62.1	76	43.3	68.4	66	63.4	53.3
	23:00:00	24.6	65.4	79.7	46.7	71.9	69.2	66.3	57.2
2-Aug	0:00:00	26.9	67.2	80.6	45.9	73.8	71.2	68.1	58.9
	1:00:00	23.5	65.1	80.8	44.5	72	69	66	56
	2:00:00	25.9	68.2	81.4	42.4	75.6	72.8	69	57.1
	3:00:00	25	68.3	81	47.2	75	72.5	69.2	59.4
	4:00:00	22.8	65.8	78.8	42.6	72.5	69.9	66.8	57.2
	5:00:00	19.3	62.2	79.3	38.5	69.8	66.6	62.8	50.3
	6:00:00	16.4	55.2	71.1	30.4	63.5	60.1	55.4	43.4
	7:00:00	17.4	60.9	76.2	36.2	67.9	65.3	61.8	50.9
	8:00:00	19.1	61.7	76.4	36.7	68.5	65.9	62.7	51.9
	9:00:00	19.2	62.5	75.3	39.5	69.1	66.6	63.6	53.4
	10:00:00	18.9	61.2	74.7	35.3	68	65.4	62.3	50.8
	11:00:00	16.5	57.6	73.4	31.3	64.7	62	58.6	47.1
	12:00:00	15	55.1	69.8	31.7	62	59.5	56.2	45.2
	13:00:00	9.6	47.3	63.1	22.9	56.4	52.4	47.1	30.4
	14:00:00	11	41.1	60.7	22.4	50	45.8	40.7	26.9
	15:00:00	5.7	31.5	49.4	21.4	40.8	35.9	30.1	22.6
	16:00:00	5	36.4	60.6	21	44.6	36.3	30	22.5
	17:00:00	3.4	28.6	48.2	20.6	37.2	32.8	27.5	21.7
	18:00:00	12.4	49.3	67.2	22.3	58.4	53.7	48.7	26
	19:00:00	17.3	58.6	73.1	34.3	65.7	63.1	59.7	47.1
	20:00:00	17.8	58.3	72.3	36.7	65.2	62.7	59.5	47.3
	21:00:00	19.2	60.4	75	40.1	67.2	64.6	61.5	50.3
	22:00:00	22.5	62.4	76.8	42.8	68.7	66.3	63.5	53.6
	23:00:00	22.9	62.6	77.4	42.8	69.6	66.6	63.5	52.8
3-Aug	0:00:00	23.6	65.7	80.2	45.4	72.2	69.6	66.7	57.2
	1:00:00	22.6	64.4	80.1	43.8	70.7	68.3	65.5	55.3
	2:00:00	23.4	64	76.6	42.4	70	67.8	65.2	55
	3:00:00	23.1	64.8	78.2	39.6	71.1	68.6	65.9	55.8
	4:00:00	20.7	62.6	79.1	42	68.8	66.6	63.8	53.3
	5:00:00	18.2	59.8	73.8	38.7	66.8	64.3	60.9	49
	6:00:00	19.6	59.9	75.3	37.2	67	64.4	61	48.9
	7:00:00	19.4	60.1	75.1	36.7	67.1	64.5	61.2	49.4
	8:00:00	14.7	56.3	72.7	33.2	63.9	60.9	57	45.1
	9:00:00	13.5	53.1	67.9	31.7	60.5	57.6	53.8	43.2
	10:00:00	13.6	52.5	66.6	32.5	59.8	57.1	53.3	43.1

SLM3 – Western Parcels, East of Lower Green Canyon Road and North of Smithson Road									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
	11:00:00	13.5	52.9	67.9	31.6	60.1	57.3	53.7	43.3
	12:00:00	14.6	54.9	71.1	29	62.1	59.2	55.7	43.9
	13:00:00	14.4	53.5	70	29.9	61	58	54.2	43.5
	14:00:00	15.4	56.6	75.5	31.7	63.4	60.9	57.7	46.7
	15:00:00	14.8	54	68.9	31.7	61.7	58.7	54.6	43.7
	16:00:00	16.8	57.3	72.9	33.1	64.7	61.8	58.2	46.2
	17:00:00	17.4	59.4	73	35.8	66.4	63.8	60.3	49.3
	18:00:00	15.8	56.5	70.6	33	63.9	61	57.3	45.9
	19:00:00	14.4	52.5	68.3	28.8	60.7	57.2	52.6	41.3
	20:00:00	13.6	52.4	69	27.2	61	57.3	52.3	40.1
	21:00:00	13.2	50.2	67.5	33.2	57.9	54.4	50.3	41.6
	22:00:00	14.2	52.6	68.4	32.5	60.8	57.1	52.3	43.6
	23:00:00	12.8	49.5	65.6	31.3	57.3	53.7	49.7	41.1
4-Aug	0:00:00	13.2	52.5	68.8	32.4	59.9	56.7	53.1	43.4
	1:00:00	14.4	55.5	71.3	34.4	63	60	56.1	46
	2:00:00	15.8	55.7	71.2	35.6	63.8	60.3	55.9	45.6
	3:00:00	15	47.1	67.1	31.1	54.8	50	46.8	39.2
	4:00:00	13.1	44.9	62	29.9	51.6	48.2	45.5	37.6
	5:00:00	8.5	39.8	57	24.4	48.4	45.1	39.9	27
	6:00:00	3.4	31.3	50.1	23.3	38.9	34.1	30.2	25.6
	7:00:00	2.7	37	59.3	24.7	46.6	39.1	33.1	27.1
	8:00:00	4.5	34.2	72.8	22	38.9	33.2	28.8	23.5
	9:00:00	5.8	30.2	51.6	22.1	37.4	32.8	29.8	24.1
	10:00:00	5.1	31.3	54.6	22.5	39.7	35.1	30.1	24.5
	11:00:00	7.9	36	58	22.4	44.9	40.7	34.8	25.1
	12:00:00	8.6	37.8	63.7	21.7	47	41.8	34.5	24.3
	13:00:00	7.5	40.6	65.8	21.3	49.1	43.2	37.2	23.9
	14:00:00	7.3	35.6	57.5	21.8	45.4	39.3	31.9	23.5
	15:00:00	6.2	35.7	60.5	21.7	45.2	39.6	32.3	23.2
	16:00:00	6.4	32.2	58.2	21.6	41.4	36.4	30.4	23.1
	17:00:00	5.9	30.9	52.6	20.9	40.3	34.6	28.8	22.3
	18:00:00	4.7	29.9	52.5	20.4	40	32.7	26.5	21.2
	19:00:00	2.3	28.6	46.4	20.6	36.4	32	27.8	22.9
	20:00:00	3.3	38.8	57	22.6	46.9	43.5	39.4	25.4
	21:00:00	8	39	57.4	24	45.5	41.1	39.4	30.7
	22:00:00	9.4	43.2	64.7	31.3	51.7	42.4	39.6	35.3
	23:00:00	6.5	35.8	50.7	22.6	40.8	38.8	36.7	26.2
5-Aug	0:00:00	4.4	32.5	55.9	23.3	37.9	32.7	29.5	24.9
	1:00:00	1.5	30.4	50.3	20.4	35.5	34	31.2	22
	2:00:00	6.5	28.3	41.2	21.3	33.7	32.3	29.4	23.1

SLM3 – Western Parcels, East of Lower Green Canyon Road and North of Smithson Road									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
	3:00:00	3.3	28.1	54.1	20.7	37.6	29.3	25.8	22.2
	4:00:00	2.8	33.4	57	21.4	42.9	32.5	26.2	22.9
	5:00:00	3.7	33.7	67.1	20.8	42.3	34.2	28.7	22.5
	6:00:00	4.8	43.4	73.9	25.4	51.9	44.4	36.7	28.2
	7:00:00	1.9	34.1	55.5	25.7	41.6	37.2	33.2	28.2
	8:00:00	3.1	35.3	54.5	23.1	44.4	37.2	32.4	25.9
	9:00:00	8.5	36.2	52.7	23.6	43.9	41	36.4	27.4
	10:00:00	4.6	35.3	57.7	23.2	45.1	38	31.8	25.9


SLM3: Western Parcels
Sound Level (dBA) or Wind Speed (mph)
80
70
60
50
40
30
20
10
0
29-Jul
30-Jul
31-Jul
1-Aug
2-Aug
3-Aug
4-Aug
5-Aug
Day and Time
L25
Wind Speed @ 33 feet

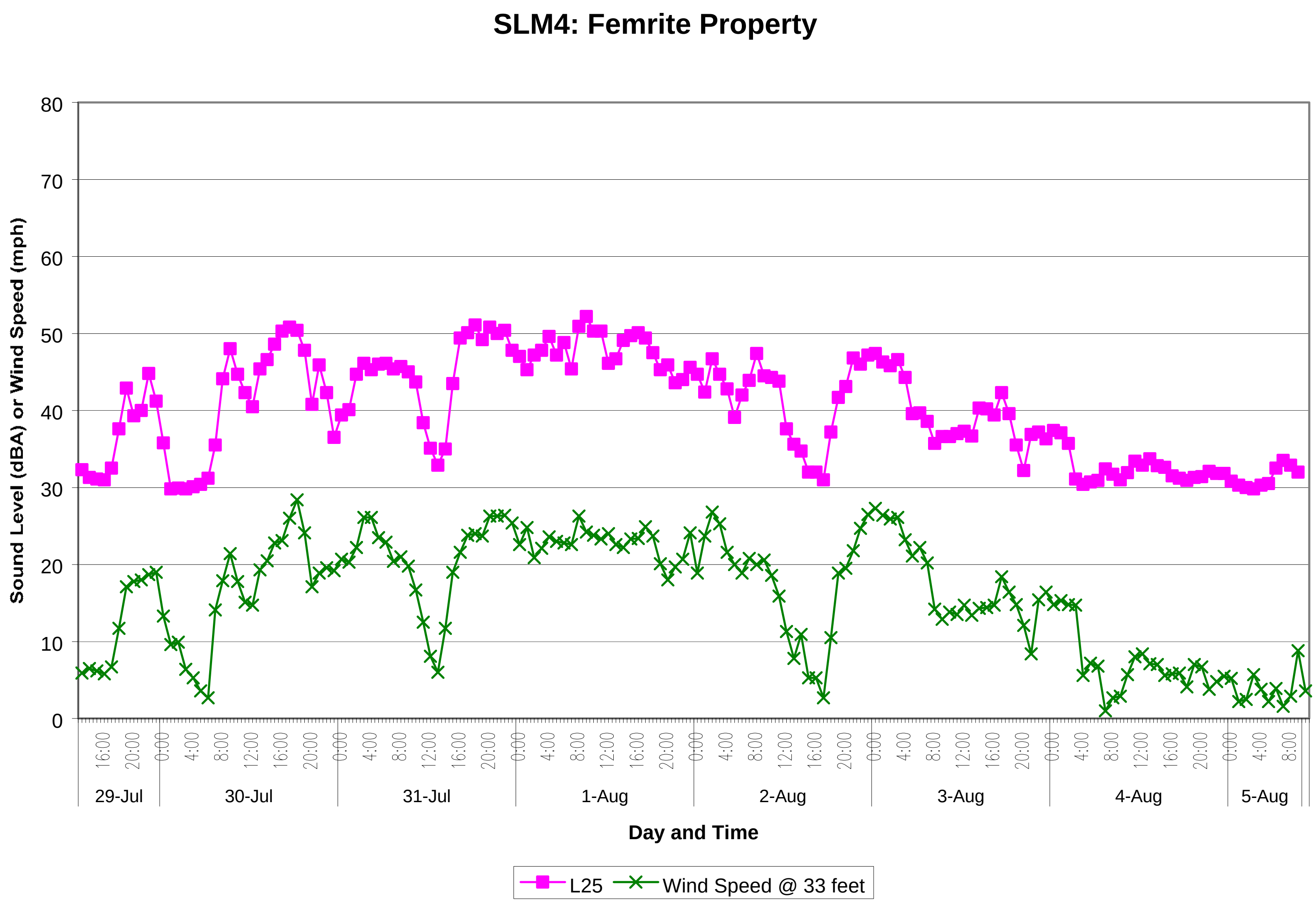
SLM4 – Femrite Property, Eastern Parcels									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_2**	**L_8**	**L_{25}**	**L_{90}**
29-Jul	13:00:00	5	32.8	53.5	29.7	37.9	34.8	32.3	29.8
	14:00:00	5.9	31.4	46.5	29.6	36.2	33.3	31.3	29.6
	15:00:00	6.5	31.5	50	29.7	36.3	32.8	31.1	29.7
	16:00:00	6.2	31.1	45.8	29.7	35.1	32.7	31	29.7
	17:00:00	5.8	32.4	48.2	29.8	37.7	34.9	32.5	30.2
	18:00:00	6.7	37.7	63.3	29.8	45.4	42.1	37.6	30.5
	19:00:00	11.7	42.7	59	31.3	50.7	46.9	42.9	34
	20:00:00	17.1	39.2	55.1	30.6	46.7	43.3	39.3	32.3
	21:00:00	17.8	39.7	54.9	30.9	46.5	43.3	40	33.9
	22:00:00	18	44.4	61.7	32.6	51.7	48.5	44.8	37.3
	23:00:00	18.7	41.1	58.9	30.9	48.5	44.9	41.2	34.9
30-Jul	0:00:00	19	36.7	53.4	29.5	45.4	40.5	35.8	30.2
	1:00:00	13.3	29.8	49.9	29.3	30.9	30.2	29.8	29.3
	2:00:00	9.6	30.1	47.2	29.3	32.5	30.7	29.9	29.3
	3:00:00	9.9	30	53.9	29.3	31.9	30.3	29.8	29.3
	4:00:00	6.4	30.3	49.3	29.3	33.9	31.4	30.1	29.3
	5:00:00	5.3	31.2	50.7	29.3	36.4	31.4	30.4	29.3
	6:00:00	3.6	31.2	49.2	29.5	35.1	32.8	31.2	29.5
	7:00:00	2.7	37.3	56.9	29.9	46.5	41.4	35.5	30.3
	8:00:00	14.1	44.7	70.2	31.1	51.4	47.9	44.1	34.1
	9:00:00	17.9	47.5	67	32.5	55.2	52	48	37.5
	10:00:00	21.4	44.1	59.4	31.9	51.6	48.5	44.7	35.4
	11:00:00	17.8	41.5	56.1	30.3	48.7	45.9	42.3	33.5
	12:00:00	15.1	40.6	57.9	30.1	49	44.8	40.5	31.6
	13:00:00	14.7	45.2	63.9	30.9	52.9	49.5	45.4	35.3
	14:00:00	19.3	46.3	64.6	30.9	54.2	50.8	46.6	35.9
	15:00:00	20.5	48.1	62.8	32.6	55.5	52.6	48.6	38.6
	16:00:00	22.8	49.8	65.5	33.4	57.4	54.4	50.3	39.3
	17:00:00	23.1	50.5	70	35.9	58.3	55	50.8	40.4
	18:00:00	26	50.3	66.1	34.9	58.3	54.9	50.4	39.7
	19:00:00	28.4	47.9	63.8	31.4	56.4	52.5	47.8	36.4
	20:00:00	24.1	41.1	58.1	30.9	49.5	45.3	40.8	32.6
	21:00:00	17.1	46.5	64.3	32.1	55.1	51.1	45.9	36.5
	22:00:00	18.9	43.7	64.1	31.5	52.8	47.7	42.3	33.8
	23:00:00	19.6	38.8	65.1	30.7	47.7	41.8	36.5	31.8
31-Jul	0:00:00	19.2	39.6	60.7	31.3	47.5	43.6	39.4	32.8
	1:00:00	20.7	40.4	58.4	31.8	48.4	44.5	40.1	33.4
	2:00:00	20.3	44.8	62.6	32.3	52.9	49.3	44.7	35.2
	3:00:00	22.2	46.1	63.7	33.9	54.2	50.5	46.1	37.1

SLM4 – Femrite Property, Eastern Parcels									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
	4:00:00	26.1	45.3	63.7	32.8	53.3	49.6	45.3	36
	5:00:00	26.1	46	62.3	32.3	54.2	50.6	46	36
	6:00:00	23.5	46.5	64.3	34	54.9	50.9	46.1	37
	7:00:00	22.9	45.5	63.8	31.7	53.6	49.8	45.4	35.8
	8:00:00	20.4	45.5	65.2	32.4	53.4	49.8	45.7	36.5
	9:00:00	21	45	61.5	31.9	52.9	49.4	45	36.8
	10:00:00	19.8	43.1	60.6	31.6	50.3	47.4	43.7	35.2
	11:00:00	16.7	38	54.8	29.9	45.3	42	38.4	31.7
	12:00:00	12.5	35.3	53.6	29.8	42.3	38.8	35.1	30.5
	13:00:00	8.1	37.9	63.4	29.7	44.9	38.4	32.9	30
	14:00:00	6	36.5	55.6	29.7	45.2	40.1	35	30.1
	15:00:00	11.7	43.3	60.3	30.1	51.3	47.7	43.5	33.2
	16:00:00	19	53	82.4	32.8	58.9	53.7	49.4	38
	17:00:00	21.6	49.4	67.6	34.4	56.9	53.9	50.1	39.8
	18:00:00	23.8	51.1	68.2	34.7	59.1	55.4	51.1	40.3
	19:00:00	24	49	67	34.2	57.2	53.6	49.2	38.8
	20:00:00	23.7	50.7	68.2	35.9	58.9	55.3	50.8	40.5
	21:00:00	26.3	50.6	68.8	36.4	59.3	55.2	50	40.7
	22:00:00	26.3	49.9	64.7	37.1	57.6	54.3	50.4	41.4
	23:00:00	26.4	47.5	67.7	34.2	55.1	51.9	47.8	38.1
1-Aug	0:00:00	25.4	46.8	62.6	32.9	54.9	51.6	47	36.3
	1:00:00	22.6	45.5	69.4	32.7	53.7	49.7	45.3	35.6
	2:00:00	24.8	47.3	65.5	32.7	55.6	51.6	47.2	37.2
	3:00:00	20.9	47.8	64.8	33.2	56	52.2	47.8	37.9
	4:00:00	22.1	49.8	67.9	34.4	58	54.2	49.6	39.2
	5:00:00	23.6	47.6	66.5	34.5	56.2	52.2	47.2	37.5
	6:00:00	23	49.1	66.7	32.8	57.5	53.5	48.8	37.7
	7:00:00	22.8	44.9	61.8	32.2	52.7	49.5	45.4	35.7
	8:00:00	22.6	50.5	66.1	33.2	58.4	55.1	50.9	39.7
	9:00:00	26.3	51.7	67.6	35.1	59.5	56.3	52.2	40.4
	10:00:00	24.2	49.6	64.4	34.4	57.2	54.1	50.3	40
	11:00:00	23.8	49.3	63	33.1	56.5	53.8	50.3	39.9
	12:00:00	23.3	45.5	62.1	32.5	53.1	49.9	46.1	36.8
	13:00:00	24	46.3	62.8	32	54.1	50.6	46.7	37
	14:00:00	22.6	48.8	65.1	33.1	56.6	53.2	49.1	38.9
	15:00:00	22.2	49.3	66.2	33.3	56.9	53.7	49.7	38.5
	16:00:00	23.3	49.5	68.7	33.1	57.1	54	50.1	39.2
	17:00:00	23.4	49	66.6	33.2	56.9	53.5	49.4	38.9
	18:00:00	24.9	47.5	66.1	33.2	55.6	51.9	47.5	37.3
	19:00:00	23.7	45.4	64.8	32.1	53.8	50.1	45.3	35.8

SLM4 – Femrite Property, Eastern Parcels									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
	20:00:00	20.1	46.1	62.2	32.7	54.6	50.6	45.9	36.5
	21:00:00	18	44.3	65.6	32.8	52.8	48.6	43.6	36.2
	22:00:00	19.7	44.8	62.8	33.1	53.5	49.3	44	35.4
	23:00:00	20.7	45.7	64.4	32.3	53.9	50.1	45.6	35.6
2-Aug	0:00:00	24.1	44.6	59.9	32.8	52.7	48.9	44.7	35.7
	1:00:00	18.9	42.2	65.9	31.7	50.1	46.6	42.4	33.6
	2:00:00	23.7	46.2	61.7	32.7	53.9	50.8	46.7	36.8
	3:00:00	26.8	44.3	59.2	31.7	52.4	48.9	44.7	35
	4:00:00	25.3	42.4	59.3	30.8	50.1	46.8	42.8	33.5
	5:00:00	21.6	39.2	58.4	30.4	47.2	43.5	39.1	31.7
	6:00:00	20	41.9	60.1	30.8	49.9	46.2	42	33.1
	7:00:00	18.9	43.1	57.4	30.8	50.4	47.6	43.9	34.6
	8:00:00	20.8	46.7	61.9	31.9	54.1	51	47.4	37
	9:00:00	20	44.3	60.7	31.7	52.3	48.7	44.5	34.5
	10:00:00	20.6	44	60.1	31.1	52	48.4	44.3	33.9
	11:00:00	18.6	43.1	57.6	30.8	50.4	47.6	43.8	33.9
	12:00:00	15.9	37.1	60.8	30.3	43.8	41	37.6	31.5
	13:00:00	11.3	35.8	59.1	30	42.3	38.6	35.6	31.1
	14:00:00	7.8	35.3	55.7	30.1	42.4	37.9	34.7	30.8
	15:00:00	10.9	32.3	48.7	29.8	38	34.5	32	30.2
	16:00:00	5.3	34.8	56.6	29.8	43.2	36.9	32	30.1
	17:00:00	5.3	32.8	56.7	29.7	40.6	33.6	31	29.7
	18:00:00	2.7	37.5	56.6	29.7	45.7	42.1	37.2	29.8
	19:00:00	10.5	41.6	60.5	31.2	49.3	45.9	41.7	33.4
	20:00:00	18.9	43.1	61.4	31.8	51.3	47.6	43.1	34.1
	21:00:00	19.5	47	65.2	32.8	55.4	51.6	46.8	36.8
	22:00:00	21.8	46.1	64.4	33.7	54.3	50.6	46	36.7
	23:00:00	24.7	46.9	65.2	33.9	54.9	51.4	47.2	37.4
3-Aug	0:00:00	26.5	47.3	62.3	34.4	55.4	51.9	47.4	37.8
	1:00:00	27.3	45.9	62.4	33.8	53.6	50.3	46.3	37.1
	2:00:00	26.4	45.4	61.5	32.9	53.4	49.8	45.8	36.7
	3:00:00	25.9	46.5	63.7	33.3	54.7	50.8	46.6	37.3
	4:00:00	26.1	44.2	59.8	31.2	52.4	48.7	44.3	34.6
	5:00:00	23.2	40.2	62.2	30.3	48.5	44.1	39.6	31.8
	6:00:00	21.1	39.4	59.2	30.2	47	43.8	39.7	31.8
	7:00:00	22.2	38.3	54.6	30.2	45.7	42.5	38.6	31.7
	8:00:00	20.2	35.5	54.7	30	42	39.2	35.7	31
	9:00:00	14.2	45.2	79.3	29.9	49.5	40.8	36.6	31
	10:00:00	12.9	36.2	52.7	30	43	40	36.6	31
	11:00:00	13.8	38.4	59	29.9	45.3	40.9	37	31.1

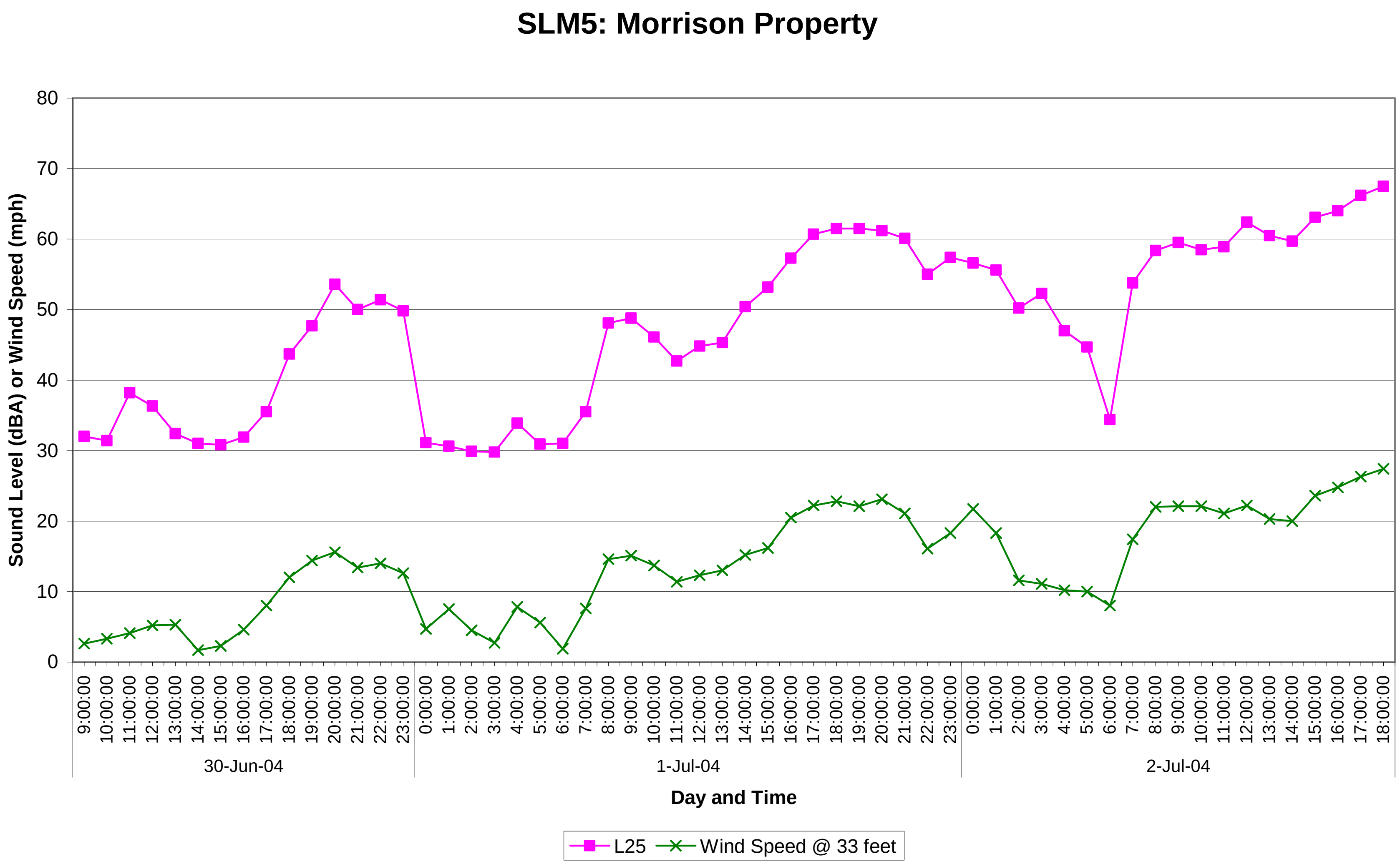
SLM4 – Femrite Property, Eastern Parcels									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
	12:00:00	13.5	37	52.9	30	44	41	37.3	31.2
	13:00:00	14.7	36.9	62.8	29.9	44.3	40.7	36.7	30.7
	14:00:00	13.4	40.6	58.1	30.1	48.9	44.8	40.3	32.1
	15:00:00	14.3	40.1	59.2	30.3	48.1	44.5	40.2	32.3
	16:00:00	14.4	39.5	64.8	30.4	47.4	43.5	39.4	32
	17:00:00	14.7	42	58.6	30.8	49.6	46.5	42.3	33.5
	18:00:00	18.4	41	67.2	30.2	48.8	43.9	39.6	31.9
	19:00:00	16.4	36.5	56.1	29.8	45.1	40.2	35.5	30.3
	20:00:00	14.8	32.3	47.6	29.7	37.8	34.8	32.2	30.1
	21:00:00	12.1	37	54.2	30.1	44.8	40.9	36.9	31.2
	22:00:00	8.4	37.1	53.6	30.3	44.6	41.2	37.2	31.6
	23:00:00	15.4	35.8	54.2	30.3	42.5	39.6	36.3	31.2
4-Aug	0:00:00	16.4	37	52.8	30.5	43.7	40.8	37.4	31.6
	1:00:00	14.8	36.8	51.5	30.2	43.7	40.9	37.1	31.4
	2:00:00	15.3	35.8	52.2	30.2	43.1	39.7	35.7	30.8
	3:00:00	14.8	31.6	47.2	29.6	36.8	33.1	31.1	29.7
	4:00:00	14.7	30.9	44	29.3	36.5	32	30.4	29.3
	5:00:00	5.6	30.4	44.2	29.3	33	31.2	30.7	29.3
	6:00:00	7.2	31.4	51.3	29.4	35.7	32	30.9	29.6
	7:00:00	6.8	43	80.7	29.7	42.4	36.2	32.4	30.1
	8:00:00	1	33.6	60.7	29.5	41.3	34.7	31.7	29.9
	9:00:00	2.7	31.1	52.9	29.6	34.6	32.5	31	29.6
	10:00:00	2.9	32.7	49.4	29.8	39.6	34.5	31.9	30.2
	11:00:00	5.7	37.7	60.8	29.9	44	37.1	33.4	30.3
	12:00:00	8	33.6	51	29.9	39.8	35.9	32.9	30.2
	13:00:00	8.4	34.8	60.5	29.9	41.5	36.9	33.7	30.3
	14:00:00	7.1	43.9	72.3	29.8	42.2	36.5	32.8	30.2
	15:00:00	7	33.3	50.9	29.7	40.2	35.9	32.6	30.2
	16:00:00	5.6	32.1	58.9	29.7	36.8	33.6	31.5	30.1
	17:00:00	5.8	32	49.3	29.6	37.7	33.2	31.2	29.7
	18:00:00	5.9	32.2	50.5	29.6	39.2	33.2	30.9	29.6
	19:00:00	4.1	31.7	51.7	29.6	36.8	33.7	31.3	29.6
	20:00:00	7	34.8	72.9	29.6	38.7	34.2	31.4	29.6
	21:00:00	6.7	31.9	47.4	29.8	35.9	33	32.1	30.3
	22:00:00	3.8	40.1	63.4	29.7	44.1	32.9	31.8	30.2
	23:00:00	4.8	31.6	44.4	29.7	35.1	32.7	31.8	30.2
5-Aug	0:00:00	5.5	30.5	41.9	29.5	32.8	31.6	30.8	29.5
	1:00:00	5.2	30.1	39.8	29.2	32.4	30.9	30.3	29.2
	2:00:00	2.2	56	82.5	29.2	46.2	33.5	30	29.2
	3:00:00	2.5	29.9	44.2	29.2	32.1	30.4	29.8	29.2

SLM4 – Femrite Property, Eastern Parcels									
Date	**Time**	**Wind Speed**	**L_{eq}**	**L_{max}**	**L_{min}**	**L_{2}**	**L_{8}**	**L_{25}**	**L_{90}**
	4:00:00	5.7	30.3	44	29.3	33.3	31.2	30.3	29.3
	5:00:00	3.8	30.5	47.1	29.3	33.8	31.3	30.5	29.3
	6:00:00	2.2	33.1	50.4	29.6	40	36.1	32.5	30.1
	7:00:00	3.9	33.8	57.3	29.9	38.9	35.8	33.5	30.9
	8:00:00	1.6	41.7	77.8	29.7	45.3	36.6	32.9	30.3
	9:00:00	2.9	38.1	69.3	29.7	39.2	34.4	32	30.2


SLM4: Femrite Property
Sound Level (dBA) or Wind Speed (mph)
80
70
60
50
40
30
20
10
0
16:00
20:00
0:00
4:00
8:00
12:00
29-Jul
30-Jul
31-Jul
1-Aug
2-Aug
3-Aug
4-Aug
5-Aug
Day and Time
L25
Wind Speed @ 33 feet

SLM5: Morrison Property, Easternmost Parcel									
Date	**Time**	**Wind Speed**	**Leq**	**Lmax**	**Lmin**	**L2**	**L8**	**L25**	**L90**
30-Jun-04	9:00:00	2.6	38.5	71.5	29.3	45.6	37.1	32	29.3
	10:00:00	3.3	34.8	58.4	29.3	42.1	34.4	31.4	29.3
	11:00:00	4.1	44.7	73.9	29.3	54.3	47.7	38.2	30.1
	12:00:00	5.2	41.4	67.4	29.2	48.7	44.1	36.3	29.6
	13:00:00	5.3	33.8	64.7	29.2	39.5	35.3	32.4	29.4
	14:00:00	1.7	32.8	52.9	29.2	40.9	34.6	31	29.2
	15:00:00	2.3	32.7	50.7	29.2	40.6	33.8	30.8	29.2
	16:00:00	4.6	32.2	58.2	29.2	37.3	34.1	31.9	29.2
	17:00:00	8	37.3	61	29.2	45.8	41.2	35.5	29.3
	18:00:00	12	44.2	66.3	29.2	53	48.9	43.7	31.3
	19:00:00	14.4	48.3	68.8	29.5	57.1	52.9	47.7	33.3
	20:00:00	15.6	53.2	68.6	30.3	61.3	57.9	53.6	39.9
	21:00:00	13.4	49.9	67.8	29.8	58.2	54.5	50	38.1
	22:00:00	14	51.5	72.3	29.6	60	56	51.4	37.8
	23:00:00	12.6	49.4	68.2	29.4	57.6	54.1	49.8	35
1-Jul-04	0:00:00	4.7	31.9	50.1	29.1	38.5	34.5	31.1	29.2
	1:00:00	7.5	32.4	52.9	28.9	40.4	34.8	30.6	29.1
	2:00:00	4.5	30.4	47.8	28.9	35.9	32.1	29.9	29.1
	3:00:00	2.7	29.3	41.1	28.9	30.5	29.9	29.8	29.1
	4:00:00	7.8	34.3	56	29.1	41.6	37.8	33.9	29.4
	5:00:00	5.6	31.8	53.4	29.2	38.6	33.6	30.9	29.2
	6:00:00	1.9	32.7	53.6	29.3	39.3	33.5	31	29.3
	7:00:00	7.6	38.2	59.9	29.2	47.6	42.7	35.5	29.4
	8:00:00	14.6	48.4	70.6	29.8	56.6	52.9	48.1	35.8
	9:00:00	15.1	48.7	67.5	29.8	56.9	53.3	48.8	35.4
	10:00:00	13.7	46.5	66.4	29.9	55.3	51.4	46.1	33.5
	11:00:00	11.4	43.5	65.5	29.8	52.5	48.2	42.7	31.5
	12:00:00	12.3	45.8	65.1	29.7	54.9	50.6	44.8	31.6
	13:00:00	13	46.3	67.6	29.8	55.2	50.7	45.3	31.6
	14:00:00	15.2	51	70.1	29.7	60	55.8	50.4	33.9
	15:00:00	16.2	53.3	71.5	30	61.7	57.9	53.2	39.2
	16:00:00	20.5	56.9	73.9	31.7	64.8	61.6	57.3	44.3
	17:00:00	22.2	59.9	75	34.1	67.7	64.7	60.7	47.2
	18:00:00	22.8	60.8	76.9	35.2	68.6	65.5	61.5	48.3
	19:00:00	22.1	61.1	77.9	36.1	69.2	65.7	61.5	48.3
	20:00:00	23.1	61	78.2	35.3	69.2	65.8	61.2	47.9
	21:00:00	21.1	59.7	78.4	34.5	67.6	64.3	60.1	47.6
	22:00:00	16.1	54.8	75.9	31.5	63	59.4	55	41.4
	23:00:00	18.3	57.1	73.2	32.8	65.3	61.8	57.4	43.4

2-Jul-04	0:00:00	21.7	56.6	76.1	32.5	65.1	61.4	56.6	42.3
	1:00:00	18.3	55.6	75.9	30.5	64.3	60.4	55.6	40.9
	2:00:00	11.6	50.2	69.6	29.9	58.7	54.8	50.2	37.9
	3:00:00	11.1	52.1	67.7	30.6	60.4	56.7	52.3	39.4
	4:00:00	10.2	46.9	65.3	29.7	55.3	51.8	47	34.2
	5:00:00	10	45.4	66.6	29.4	54.1	49.9	44.7	30.3
	6:00:00	8	38	62.4	29.4	46.9	40.2	34.4	29.9
	7:00:00	17.4	54.8	77.4	29.4	64.3	59.8	53.8	30.8
	8:00:00	22	58.4	77.4	33.5	66.9	63.1	58.4	43.8
	9:00:00	22.1	59.2	75.6	34.9	67.5	64	59.5	44.2
	10:00:00	22.1	58.1	73.9	33.4	66.2	62.8	58.5	44.2
	11:00:00	21.1	58.8	77.5	32.9	67.1	63.6	58.9	44.5
	12:00:00	22.2	61.6	77.1	37.1	69.3	66.2	62.4	50.1
	13:00:00	20.3	60	75.3	34.9	67.9	64.7	60.5	47.3
	14:00:00	20	59.3	75.6	33.5	67.5	64.1	59.7	46.2
	15:00:00	23.6	62.4	79.1	34.6	70.2	67.1	63.1	49.3
	16:00:00	24.8	63.3	77.1	35.8	71	68	64	50.3
	17:00:00	26.3	65.4	81.6	38.6	73.1	70	66.2	53.1
	18:00:00	27.4	66.8	83.1	38	74.5	71.4	67.5	54.2


SLM5: Morrison Property
Sound Level (dBA) or Wind Speed (mph)
0
10
20
30
40
50
60
70
80
30-Jun-04
1-Jul-04
2-Jul-04
Day and Time
L25
Wind Speed @ 33 feet

Appendix F, Exhibit 2
Brief Description of Site Visit to Comparable Operating Wind Farm

Background

Staff from MFG Inc., the firm assigned to perform the noise analysis for the Desert Claim EIS team, visited an operating wind farm on June 29 and 30, 2004 to observe wind turbine noise characteristics. The subject wind energy project is comparable to the proposed Desert Claim project in that it uses a model of wind turbine very similar to the model proposed for the Desert Claim project. The specific purpose of the site visit was to characterize the types of noise heard both near the turbine base and at a location 1,000 feet downwind from the turbine under varying wind conditions. MFG also wanted to characterize the difference between the noise experienced outside and inside a structure. Because there were no existing structures at the prescribed locations, MFG observed the noise experienced outside and inside a parked vehicle (specifically, a Jeep Cherokee). MFG personnel slept inside the vehicle at a position 1,000 feet downwind of the turbines to gauge how audible and/or disturbing the turbine noise may be inside at that distance, particularly while sleeping. It is recognized that the noise reduction experienced inside a vehicle will be somewhat different from the noise reduction experienced inside a residential structure; a structure would be expected to produce more sound attenuation than would a vehicle. A brief description of the turbine noise at varying times and wind conditions is provided below.

Field Observations

The on-site observations began at approximately 7:30 pm. There was a moderate wind with frequent gusts at this time, and the turbines were operating. With the vehicle parked at the base of one of the operating turbines and the engine running, the turbines could not be heard. Once the vehicle engine was turned off, the turbine noise was audible and distinct from the wind noise. Outside of the vehicle, the turbine noise was quite noticeable during times when wind noise was not dominating (i.e., when the wind was not gusting). No pulsing or tones were audible at this time, although an interesting aerodynamic noise was noticeable, something akin to a "swishing" noise. The turbines were audible at a location 1,000 feet to the east (downwind from the turbine) in a plowed field with no protection from the wind, but no pulses or tones were noticed in this observation. Wind noise, rather than turbine noise, dominated.

By approximately 9:30 pm, the winds had shifted direction and were coming from the southwest or south-southwest instead of the west. The turbine blades had rotated accordingly. Because of the shift in wind direction, noise could be experienced 1,000 feet downwind from the nearest turbine while remaining on the project access road. Outside the vehicle at this time, the turbine noise was audible but the wind noise also contributed greatly to the overall sound level. Inside the vehicle, the overall sound levels were fairly low but there was a noticeable pulsing hum similar to a distant light aircraft. The pulse was noticeable but did not prevent sleep.

At 1:30 am, sleep was interrupted by heavier winds and wind noise. There were no noticeable tones or pulses from the turbines inside the vehicle at 1,000 feet from the turbine at this time.

At approximately 5:20 am, the winds were considerably lighter, although the turbines were still operating. No tones or pulses were noticed inside or outside the vehicle at 1,000 feet from the turbine. There were very noticeable tones at the base of the turbine.

Appendix F, Exhibit 3
Discussion of WindPRO Noise Model

The WindPRO model employed for the noise analysis uses algorithms described by the International Standards Organization standard, ISO 9613-2. ISO 9613-2 describes a process for calculating sound levels for calculation of source noise at a distance from a source due to distance attenuation, terrain or barrier effects, atmospheric attenuation, ground effects, directivity of the source, and meteorological influence. WindPRO typically considers broadband A-weighted sound levels, but can make adjustments for octave band data if it is manually entered into the program catalog. A brief discussion of the WindPRO methodology used for each of the sound level adjustment factors follows:

- Directional Correction –If a source is located near one or more reflecting surfaces (e.g., on a floor or in a corner), the surface will reflect the sound energy, effectively doubling, tripling, or quadrupling the sound energy in the direction away from the surface(s), depending on the number of reflecting surfaces. For example, if a sound source is placed on a reflective floor, half the sound energy is reflected from the surface and added to the sound energy dissipating away from the surface in a hemispherical pattern. This would effectively result in a doubling of the sound energy of the source at a distance, or a 3-dBA increase. This correction to account for the surface reflection is called a directional correction. WindPRO uses a simplified "alternate method" described in ISO 9613-2 for estimating the directional correction for a noise source. For most point sources located high above the ground, the directivity is often assumed to be zero, which indicates that the sound energy is not located near any reflecting surfaces, and this radiates and dissipates in a spherical manner away from the source. Although the wind turbines are located high in the air above a somewhat porous (and non-reflective) surface, for this analysis, WindPRO has calculated a directivity factor of 3 dBA for all of the source-receiver combinations. This is obviously a conservative estimate since the primary wind turbine noise sources are not located near a reflecting surface and are not behaving as hemispherical sources.

- Distance Attenuation - As sound energy spreads as it radiates from a source, its energy (and perceived loudness) at a specific location decreases. For a single point source, the sound level decreases at a rate of 6 dBA per doubling of the distance from the source. Sound loss due to divergence of sound energy is the same for all frequencies, and is independent of any weighting scale used. In the absence of hills, barriers, or intervening buildings, distance is the primary mechanism for decreasing the noise from a site.

- Atmospheric Damping – The atmosphere absorbs some of the energy in a sound wave. The amount of absorption depends on the frequency of the sound, the temperature, and relative humidity of the atmosphere. This absorption is small and ignored for short distances, but the effect becomes significant as the distance between the source and receiver increases. Because of the more effective absorption at higher frequencies, atmospheric absorption tends to lower the pitch of noise generated by wind turbines. WindPRO simplifies this otherwise complex computation by estimating the atmospheric absorption only at a frequency of 500 hertz under the worst-case condition of a temperature of 10 ºC and a relative humidity of 70%.

- Terrain Damping or Ground Effects - The surfaces over which sound waves travel affect the amount of sound at a distant receptor in a complex manner. Hard surfaces such as asphalt can reflect energy and increase the noise level at distant receptors. A soft surface will absorb sound energy, reducing the noise level at a distant receptor. In addition, the surface can produce a reflected wave that interferes with the direct sound wave and actually reduces or increases the sound level expected due to distance. These interactions are commonly referred to as “ground effects.” In addition to surface qualities, the magnitude of the ground effect depends on the height of the source and receiver and the frequency of the sound. In the site area, most of the ground is “soft” and therefore tends to absorb rather than reflect sound. WindPRO uses a simplified algorithm described in the WindPRO manual and ISO 9613-2 to calculate the ground effects at a distance. Unfortunately, it appears that WindPRO does not properly consider the occasions when the calculation is less than zero. When the calculated ground effects correction is less than zero, the correction given should be zero. WindPRO incorrectly applies the absolute value of the level. For the Desert Claim site, this results in a ground effects correction greater than zero for some of the nearest turbine-receptor combinations, when no correction should be given. For the wind turbines nearest the receptors, this likely overstates the ground effects somewhat. For the more distant turbines, the ground effects are likely to be greater than zero and are likely correct.

- Barrier or Shielding Correction - If a wall or hillside obstructs the line-of-sight between a noise source and receiver, the sound waves must bend (or refract) around the obstruction in order to reach the receiver. WindPRO allows a manual correction factor to be input by the modeler. However, because much of the site and adjacent properties are relatively flat, there is little natural topography that would serve as a noise barrier. Also, the noise sources are located very high with little potential for barriers obstructing the noise source to receiver path. Therefore, no barrier correction was used in this analysis.

- Meteorological Effects - Sound propagation through the atmosphere is also affected by wind and by temperature change with height. With a temperature inversion, temperatures at the ground surface are lower than the temperatures aloft and the atmosphere is said to be stable. This causes sound waves radiating upward to bend back toward the ground, which effectively reduces distance attenuation. Sound traveling downwind also bends downward. WindPRO and ISO 9613-2 allow for an estimate of meteorological effects typically by considering either moderate wind speeds between 1 and 5 m/s over a short period of time or considering the average meteorological conditions over an annual period. No corrections were made to the predicted sound levels to account for meteorological effects.

Exhibit 4
WindPRO Noise Output

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 27 through 34, 62o and 64o, 105 through 114, 149 through 166
120 GE 1.5s (180MW) 70.5m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

Printed/Page
07/21/2004 23:49 / 1

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:47/2.3.0.216

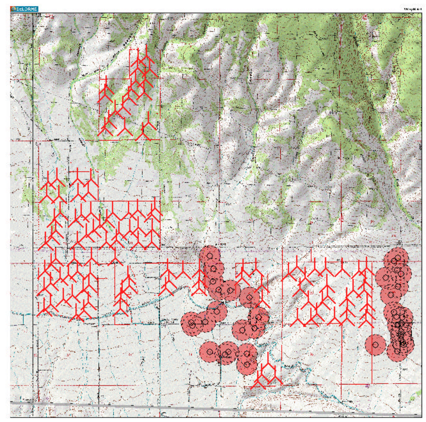
DECIBEL - Main Result

Calculation: 040720 Noise, southeast area

ISO 9613-2

The calculation is based on the international norm "ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors"

Wind speed in 10 m height: 8.0 m/s
Meteorological correction factor, C0: 0.0 dB



Scale 1:200,000

New WTG   Noise sensitive area

WTGs

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	Creator	Name	LwA,ref [dB(A)]	Pure tones	Octave data
001	683,014	5,226,319	1,110	001	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
002	682,804	5,226,234	1,074	002	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
003	682,791	5,226,001	1,025	003	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
004	683,105	5,225,970	1,025	004	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
005	682,740	5,225,651	961	005	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
006	682,994	5,225,693	980	006	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
007	681,975	5,225,474	920	007	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
008	682,634	5,225,428	927	008	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
009	682,981	5,225,355	923	009	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
010	681,946	5,225,268	900	010	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
011	682,569	5,225,217	900	011	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
012	682,426	5,224,961	880	012	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
013	682,232	5,224,844	863	013	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
014	683,114	5,224,561	846	014	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
015	682,061	5,224,572	825	015	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
016	682,499	5,224,392	819	016	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
017	681,965	5,224,388	803	017	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
018	682,979	5,224,272	826	018	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
019	681,632	5,223,025	731	019	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
020	680,746	5,223,014	742	020	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
021	681,284	5,223,026	737	021	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
022	680,495	5,222,921	743	022	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
023	681,306	5,222,614	723	023	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
024	680,481	5,222,564	729	024	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
025	681,589	5,222,672	721	025	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
026	680,800	5,222,554	728	026	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
027	682,253	5,222,153	705	027	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
028	682,664	5,222,171	709	028	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
029	682,712	5,221,699	690	029	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
030	682,901	5,222,242	715	030	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
031	682,937	5,221,783	695	031	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
032	683,278	5,222,135	714	032	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
033	683,318	5,221,753	697	033	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
034	683,306	5,221,415	685	034	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
035	683,360	5,222,311	722	035	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
036	680,493	5,221,315	691	036	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
037	680,706	5,221,921	708	037	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
038	680,489	5,220,566	666	038	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
039	680,490	5,220,109	651	039	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 27 through 34, 62o and 64o, 105 through 114, 149 through 166
120 GE 1.5s (180MW) 70.5m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

Printed/Page
07/21/2004 23:44 / 2

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:47/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, southeast area

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
040	680,514	5,219,556	634	040	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
041	680,661	5,220,731	671	041	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
042	680,675	5,219,682	638	042	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
043	680,852	5,222,121	717	043	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
044	680,659	5,220,251	656	044	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
045	680,656	5,221,461	695	045	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
046	680,776	5,220,888	675	046	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
047	680,753	5,221,644	700	047	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
048	680,913	5,220,382	660	048	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
049	681,367	5,219,446	635	049	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
050	681,010	5,219,827	645	050	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
051	681,354	5,220,572	666	051	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
052	681,532	5,220,095	653	052	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
053	681,332	5,221,353	689	053	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
054	681,673	5,219,767	644	054	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
055	682,558	5,220,102	647	055	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
056	681,566	5,221,558	694	056	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
057	681,263	5,220,913	676	057	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
058	681,567	5,219,546	638	058	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
059	681,676	5,220,233	657	059	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
060	681,675	5,222,134	709	060	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
061	681,707	5,220,549	666	061	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
062	681,245	5,219,941	648	062	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
063	682,099	5,221,366	685	063	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
064	682,377	5,221,436	680	064	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
065	682,429	5,221,643	685	065	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
066	682,530	5,219,631	636	066	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
067	682,538	5,219,890	641	067	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
068	682,745	5,220,236	648	068	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
069	682,948	5,221,392	681	069	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
070	683,722	5,220,210	638	070	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
071	683,802	5,220,409	641	071	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
072	683,762	5,220,692	652	072	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
073	684,611	5,220,451	655	073	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
074	684,595	5,220,725	680	074	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
075	684,609	5,220,225	644	075	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
076	685,724	5,220,530	658	076	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
077	685,764	5,220,737	664	077	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
078	686,091	5,220,775	663	078	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
079	686,261	5,220,367	678	079	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
080	686,301	5,219,957	647	080	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
081	682,706	5,220,478	654	081	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
082	681,415	5,222,087	709	082	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
083	684,158	5,220,654	651	083	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
084	681,259	5,221,945	705	084	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
085	681,731	5,220,931	677	085	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
086	682,344	5,220,953	673	086	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
087	681,123	5,220,481	664	087	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
088	682,103	5,221,953	698	088	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
089	681,910	5,221,823	697	089	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
090	681,750	5,221,684	697	090	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
091	687,250	5,219,497	668	091	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
092	687,601	5,219,511	680	092	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
093	687,511	5,219,965	687	093	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
094	687,945	5,220,852	720	094	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
095	688,830	5,220,812	741	095	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
096	687,669	5,220,826	715	096	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
097	689,042	5,220,901	748	097	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
098	687,421	5,220,582	700	098	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
099	687,279	5,220,288	692	099	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
100	687,888	5,219,951	699	100	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
101	688,026	5,220,123	702	101	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 27 through 34, 62o and 64o, 105 through 114, 149 through 166
120 GE 1.5s (180MW) 70.5m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:47/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, southeast area

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
102	687,992	5,220,421	709	102	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
103	688,697	5,220,308	720	103	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
104	688,391	5,220,848	731	104	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
105	688,993	5,220,311	724	105	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
106	689,076	5,219,960	714	106	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
107	688,537	5,220,075	711	107	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
108	688,567	5,219,790	703	108	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
109	688,546	5,219,547	698	109	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
110	688,227	5,219,566	694	110	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
111	689,071	5,219,520	700	111	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
112	689,083	5,219,735	706	112	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
113	687,186	5,220,886	700	113	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
114	686,969	5,220,695	696	114	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
115	687,742	5,219,655	684	115	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
116	689,009	5,220,533	733	116	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
117	686,507	5,218,310	620	117	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
118	686,696	5,217,949	620	118	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
119	686,344	5,218,001	616	119	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
120	686,235	5,217,814	600	120	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Calculation Results

Sound Level

Noise sensitive area		UTM NAD27 Zone: 10			Demands	Sound Level	Demands fulfilled ?
No	Name	East	North	Z	Noise	Calculated	Noise
				[m]	[dB(A)]	[dB(A)]	
105	105	684,419	5,219,315	616	50.0	39.5	Yes
106	106	684,461	5,219,221	613	50.0	38.9	Yes
107	107	684,806	5,219,342	620	50.0	39.4	Yes
108	108	685,104	5,219,618	629	50.0	40.7	Yes
109	109	684,965	5,220,411	655	50.0	47.2	Yes
110	110	685,942	5,218,236	600	50.0	43.9	Yes
111	111	684,857	5,221,086	680	50.0	44.0	Yes
112	112	685,360	5,218,490	597	50.0	37.8	Yes
113	113	685,444	5,218,569	600	50.0	38.2	Yes
114	114	684,947	5,218,540	600	50.0	36.6	Yes
149	149	689,915	5,218,715	677	50.0	36.3	Yes
150	150	690,087	5,218,888	681	50.0	36.1	Yes
151	151	690,061	5,218,959	683	50.0	36.6	Yes
152	152	689,345	5,218,869	682	50.0	40.4	Yes
153	153	690,022	5,219,029	687	50.0	37.1	Yes
154	154	690,015	5,219,117	689	50.0	37.5	Yes
155	155	690,016	5,219,167	691	50.0	37.8	Yes
156	156	690,013	5,219,246	694	50.0	38.1	Yes
157	157	689,917	5,219,412	702	50.0	39.6	Yes
158	158	690,021	5,219,440	701	50.0	38.7	Yes
159	159	689,878	5,219,636	709	50.0	40.7	Yes
160	160	690,025	5,219,621	708	50.0	39.2	Yes
161	161	689,710	5,220,198	727	50.0	42.9	Yes
162	162	689,884	5,220,423	737	50.0	40.8	Yes
163	163	689,561	5,220,647	743	50.0	44.1	Yes
164	164	689,964	5,220,765	751	50.0	39.5	Yes
165	165	689,856	5,220,867	755	50.0	40.2	Yes
166	166	689,757	5,221,102	765	50.0	40.2	Yes
27	27	685,928	5,218,534	600	50.0	40.3	Yes
28	28	685,430	5,220,179	646	50.0	44.4	Yes
29	29	685,128	5,220,191	645	50.0	44.2	Yes
30	30	684,977	5,220,755	668	50.0	46.2	Yes
31	31	685,798	5,219,141	616	50.0	39.7	Yes
32	32	686,117	5,219,215	620	50.0	40.8	Yes

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 27 through 34, 62o and 64o, 105 through 114, 149 through 166
120 GE 1.5s (180MW) 70.5m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:47/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, southeast area

Noise sensitive area		UTM NAD27 Zone: 10			Demands	Sound Level	Demands fulfilled ?
No	Name	East	North	Z	Noise	Calculated	Noise
				[m]	[dB(A)]	[dB(A)]	
33	33	685,947	5,220,014	640	50.0	46.7	Yes
34	34	686,215	5,219,502	631	50.0	43.3	Yes
62o	62o	689,799	5,219,740	712	50.0	41.8	Yes
64o	64o	689,867	5,221,179	769	50.0	38.9	Yes

Distances (m)

Noise sensitive area

WTG	27	28	29	30	31	32	33	34	64o	62o	105	106	107	108	109	110	111	112	113	114
001	8312	6598	6482	5900	7699	7752	6954	7531	8566	9451	7144	7244	7203	7019	6222	8597	5548	8173	8122	8016
002	8310	6600	6474	5894	7699	7762	6969	7547	8686	9545	7105	7206	7177	7004	6211	8592	5542	8155	8107	7987
003	8099	6392	6262	5683	7490	7557	6768	7346	8563	9397	6881	6983	6957	6789	5998	8380	5332	7938	7891	7766
004	7954	6240	6123	5541	7341	7396	6599	7177	8287	9145	6783	6884	6843	6659	5862	8238	5189	7812	7762	7655
005	7798	6097	5959	5383	7192	7268	6485	7063	8414	9207	6555	6656	6639	6480	5693	8077	5032	7625	7581	7446
006	7737	6028	5901	5321	7127	7191	6401	6979	8223	9041	6535	6636	6604	6431	5638	8019	4969	7582	7533	7415
007	7987	6322	6152	5593	7397	7505	6752	7324	8985	9700	6626	6729	6754	6640	5880	8254	5250	7761	7727	7544
008	7640	5947	5801	5227	7038	7123	6347	6924	8389	9148	6368	6470	6462	6313	5532	7916	4878	7454	7412	7266
009	7430	5726	5593	5014	6823	6894	6109	6687	8053	8832	6209	6310	6284	6117	5327	7710	4663	7265	7219	7093
010	7823	6167	5992	5436	7237	7351	6604	7174	8914	9604	6446	6549	6580	6473	5719	8088	5095	7589	7557	7367
011	7480	5794	5640	5070	6881	6972	6203	6779	8341	9070	6185	6287	6286	6146	5370	7753	4722	7283	7243	7088
012	7319	5647	5482	4919	6726	6829	6072	6645	8347	9034	5987	6090	6102	5977	5210	7589	4574	7105	7069	6898
013	7313	5656	5481	4925	6726	6839	6093	6663	8469	9127	5946	6049	6074	5963	5208	7578	4584	7082	7049	6864
014	6652	4956	4812	4237	6048	6132	5357	5934	7553	8242	5406	5507	5486	5329	4544	6928	3888	6473	6429	6294
015	7170	5536	5348	4803	6592	6719	5990	6554	8512	9123	5762	5865	5907	5814	5074	7430	4469	6919	6891	6687
016	6788	5132	4956	4401	6201	6316	5573	6142	8038	8656	5428	5531	5552	5438	4683	7053	4061	6559	6525	6343
017	7069	5452	5255	4719	6498	6633	5915	6476	8529	9109	5635	5738	5791	5710	4982	7326	4389	6805	6780	6564
018	6451	4771	4612	4045	5854	5951	5190	5764	7551	8188	5162	5264	5258	5116	4342	6724	3698	6253	6213	6060
019	6215	4746	4500	4042	5696	5885	5262	5781	8439	8803	4640	4741	4862	4864	4236	6443	3763	5871	5864	5577
020	6850	5475	5213	4796	6366	6579	6004	6500	9304	9627	5213	5309	5474	5525	4957	7059	4541	6462	6468	6137
021	6461	5029	4776	4335	5956	6155	5551	6061	8779	9127	4858	4957	5097	5119	4515	6681	4066	6098	6097	5791
022	6983	5646	5377	4978	6512	6734	6179	6664	9533	9833	5329	5424	5603	5670	5126	7185	4732	6580	6590	6246
023	6165	4789	4525	4115	5678	5891	5320	5812	8680	8966	4536	4633	4791	4837	4271	6376	3866	5783	5787	5464
024	6776	5494	5218	4846	6324	6556	6032	6500	9488	9737	5105	5198	5393	5482	4974	6968	4619	6356	6371	6011
025	5996	4579	4322	3893	5494	5697	5105	5608	8412	8718	4391	4490	4630	4656	4063	6215	3633	5631	5630	5324
026	6516	5204	4931	4548	6052	6278	5740	6216	9171	9429	4857	4951	5135	5210	4684	6715	4314	6108	6119	5771
027	5158	3740	3481	3062	4652	4854	4269	4767	7676	7922	3570	3670	3797	3815	3223	5381	2814	4803	4799	4507
028	4887	3409	3161	2712	4359	4545	3928	4442	7271	7538	3352	3454	3548	3531	2897	5121	2447	4563	4550	4289
029	4512	3114	2848	2454	4008	4215	3648	4135	7174	7353	2932	3033	3153	3171	2595	4736	2231	4160	4155	3870
030	4787	3264	3028	2554	4244	4416	3774	4300	7047	7338	3297	3400	3470	3426	2759	5029	2272	4486	4467	4230
031	4416	2964	2708	2284	3894	4087	3491	3994	6956	7160	2879	2981	3074	3063	2448	4649	2043	4088	4076	3815
032	4471	2908	2684	2189	3913	4073	3409	3944	6658	6947	3042	3145	3184	3110	2412	4722	1896	4198	4172	3964
033	4144	2634	2391	1936	3602	3778	3152	3669	6574	6786	2675	2778	2833	2784	2124	4388	1677	3849	3829	3602
034	3895	2457	2195	1797	3374	3570	2990	3482	6565	6706	2377	2479	2559	2542	1939	4130	1586	3574	3560	3310
035	4567	2972	2760	2244	3999	4146	3460	4005	6605	6933	3178	3280	3302	3208	2487	4824	1934	4313	4283	4091
036	6105	5066	4769	4519	5733	6003	5607	6002	9375	9438	4406	4487	4743	4913	4562	6259	4370	5627	5662	5248
037	6224	5035	4748	4427	5801	6050	5577	6017	9191	9351	4536	4625	4844	4964	4519	6403	4234	5782	5804	5424
038	5806	4956	4654	4492	5497	5788	5486	5824	9398	9347	4124	4194	4487	4711	4479	5930	4399	5295	5342	4897
039	5661	4940	4639	4533	5396	5698	5458	5757	9438	9316	4008	4069	4384	4640	4485	5765	4475	5132	5188	4725
040	5510	4955	4657	4621	5300	5613	5452	5701	9493	9287	3912	3961	4297	4590	4532	5586	4605	4962	5028	4548
041	5707	4801	4500	4316	5377	5663	5334	5688	9217	9192	4016	4089	4372	4580	4316	5841	4211	5206	5249	4814
042	5377	4781	4482	4434	5151	5462	5282	5543	9313	9124	3762	3814	4145	4429	4352	5462	4411	4834	4897	4422
043	6215	4973	4691	4345	5774	6014	5513	5968	9064	9258	4538	4630	4833	4934	4454	6403	4137	5788	5805	5440
044	5542	4772	4469	4347	5258	5555	5293	5606	9255	9154	3875	3939	4245	4490	4309	5654	4280	5020	5072	4617
045	6030	4943	4649	4378	5641	5905	5485	5894	9215	9304	4332	4415	4660	4815	4435	6192	4218	5564	5594	5191
046	5664	4708	4407	4203	5317	5597	5244	5613	9096	9096	3968	4045	4316	4510	4216	5807	4086	5173	5212	4786
047	6038	4901	4610	4317	5632	5888	5444	5867	9126	9244	4343	4429	4661	4800	4389	6208	4142	5583	5609	5218
048	5345	4522	4219	4081	5040	5333	5047	5375	8989	8909	3665	3733	4030	4260	4052	5468	4006	4833	4880	4435
049	4651	4129	3834	3840	4441	4756	4615	4848	8675	8437	3055	3102	3441	3741	3725	4732	3856	4106	4170	3693
050	5085	4434	4134	4074	4837	5144	4941	5215	8960	8789	3447	3504	3827	4099	3998	5182	4048	4551	4609	4142
051	5007	4095	3793	3628	4669	4953	4627	4977	8535	8486	3313	3388	3665	3869	3615	5148	3541	4515	4554	4128
052	4665	3899	3597	3508	4371	4669	4416	4720	8405	8275	2991	3057	3359	3604	3448	4786	3470	4151	4199	3752
053	5392	4263	3970	3694	4984	5241	4805	5222	8537	8619	3699	3786	4014	4152	3753	5565	3535	4942	4966	4581
054	4430	3780	3481	3449	4172	4478	4281	4550	8315	8126	2783	2841	3162	3434	3354	4535	3446	3902	3957	3496
055	3717	2873	2572	2506	3380	3668	3390	3706	7388	7250	2021	2097	2373	2592	2427	3864	2501	3233	3268	2854
056	5308	4103	3815	3504	4874	5119	4645	5083	8310	8431	3629	3721	3925	4035	3587	5494	3325	4879	4896	4532
057	5237	4231	3932	3717	4869	5142	4769	5149	8608	8616	3537	3618	3876	4053	3736	5391	3598	4760	4793	4382
058	4477	3915	3619	3618	4250	4562	4405	4648	8459	8234	2861	2912	3245	3538	3506	4567	3633	3937	3998	3527
059	4579	3754	3452	3342	4264	4556	4277	4597	8245	8138	2893	2963	3254	3483	3294	4710	3293	4076	4119	3683
060	5572	4233	3962	3578	5095	5315	4769	5248	8247	8469	3934	4031	4195	4253	3714	5779	3350	5182	5188	4860
061	4677	3741	3440	3276	4327	4607	4274	4628	8184	8132	2980	3057	3326	3522	3261	4825	3195	4193	4229	3812
062	4890	4192	3891	3820	4623	4926	4703	4989	8710	8556	3235	3296	3611	3872	3750	4997	3789	4363	4417	3958
063	4762	3536	3249	2942	4317	4558	4079	4518	7770	7870	3097	3191	3380	3476	3021	4956	2772	4348	4360	4012
064	4586	3302	3020	2688	4119	4350	3843	4298	7494	7613	2944	3041	3207	3277	2784	4791	2505	4192	4198	3872
065	4681	3339	3065	2698	4196	4415	3877	4349	7452	7612	3063	3161	3308	3355	2819	4894	2491	4305	4306	3996
066	3571	2951	2658	2693	3305	3611	3438	3687	7499	7270	1915	1974	2294	2574	2557	3686	2744	3051	3101	2652
067	3651	2906	2607	2588	3345	3642	3411	3697	7441	7263	1967	2036	2333	2580	2482	3785	2609	3150	3192	2761
068	3609	2686	2383	2292	3243	3523	3210	3547	7184	7071	1911	1994	2247	2439	2227	3771	2277	3144	3172	2779
069	4129	2763	2489	2127	3632	3845	3300	3774	6922	7047	2545	2646	2767	2792	2243	4350	1933	3773	3768	3483
070	2770	1708	1406	1368	2335	2593	2234	2592	6221	6095	1134	1235	1389	1503	1259	2971	1434	2375	2379	2071
071	2835	1644	1344	1225	2365	2605	2181	2578	6114	6034	1256	1359	1465	1523	1163	3050	1254	2472	2466	2192
072	3058	1745	1455	1217	2559	2780	2288	2726	6124	6112	1526	1629	1707	1719	1235	3284	1164	2721	2709	2457
073	2326	863	579	476	1768	1948	1406	1864	5306	5236	1152	1239	1126	968	356	2584	681	2099	2058	1940
074	2565	998	754	383	1989	2144	1528	2030	5292	5296	1421	1510	1399	1218	485	2830	446	2362	2317	2213
075	2145	822	520	645	1609	1815	1355	1761	5344	5213	930	1015	905	783	402	2394	896	1891	1855	1719
076	2006	458	686	780	1391	1372	562	1139	4194	4151	1783	1819	1501	1103	768	2304	1030	2072	1981	2136
077	2209	650	838	787	1596	1562	746	1315	4127	4156	1957	1999	1692	1299	863	2507	972	2283	2191	2344
078	2247	890	1126	1114	1660	1560	774	1279	3798	3850	2220	2252	1925	1521	1183	2543	1273	2399	2299	2511
079	1863	852	1147	1341	1310	1161	472	866	3696	3593	2121	2134	1780	1378	1297	2155	1577	2082	1975	2250
080	1471	899	1196	1546	959	764	359	463	3770	3505	1988	1982	1617	1244	1411	1758	1833	1743	1631	1960
081	3763	2740	2439	2288	3369	3637	3274	3642	7195	7131	2070	2159	2388	2548	2260	3937	2235	3316	3338	2963
082	5744	4445	4169	3803	5281	5510	4984	5452	8501	8706	4088	4182	4363	4439	3926	5943	3585	5339	5349	5006
083	2762	1358	1075	825	2231	2431	1900	2358	5733	5715	1364	1465	1463	1403	843	3005	822	2475	2450	2256
084	5782	4529	4248	3904	5335	5573	5070	5525	8642	8820	4111	4204	4400	4494	4011	5974	3699	5362	5377	5019
085	4833	3775	3477	3251	4443	4710	4315	4706	8140	8155	3136	3221	3461	3620	3276	5000	3130	4374	4401	4007
086	4324	3182	2886	2640	3900	4154	3723	4134	7526	7553	2644	2735	2942	3066	2676	4509	2517	3894	3911	3549
087	5184	4318	4015	3864	4863	5152	4847	5185	8772	8708	3496	3568	3855	4073	3843	5316	3783	4681	4725	4288
088	5130	3770	3501	3114	4643	4859	4305	4787	7802	8008	3510	3609	3758	3802	3251	5344	2887	4754	4755	4443

WTG	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
001	10269	10259	10190	9777	10112	10044	10009	9951	9765	9819	9580	9696	9072	9053	8662	8897	8749	8526
002	10349	10344	10276	9850	10199	10132	10097	10040	9856	9912	9673	9792	9172	9159	8768	9010	8862	8642
003	10190	10190	10121	9686	10045	9979	9945	9889	9705	9763	9526	9645	9030	9024	8631	8881	8733	8516
004	9950	9945	9876	9453	9799	9732	9698	9640	9456	9512	9273	9391	8772	8759	8367	8610	8463	8243
005	9979	9986	9919	9467	9843	9778	9746	9691	9510	9570	9334	9457	8850	8853	8460	8721	8575	8362
006	9828	9829	9762	9322	9685	9620	9586	9530	9348	9406	9169	9290	8678	8674	8282	8536	8389	8174
007	10427	10449	10384	9897	10310	10250	10219	10168	9991	10057	9825	9953	9363	9384	8991	9274	9129	8926
008	9903	9916	9849	9384	9774	9711	9680	9626	9446	9509	9275	9399	8799	8810	8417	8687	8542	8334
009	9600	9608	9541	9087	9465	9402	9369	9315	9134	9195	8960	9083	8478	8484	8091	8356	8210	8000
010	10317	10343	10279	9782	10205	10146	10117	10067	9891	9958	9728	9857	9273	9300	8907	9196	9052	8853
011	9810	9827	9762	9285	9687	9626	9595	9543	9364	9429	9196	9322	8728	8746	8353	8632	8487	8283
012	9752	9776	9712	9219	9638	9578	9549	9499	9322	9390	9159	9288	8703	8730	8338	8627	8483	8285
013	9828	9858	9794	9290	9721	9663	9634	9585	9411	9480	9251	9381	8804	8837	8446	8742	8599	8404
014	8968	8989	8924	8439	8850	8790	8760	8709	8532	8598	8367	8495	7908	7934	7542	7831	7688	7490
015	9797	9835	9773	9251	9701	9645	9617	9571	9399	9471	9245	9377	8811	8855	8465	8772	8631	8442
016	9339	9374	9311	8796	9239	9182	9155	9107	8935	9006	8779	8911	8342	8384	7994	8299	8158	7969
017	9767	9809	9748	9215	9676	9622	9596	9550	9381	9454	9230	9364	8806	8856	8467	8781	8641	8457
018	8888	8917	8853	8350	8780	8722	8694	8645	8471	8540	8312	8443	7868	7905	7514	7816	7674	7483
019	9337	9413	9358	8761	9293	9249	9229	9194	9039	9123	8915	9057	8558	8652	8278	8633	8502	8349
020	10127	10212	10159	9546	10096	10055	10037	10004	9853	9940	9737	9880	9396	9498	9127	9488	9360	9212
021	9648	9727	9673	9070	9609	9566	9547	9512	9359	9444	9238	9381	8888	8985	8612	8970	8840	8689
022	10316	10405	10354	9733	10291	10252	10234	10203	10054	10142	9941	10085	9609	9716	9347	9711	9584	9439
023	9451	9539	9487	8868	9424	9385	9367	9336	9187	9275	9075	9218	8744	8853	8486	8853	8727	8585
024	10189	10285	10236	9603	10175	10138	10122	10093	9949	10038	9843	9987	9527	9644	9280	9652	9527	9390
025	9218	9302	9250	8638	9186	9145	9127	9094	8943	9030	8827	8971	8489	8594	8225	8589	8462	8318
026	9890	9984	9934	9306	9873	9835	9819	9789	9643	9733	9535	9680	9216	9331	8966	9337	9212	9074
027	8398	8487	8436	7815	8374	8335	8317	8287	8139	8228	8030	8174	7709	7825	7462	7835	7711	7577
028	8032	8117	8064	7452	8001	7960	7942	7910	7760	7848	7646	7790	7317	7429	7063	7434	7309	7173
029	7797	7893	7843	7211	7782	7746	7730	7702	7559	7650	7457	7602	7157	7285	6929	7312	7192	7070
030	7851	7930	7877	7273	7812	7770	7751	7717	7565	7651	7448	7591	7109	7216	6848	7216	7090	6950
031	7623	7714	7663	7039	7601	7563	7547	7517	7372	7461	7265	7410	6956	7079	6721	7100	6979	6854
032	7466	7544	7490	6890	7425	7382	7363	7328	7176	7262	7057	7200	6717	6824	6457	6825	6699	6561
033	7263	7350	7299	6681	7236	7197	7180	7149	7002	7091	6893	7038	6578	6699	6340	6719	6598	6472
034	7139	7237	7188	6554	7127	7092	7077	7049	6908	6999	6809	6954	6519	6652	6302	6690	6573	6459
035	7477	7548	7493	6904	7427	7382	7361	7325	7169	7253	7046	7187	6692	6792	6420	6783	6655	6510
036	9774	9896	9854	9184	9799	9772	9762	9742	9614	9711	9534	9681	9284	9433	9093	9487	9374	9266
037	9751	9859	9813	9162	9755	9722	9709	9684	9547	9640	9452	9599	9167	9299	8946	9330	9210	9088
038	9606	9744	9706	9017	9656	9636	9629	9615	9498	9598	9435	9583	9228	9396	9072	9477	9372	9283
039	9528	9674	9640	8941	9593	9577	9572	9562	9453	9554	9400	9547	9220	9399	9087	9497	9397	9320
040	9439	9596	9566	8858	9523	9511	9510	9504	9404	9508	9364	9511	9218	9410	9113	9527	9434	9371
041	9471	9604	9566	8881	9514	9492	9485	9469	9350	9449	9282	9430	9065	9228	8900	9303	9196	9104
042	9290	9445	9414	8708	9370	9357	9355	9348	9246	9349	9203	9350	9050	9239	8938	9352	9257	9192
043	9682	9785	9737	9094	9677	9643	9628	9602	9461	9553	9362	9508	9064	9190	8833	9212	9091	8963
044	9383	9526	9490	8795	9442	9424	9420	9408	9296	9397	9239	9387	9051	9227	8911	9319	9218	9138
045	9658	9776	9732	9067	9677	9648	9637	9616	9485	9581	9401	9548	9142	9286	8942	9334	9219	9108
046	9394	9523	9483	8804	9431	9407	9399	9382	9259	9358	9188	9335	8961	9120	8788	9189	9080	8984
047	9619	9732	9688	9029	9631	9601	9588	9565	9432	9526	9343	9490	9073	9212	8864	9253	9136	9020
048	9155	9295	9258	8567	9209	9189	9184	9171	9056	9157	8996	9144	8799	8971	8652	9059	8956	8873
049	8579	8738	8708	7999	8665	8654	8653	8648	8550	8654	8513	8660	8377	8573	8282	8698	8607	8552
050	8974	9125	9093	8390	9047	9033	9030	9022	8917	9019	8870	9017	8708	8894	8590	9003	8907	8839
051	8760	8894	8855	8170	8804	8782	8775	8760	8641	8741	8575	8723	8364	8531	8207	8612	8507	8420
052	8496	8640	8604	7909	8557	8539	8535	8523	8413	8514	8359	8506	8179	8358	8048	8459	8360	8286
053	8979	9095	9051	8389	8995	8966	8955	8933	8802	8897	8717	8864	8457	8602	8259	8652	8538	8429
054	8309	8460	8427	7724	8382	8367	8365	8356	8252	8354	8206	8353	8049	8237	7937	8351	8257	8193
055	7487	7626	7590	6898	7541	7522	7516	7504	7391	7492	7335	7482	7153	7333	7024	7436	7338	7268
056	8820	8930	8884	8231	8826	8795	8782	8758	8622	8716	8531	8678	8257	8395	8047	8435	8319	8204
057	8927	9053	9012	8336	8959	8934	8925	8907	8783	8881	8709	8857	8477	8635	8302	8702	8593	8496
058	8389	8545	8514	7807	8471	8459	8457	8451	8351	8455	8311	8458	8169	8363	8069	8485	8394	8337
059	8378	8518	8481	7789	8432	8413	8408	8395	8282	8383	8224	8371	8034	8210	7896	8305	8205	8128
060	8921	9017	8967	8336	8906	8869	8853	8824	8680	8770	8575	8720	8265	8385	8025	8401	8279	8148
061	8410	8543	8504	7821	8453	8431	8423	8408	8288	8388	8222	8370	8011	8178	7855	8260	8155	8069
062	8756	8904	8871	8171	8824	8809	8805	8795	8688	8790	8638	8786	8469	8652	8346	8758	8661	8591
063	8253	8364	8318	7664	8260	8229	8217	8193	8058	8153	7969	8116	7700	7842	7497	7888	7773	7663
064	8014	8120	8073	7426	8015	7982	7969	7944	7807	7900	7714	7860	7437	7575	7227	7617	7501	7388
065	8038	8138	8090	7452	8030	7995	7981	7954	7813	7905	7715	7861	7423	7554	7201	7586	7467	7348
066	7442	7593	7561	6857	7516	7503	7500	7493	7390	7493	7348	7495	7202	7397	7104	7520	7430	7375
067	7470	7615	7580	6883	7533	7517	7513	7503	7394	7497	7344	7492	7179	7365	7064	7477	7383	7320
068	7330	7465	7427	6740	7376	7356	7349	7335	7219	7319	7158	7306	6965	7141	6828	7238	7139	7065
069	7464	7565	7518	6877	7458	7424	7410	7384	7245	7337	7149	7295	6867	7003	6655	7044	6928	6815
070	6371	6501	6461	5781	6410	6387	6380	6364	6246	6346	6183	6330	5988	6166	5855	6267	6169	6101
071	6343	6466	6425	5753	6371	6346	6337	6319	6196	6294	6125	6273	5912	6082	5764	6172	6071	5995
072	6463	6577	6533	5873	6477	6448	6437	6416	6287	6383	6206	6354	5968	6128	5799	6202	6097	6009
073	5581	5695	5651	4991	5595	5566	5555	5535	5407	5504	5330	5477	5105	5273	4954	5362	5261	5187
074	5687	5791	5744	5100	5686	5653	5640	5616	5482	5576	5394	5541	5142	5298	4967	5369	5263	5176
075	5517	5639	5597	4926	5544	5518	5510	5492	5370	5469	5302	5450	5101	5279	4970	5382	5286	5222
076	4567	4662	4613	3984	4553	4518	4503	4477	4339	4433	4249	4396	4000	4161	3839	4247	4146	4073
077	4617	4702	4650	4039	4588	4549	4533	4503	4359	4450	4259	4405	3983	4132	3798	4200	4094	4010
078	4344	4419	4366	3771	4301	4260	4242	4209	4062	4151	3955	4100	3665	3809	3472	3873	3766	3681
079	4010	4102	4052	3429	3992	3957	3942	3916	3779	3873	3690	3837	3453	3623	3312	3724	3630	3572
080	3821	3934	3890	3233	3835	3808	3798	3779	3657	3756	3591	3739	3418	3613	3332	3751	3670	3641
081	7421	7550	7510	6831	7458	7435	7427	7410	7289	7388	7221	7369	7010	7178	6857	7264	7161	7079
082	9144	9243	9194	8558	9134	9098	9083	9055	8913	9004	8811	8956	8507	8631	8272	8651	8529	8400
083	6075	6186	6142	5486	6085	6055	6044	6022	5891	5987	5810	5957	5571	5731	5403	5807	5702	5617
084	9239	9342	9295	8651	9235	9201	9187	9161	9021	9113	8923	9069	8630	8758	8403	8785	8664	8540
085	8479	8602	8560	7888	8506	8480	8471	8452	8326	8423	8249	8397	8013	8169	7835	8235	8125	8028
086	7895	8014	7970	7305	7915	7888	7877	7857	7728	7825	7648	7796	7405	7559	7223	7622	7512	7414
087	8968	9104	9067	8379	9017	8996	8990	8975	8859	8959	8796	8943	8592	8761	8440	8846	8742	8656
088	8456	8552	8503	7871	8442	8405	8389	8360	8217	8307	8113	8258	7807	7930	7571	7950	7829	7701

DECIBEL - Main Result

Calculation: 040720 Noise, southeast area

Noise sensitive area

WTG	27	28	29	30	31	32	33	34	64o	62o	105	106	107	108	109	110	111	112	113	114
089	5192	3885	3608	3248	4723	4950	4424	4891	7983	8159	3548	3644	3813	3881	3366	5397	3038	4797	4804	4472
090	5232	3976	3693	3358	4780	5017	4517	4970	8133	8280	3569	3663	3850	3939	3458	5428	3164	4820	4832	4484
091	1636	1944	2233	2598	1495	1168	1402	1035	3111	2561	2837	2803	2449	2149	2461	1817	2873	2142	2030	2494
092	1937	2271	2565	2904	1841	1513	1729	1386	2814	2210	3188	3153	2800	2499	2785	2092	3164	2463	2354	2826
093	2134	2092	2394	2654	1901	1583	1565	1376	2650	2299	3160	3139	2776	2432	2585	2335	2881	2608	2494	2933
094	3073	2603	2894	2970	2745	2454	2167	2194	1950	2162	3846	3847	3483	3097	3012	3295	3097	3502	3386	3786
095	3689	3458	3754	3853	3462	3148	2991	2925	1100	1445	4658	4650	4284	3913	3886	3870	3982	4175	4062	4499
096	2878	2331	2619	2693	2518	2237	1904	1966	2226	2391	3584	3587	3225	2835	2736	3113	2824	3285	3169	3555
097	3911	3683	3978	4068	3691	3376	3220	3154	871	1386	4887	4879	4514	4142	4106	4088	4189	4401	4288	4727
098	2534	2031	2326	2450	2170	1889	1580	1619	2518	2523	3258	3258	2894	2510	2462	2773	2613	2937	2821	3208
099	2214	1852	2153	2349	1873	1582	1360	1323	2737	2579	3021	3013	2648	2276	2317	2449	2550	2630	2514	2914
100	2419	2469	2770	3020	2241	1918	1942	1732	2329	1923	3527	3504	3142	2804	2959	2594	3237	2920	2808	3262
101	2632	2597	2899	3114	2435	2114	2082	1915	2122	1814	3696	3677	3313	2965	3075	2811	3312	3126	3014	3462
102	2797	2573	2873	3033	2540	2229	2085	2001	2022	1931	3740	3729	3364	2998	3027	2996	3205	3264	3150	3579
103	3289	3270	3571	3747	3125	2802	2766	2610	1459	1240	4392	4373	4009	3659	3733	3447	3918	3800	3689	4146
104	3379	3036	3328	3415	3104	2800	2582	2559	1513	1792	4258	4253	3888	3510	3454	3581	3542	3840	3725	4146
105	3543	3565	3867	4040	3402	3078	3060	2893	1232	988	4681	4661	4298	3950	4029	3690	4208	4064	3953	4417
106	3456	3653	3955	4175	3379	3051	3129	2897	1453	756	4701	4674	4314	3987	4136	3577	4367	3996	3889	4366
107	3030	3109	3411	3624	2894	2568	2591	2392	1729	1306	4188	4165	3802	3463	3588	3181	3816	3550	3440	3904
108	2923	3161	3462	3717	2844	2517	2630	2370	1902	1233	4175	4145	3788	3467	3655	3050	3930	3460	3353	3830
109	2807	3179	3478	3768	2778	2452	2641	2331	2100	1268	4134	4098	3746	3443	3684	2915	3997	3357	3253	3737
110	2520	2863	3161	3461	2466	2139	2324	2013	2300	1582	3816	3782	3428	3123	3370	2644	3697	3062	2956	3437
111	3294	3700	4000	4276	3295	2970	3163	2856	1840	761	4657	4620	4269	3968	4202	3382	4496	3851	3750	4239
112	3376	3680	3981	4231	3338	3011	3148	2877	1643	716	4683	4650	4295	3981	4173	3480	4437	3926	3821	4305
113	2667	1893	2172	2213	2230	1984	1515	1691	2697	2853	3182	3193	2837	2438	2271	2927	2338	3012	2899	3243
114	2399	1623	1909	1993	1946	1708	1228	1411	2938	2987	2899	2909	2551	2154	2024	2665	2148	2730	2616	2955
115	2132	2371	2668	2976	2011	1684	1831	1535	2615	2059	3340	3310	2953	2638	2878	2292	3220	2652	2542	3009
116	3673	3596	3896	4038	3500	3178	3106	2978	1074	1119	4749	4733	4368	4011	4046	3832	4189	4182	4070	4525
117	621	2157	2332	2884	1092	985	1794	1227	4418	3589	2317	2240	1990	1918	2606	570	3229	1161	1094	1577
118	965	2564	2736	3291	1492	1392	2197	1626	4526	3583	2655	2572	2348	2307	3010	807	3636	1441	1397	1846
119	676	2362	2505	3075	1264	1235	2052	1507	4745	3868	2331	2244	2041	2038	2777	466	3425	1099	1064	1497
120	783	2498	2622	3199	1397	1406	2219	1688	4951	4051	2356	2264	2092	2129	2891	514	3550	1106	1094	1479

WTG	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
089	8587	8688	8640	8000	8580	8545	8530	8503	8362	8454	8263	8408	7967	8096	7741	8123	8003	7880
090	8688	8793	8746	8100	8688	8654	8641	8615	8477	8570	8382	8528	8098	8231	7880	8265	8147	8028
091	2777	2902	2862	2187	2811	2791	2786	2774	2668	2772	2632	2778	2558	2792	2581	2996	2944	2977
092	2447	2563	2521	1858	2469	2446	2439	2427	2318	2421	2280	2426	2218	2458	2265	2675	2631	2679
093	2710	2792	2741	2137	2680	2644	2629	2603	2469	2564	2390	2537	2211	2417	2160	2580	2513	2517
094	2906	2906	2839	2427	2764	2701	2670	2618	2442	2511	2284	2417	1882	1986	1629	2021	1911	1829
095	2361	2298	2225	2010	2145	2068	2028	1963	1772	1817	1575	1687	1073	1123	749	1135	1027	971
096	3082	3099	3034	2577	2961	2902	2874	2827	2656	2730	2509	2646	2135	2251	1900	2296	2187	2106
097	2354	2268	2193	2054	2113	2032	1989	1919	1727	1759	1516	1614	970	968	578	932	815	743
098	3115	3159	3099	2576	3029	2979	2956	2916	2757	2840	2633	2776	2321	2468	2141	2550	2452	2393
099	3070	3138	3083	2506	3018	2976	2958	2926	2780	2870	2680	2826	2433	2608	2310	2727	2641	2608
100	2374	2442	2389	1815	2325	2285	2268	2239	2099	2193	2015	2162	1839	2051	1812	2230	2171	2195
101	2356	2403	2344	1820	2276	2229	2208	2172	2020	2109	1915	2061	1686	1882	1622	2042	1975	1989
102	2571	2596	2533	2059	2461	2407	2381	2338	2173	2254	2043	2185	1732	1892	1585	2002	1917	1892
103	2005	1987	1918	1578	1842	1776	1744	1691	1514	1583	1359	1495	1019	1193	928	1347	1287	1324
104	2621	2592	2521	2197	2443	2374	2338	2280	2095	2154	1918	2043	1470	1552	1187	1575	1465	1389
105	1843	1795	1723	1484	1644	1572	1535	1475	1289	1347	1113	1241	726	898	660	1072	1027	1100
106	1501	1474	1404	1124	1327	1262	1230	1178	1004	1079	865	1008	677	931	841	1199	1196	1330
107	1936	1952	1889	1452	1816	1761	1735	1693	1531	1614	1411	1556	1179	1391	1173	1585	1539	1595
108	1724	1767	1710	1206	1642	1597	1577	1545	1402	1496	1320	1468	1214	1461	1312	1704	1680	1771
109	1602	1676	1625	1048	1564	1531	1518	1498	1378	1479	1335	1481	1334	1599	1497	1869	1860	1971
110	1890	1980	1932	1317	1874	1844	1833	1814	1697	1798	1652	1799	1612	1866	1717	2111	2085	2168
111	1166	1197	1138	706	1070	1026	1009	981	853	953	815	959	932	1215	1229	1532	1559	1724
112	1316	1314	1248	905	1175	1118	1092	1051	894	983	801	949	779	1056	1030	1355	1371	1524
113	3487	3522	3461	2955	3390	3337	3311	3268	3103	3182	2968	3108	2616	2737	2387	2781	2670	2580
114	3550	3604	3546	2997	3478	3430	3409	3371	3215	3300	3096	3239	2786	2928	2592	2996	2892	2818
115	2368	2467	2421	1785	2364	2336	2326	2308	2189	2289	2136	2283	2042	2276	2072	2484	2437	2481
116	2031	1967	1893	1698	1813	1737	1697	1632	1443	1490	1249	1365	777	882	564	983	910	940
117	3432	3626	3613	2893	3588	3600	3612	3629	3584	3691	3622	3754	3718	3984	3846	4240	4214	4285
118	3309	3519	3513	2804	3497	3519	3536	3562	3538	3644	3602	3725	3761	4035	3935	4314	4301	4394
119	3642	3847	3838	3124	3819	3837	3853	3874	3842	3949	3894	4022	4020	4289	4165	4555	4533	4611
120	3789	3999	3994	3284	3977	3998	4016	4040	4014	4120	4073	4199	4214	4486	4369	4755	4736	4818

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 27 through 34, 62o and 64o, 105 through 114, 149 through 166
120 GE 1.5s (180MW) 70.5m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

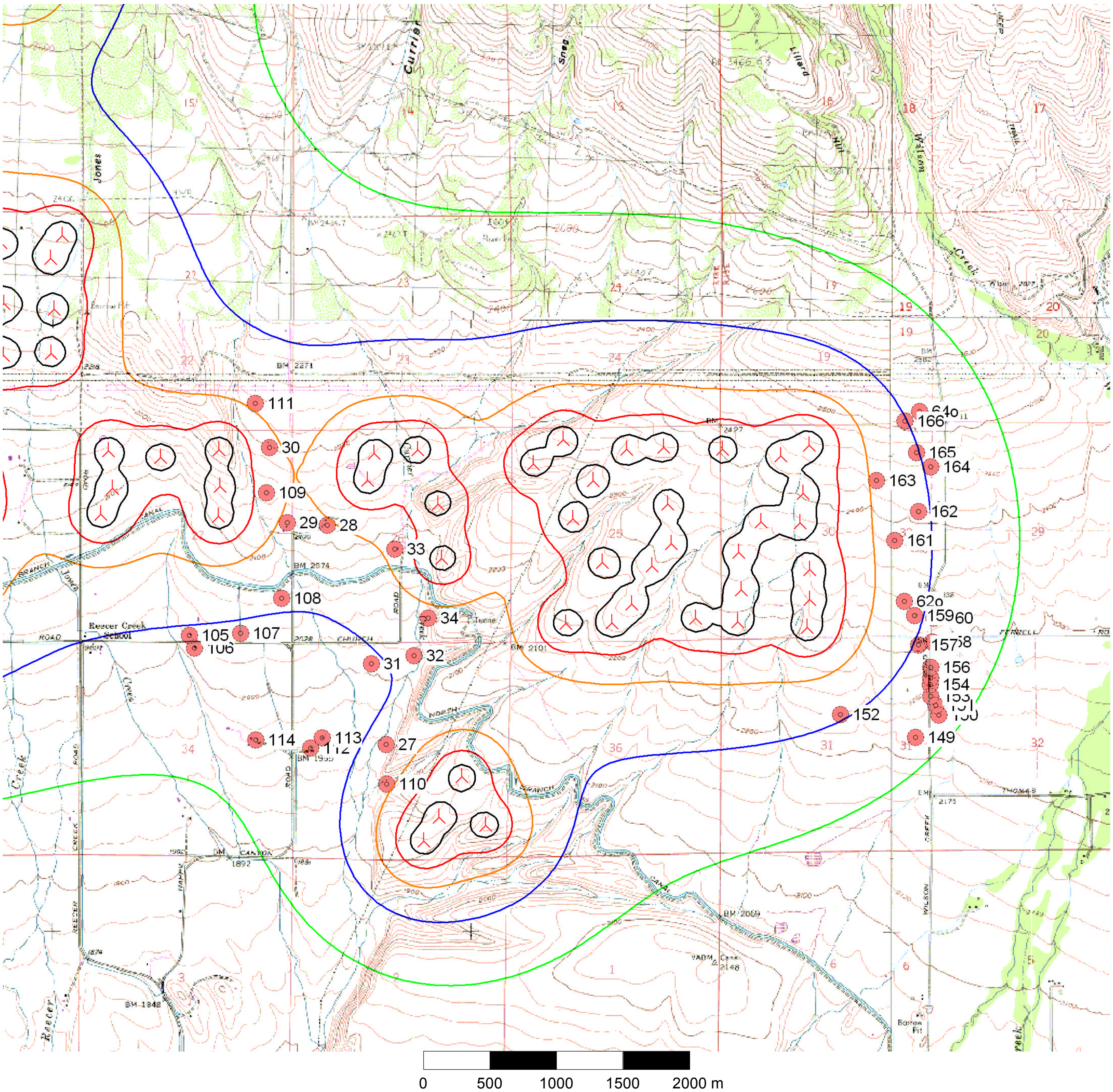
Printed/Page

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:47/2.3.0.216

DECIBEL - Bitmap map: 030410 Enxco DCWP 24k.bmi

Calculation: 040720 Noise, southeast area **File:** 030410 Enxco DCWP 24k.bmi



Map: 030410 Enexco DCWP 24k , Print scale 1:45,000, Map center UTM NAD27 Zone: 10 East: 687,017 North: 5,220,114

New WTG
Noise sensitive area
Height above sea level from active line object
35 dB(A)
40 dB(A)
45 dB(A)
50 dB(A)
55 dB(A)

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 10 through 26, 101 through 104, 115 through 136, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

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07/21/2004 23:39 / 1

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:30/2.3.0.216

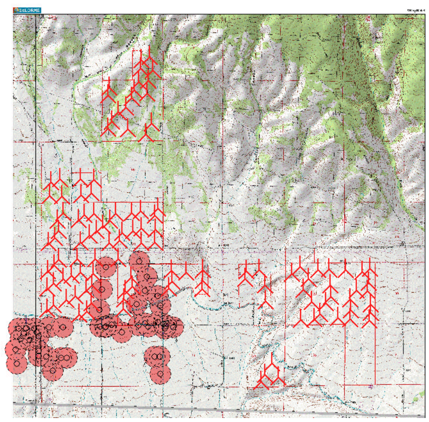
DECIBEL - Main Result

Calculation: 040720 Noise, southwest area

ISO 9613-2

The calculation is based on the international norm "ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors"

Wind speed in 10 m height: 8.0 m/s
Meteorological correction factor, C0: 0.0 dB



Scale 1:200,000
New WTG   Noise sensitive area

WTGs

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
001	683,014	5,226,319	1,110	001	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
002	682,804	5,226,234	1,074	002	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
003	682,791	5,226,001	1,025	003	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
004	683,105	5,225,970	1,025	004	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
005	682,740	5,225,651	961	005	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
006	682,994	5,225,693	980	006	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
007	681,975	5,225,474	920	007	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
008	682,634	5,225,428	927	008	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
009	682,981	5,225,355	923	009	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
010	681,946	5,225,268	900	010	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
011	682,569	5,225,217	900	011	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
012	682,426	5,224,961	880	012	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
013	682,232	5,224,844	863	013	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
014	683,114	5,224,561	846	014	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
015	682,061	5,224,572	825	015	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
016	682,499	5,224,392	819	016	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
017	681,965	5,224,388	803	017	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
018	682,979	5,224,272	826	018	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
019	681,632	5,223,025	731	019	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
020	680,746	5,223,014	742	020	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
021	681,284	5,223,026	737	021	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
022	680,495	5,222,921	743	022	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
023	681,306	5,222,614	723	023	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
024	680,481	5,222,564	729	024	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
025	681,589	5,222,672	721	025	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
026	680,800	5,222,554	728	026	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
027	682,253	5,222,153	705	027	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
028	682,664	5,222,171	709	028	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
029	682,712	5,221,699	690	029	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
030	682,901	5,222,242	715	030	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
031	682,937	5,221,783	695	031	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
032	683,278	5,222,135	714	032	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
033	683,318	5,221,753	697	033	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
034	683,306	5,221,415	685	034	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
035	683,360	5,222,311	722	035	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
036	680,493	5,221,315	691	036	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
037	680,706	5,221,921	708	037	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
038	680,489	5,220,566	666	038	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
039	680,490	5,220,109	651	039	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 10 through 26, 101 through 104, 115 through 136, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:30/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, southwest area

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
040	680,514	5,219,556	634	040	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
041	680,661	5,220,731	671	041	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
042	680,675	5,219,682	638	042	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
043	680,852	5,222,121	717	043	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
044	680,659	5,220,251	656	044	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
045	680,656	5,221,461	695	045	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
046	680,776	5,220,888	675	046	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
047	680,753	5,221,644	700	047	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
048	680,913	5,220,382	660	048	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
049	681,367	5,219,446	635	049	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
050	681,010	5,219,827	645	050	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
051	681,354	5,220,572	666	051	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
052	681,532	5,220,095	653	052	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
053	681,332	5,221,353	689	053	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
054	681,673	5,219,767	644	054	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
055	682,558	5,220,102	647	055	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
056	681,566	5,221,558	694	056	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
057	681,263	5,220,913	676	057	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
058	681,567	5,219,546	638	058	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
059	681,676	5,220,233	657	059	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
060	681,675	5,222,134	709	060	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
061	681,707	5,220,549	666	061	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
062	681,245	5,219,941	648	062	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
063	682,099	5,221,366	685	063	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
064	682,377	5,221,436	680	064	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
065	682,429	5,221,643	685	065	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
066	682,530	5,219,631	636	066	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
067	682,538	5,219,890	641	067	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
068	682,745	5,220,236	648	068	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
069	682,948	5,221,392	681	069	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
070	683,722	5,220,210	638	070	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
071	683,802	5,220,409	641	071	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
072	683,762	5,220,692	652	072	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
073	684,611	5,220,451	655	073	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
074	684,595	5,220,725	680	074	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
075	684,609	5,220,225	644	075	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
076	685,724	5,220,530	658	076	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
077	685,764	5,220,737	664	077	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
078	686,091	5,220,775	663	078	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
079	686,261	5,220,367	678	079	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
080	686,301	5,219,957	647	080	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
081	682,706	5,220,478	654	081	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
082	681,415	5,222,087	709	082	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
083	684,158	5,220,654	651	083	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
084	681,259	5,221,945	705	084	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
085	681,731	5,220,931	677	085	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
086	682,344	5,220,953	673	086	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
087	681,123	5,220,481	664	087	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
088	682,103	5,221,953	698	088	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
089	681,910	5,221,823	697	089	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
090	681,750	5,221,684	697	090	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
091	687,250	5,219,497	668	091	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
092	687,601	5,219,511	680	092	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
093	687,511	5,219,965	687	093	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
094	687,945	5,220,852	720	094	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
095	688,830	5,220,812	741	095	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
096	687,669	5,220,826	715	096	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
097	689,042	5,220,901	748	097	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
098	687,421	5,220,582	700	098	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
099	687,279	5,220,288	692	099	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
100	687,888	5,219,951	699	100	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
101	688,026	5,220,123	702	101	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 10 through 26, 101 through 104, 115 through 136, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:30/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, southwest area

	UTM NAD27 Zone: 10 East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	Noise data Creator	Name	LwA,ref [dB(A)]	Pure tones	Octave data
102	687,992	5,220,421	709	102	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
103	688,697	5,220,308	720	103	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
104	688,391	5,220,848	731	104	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
105	688,993	5,220,311	724	105	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
106	689,076	5,219,960	714	106	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
107	688,537	5,220,075	711	107	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
108	688,567	5,219,790	703	108	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
109	688,546	5,219,547	698	109	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
110	688,227	5,219,566	694	110	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
111	689,071	5,219,520	700	111	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
112	689,083	5,219,735	706	112	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
113	687,186	5,220,886	700	113	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
114	686,969	5,220,695	696	114	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
115	687,742	5,219,655	684	115	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
116	689,009	5,220,533	733	116	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
117	686,507	5,218,310	620	117	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
118	686,696	5,217,949	620	118	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
119	686,344	5,218,001	616	119	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
120	686,235	5,217,814	600	120	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Calculation Results

Sound Level

Noise sensitive area No	Name	UTM NAD27 Zone: 10 East	North	Z [m]	Demands Noise [dB(A)]	Sound Level Calculated [dB(A)]	Demands fulfilled ? Noise
10	10	682,031	5,220,719	668	50.0	49.9	Yes
11	11	681,949	5,220,118	652	50.0	50.1	No
12	12	681,908	5,219,582	638	50.0	49.5	Yes
13	13	681,927	5,219,142	625	50.0	44.4	Yes
14	14	680,951	5,219,101	622	50.0	44.7	Yes
15	15	682,071	5,219,129	625	50.0	43.7	Yes
16	16	682,092	5,219,153	625	50.0	43.8	Yes
17	17	682,227	5,219,203	626	50.0	44.1	Yes
18	18	682,506	5,219,002	620	50.0	41.9	Yes
19	19	682,888	5,219,762	635	50.0	48.0	Yes
20	20	682,944	5,219,200	621	50.0	42.2	Yes
21	21	683,122	5,219,272	621	50.0	41.8	Yes
22	22	683,517	5,219,743	629	50.0	43.8	Yes
23	23	683,434	5,220,001	636	50.0	46.6	Yes
24	24	683,095	5,220,123	641	50.0	47.5	Yes
25	25	683,132	5,220,497	651	50.0	47.3	Yes
26	26	682,914	5,220,903	663	50.0	47.6	Yes
101	101	683,619	5,219,269	617	50.0	40.2	Yes
102	102	683,656	5,219,149	614	50.0	39.4	Yes
103	103	683,680	5,219,214	616	50.0	39.7	Yes
104	104	683,861	5,219,193	614	50.0	39.4	Yes
115	115	683,572	5,217,948	589	50.0	34.2	Yes
116	116	683,539	5,218,396	598	50.0	36.0	Yes
117	117	683,400	5,218,387	599	50.0	36.2	Yes
118	118	680,577	5,219,078	620	50.0	44.0	Yes
119	119	680,251	5,218,939	619	50.0	40.9	Yes
120	120	680,311	5,218,841	615	50.0	40.3	Yes
121	121	680,191	5,219,033	621	50.0	41.4	Yes
122	122	679,966	5,219,031	621	50.0	39.9	Yes
123	123	679,907	5,218,905	620	50.0	38.7	Yes
124	124	679,830	5,218,759	616	50.0	37.4	Yes
125	125	679,779	5,219,020	621	50.0	38.6	Yes
126	126	680,080	5,218,738	616	50.0	38.5	Yes
127	127	679,715	5,218,469	607	50.0	35.4	Yes

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 10 through 26, 101 through 104, 115 through 136, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

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Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:30/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, southwest area

Noise sensitive area		UTM NAD27 Zone: 10			Demands	Sound Level	Demands fulfilled ?
No	Name	East	North	Z	Noise	Calculated	Noise
				[m]	[dB(A)]	[dB(A)]	
128	128	680,323	5,218,455	606	50.0	37.5	Yes
129	129	680,323	5,218,321	602	50.0	36.6	Yes
130	130	680,524	5,218,308	600	50.0	37.0	Yes
131	131	679,745	5,218,093	598	50.0	33.8	Yes
132	132	680,717	5,217,946	591	50.0	35.2	Yes
133	133	680,917	5,218,286	600	50.0	37.5	Yes
134	134	681,080	5,218,296	600	50.0	37.7	Yes
135	135	683,203	5,219,185	619	50.0	40.8	Yes
136	136	683,448	5,219,314	620	50.0	40.8	Yes

Distances (m)

Noise sensitive area

WTG	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	101	102	103	104	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136
001	5686	6292	6827	7259	7507	7252	7225	7159	7335	6558	7119	7048	6595	6332	6196	5823	5417	7076	7199	7136	7176	8390	7940	7941	7640	7880	7951	7814	7900	8039	8203	7984	8129	8515	8312	8439	8389	8852	8682	8302	8253	7136	7018
002	5569	6175	6712	7146	7370	7143	7117	7055	7238	6473	7035	6969	6530	6265	6118	5746	5332	7012	7136	7074	7120	8321	7872	7870	7494	7729	7802	7660	7742	7881	8045	7823	7976	8357	8165	8293	8247	8697	8547	8169	8123	7060	6950
003	5336	5943	6479	6913	7141	6910	6884	6821	7005	6240	6803	6737	6300	6034	5886	5515	5099	6783	6906	6845	6892	8091	7642	7638	7268	7505	7577	7437	7521	7660	7824	7603	7752	8136	7939	8067	8020	8474	8318	7939	7893	6828	6719
004	5360	5965	6499	6929	7199	6919	6892	6824	6994	6212	6772	6698	6241	5978	5847	5473	5071	6721	6843	6780	6819	8036	7586	7589	7341	7588	7657	7524	7616	7755	7920	7705	7839	8231	8013	8139	8085	8564	8372	7989	7937	6786	6665
005	4983	5589	6126	6560	6790	6556	6530	6468	6653	5891	6454	6390	5959	5692	5539	5169	4751	6442	6566	6505	6555	7748	7299	7294	6920	7159	7230	7092	7178	7317	7481	7262	7407	7793	7591	7718	7670	8130	7966	7587	7540	6483	6376
006	5066	5672	6207	6637	6901	6629	6602	6535	6709	5932	6493	6422	5973	5709	5571	5198	4791	6454	6577	6515	6558	7767	7317	7317	7043	7290	7359	7226	7318	7457	7622	7407	7541	7933	7715	7841	7787	8265	8075	7693	7641	6511	6395
007	4755	5356	5892	6332	6455	6346	6322	6276	6494	5784	6348	6307	5935	5664	5467	5110	4666	6419	6545	6488	6558	7694	7249	7229	6547	6759	6839	6683	6749	6887	7049	6817	6997	7361	7211	7341	7311	7710	7632	7265	7234	6408	6334
008	4747	5354	5891	6326	6547	6324	6298	6238	6427	5672	6236	6175	5753	5486	5325	4956	4534	6237	6362	6301	6355	7539	7090	7083	6675	6913	6985	6846	6931	7070	7234	7015	7161	7546	7346	7473	7426	7883	7724	7345	7299	6269	6168
009	4732	5338	5872	6302	6575	6292	6265	6198	6371	5594	6155	6085	5638	5373	5233	4860	4452	6119	6243	6181	6224	7431	6981	6981	6722	6973	7040	6910	7006	7145	7310	7098	7225	7621	7394	7519	7463	7950	7747	7364	7310	6174	6059
010	4550	5150	5686	6126	6247	6140	6117	6071	6291	5586	6149	6110	5744	5473	5272	4916	4471	6228	6353	6297	6370	7498	7054	7033	6340	6552	6632	6477	6544	6682	6844	6613	6791	7156	7004	7134	7104	7505	7424	7057	7026	6211	6141
011	4530	5137	5674	6109	6326	6108	6083	6024	6215	5464	6029	5971	5555	5287	5121	4753	4328	6040	6165	6105	6161	7338	6890	6880	6454	6692	6764	6625	6711	6850	7015	6796	6941	7327	7125	7253	7205	7663	7503	7125	7079	6065	5968
012	4260	4866	5404	5840	6043	5843	5818	5761	5960	5219	5784	5731	5331	5061	4884	4519	4087	5816	5941	5882	5944	7106	6659	6646	6167	6403	6475	6335	6420	6559	6723	6504	6650	7035	6837	6965	6920	7373	7220	6843	6800	5828	5739
013	4130	4734	5272	5710	5884	5717	5693	5641	5848	5124	5689	5643	5260	4990	4799	4439	4000	5745	5870	5813	5881	7025	6579	6562	5999	6228	6303	6159	6239	6378	6542	6319	6474	6854	6668	6797	6755	7194	7062	6689	6649	5742	5662
014	3992	4593	5123	5547	5873	5531	5504	5431	5592	4804	5364	5289	4835	4571	4438	4064	3663	5316	5439	5377	5420	6629	6180	6181	6041	6309	6370	6253	6363	6502	6667	6467	6566	6976	6714	6836	6768	7293	7036	6648	6587	5377	5258
015	3853	4455	4992	5432	5582	5443	5419	5372	5588	4881	5444	5405	5044	4773	4568	4213	3767	5527	5653	5597	5672	6794	6350	6328	5691	5917	5992	5846	5924	6063	6226	6003	6161	6538	6359	6488	6450	6880	6761	6389	6352	5507	5438
016	3703	4309	4846	5281	5513	5280	5255	5196	5390	4646	5211	5158	4759	4489	4310	3946	3514	5244	5369	5311	5374	6533	6085	6072	5651	5898	5967	5835	5929	6068	6233	6021	6150	6545	6323	6449	6397	6875	6688	6308	6259	5254	5166
017	3670	4270	4806	5246	5383	5260	5237	5192	5413	4717	5280	5245	4897	4626	4412	4062	3612	5380	5505	5451	5530	6637	6195	6170	5488	5712	5788	5641	5718	5856	6020	5796	5956	6332	6156	6285	6248	6675	6562	6191	6156	5348	5286
018	3677	4280	4811	5237	5554	5223	5195	5124	5291	4511	5072	5002	4561	4295	4151	3778	3370	5044	5168	5106	5155	6352	5903	5900	5722	5990	6051	5935	6045	6184	6349	6150	6247	6658	6395	6517	6449	6974	6718	6331	6270	5092	4980
019	2340	2924	3454	3894	3983	3921	3899	3868	4117	3496	4044	4038	3785	3520	3250	2939	2479	4249	4373	4326	4433	5435	5006	4964	4086	4313	4388	4244	4328	4467	4631	4413	4559	4943	4754	4883	4845	5281	5161	4793	4761	4149	4131
020	2630	3136	3623	4048	3918	4105	4089	4089	4381	3894	4402	4433	4287	4038	3725	3468	3026	4720	4838	4801	4930	5801	5397	5334	3940	4105	4196	4019	4059	4194	4352	4109	4328	4660	4579	4712	4711	5022	5068	4731	4730	4549	4582
021	2425	2983	3500	3937	3939	3976	3956	3938	4205	3637	4171	4180	3970	3711	3422	3132	2677	4423	4545	4502	4619	5570	5150	5099	4011	4215	4297	4140	4207	4345	4508	4279	4454	4820	4671	4802	4779	5167	5112	4754	4734	4294	4297
022	2685	3158	3626	4041	3847	4106	4092	4102	4405	3963	4455	4496	4385	4143	3820	3582	3150	4806	4921	4887	5023	5848	5454	5385	3844	3989	4084	3900	3926	4059	4215	3966	4204	4520	4469	4603	4613	4886	4980	4654	4662	4614	4662
023	2029	2577	3091	3527	3531	3568	3549	3533	3806	3261	3787	3803	3624	3370	3067	2796	2348	4067	4187	4147	4270	5187	4773	4717	3610	3823	3902	3751	3825	3964	4128	3905	4065	4440	4274	4404	4376	4783	4705	4345	4324	3919	3934
024	2410	2853	3306	3715	3495	3785	3772	3787	4097	3694	4169	4220	4144	3910	3576	3362	2946	4550	4663	4632	4774	5555	5169	5096	3487	3632	3727	3543	3570	3704	3860	3613	3847	4166	4112	4246	4256	4531	4624	4300	4310	4339	4401
025	2002	2579	3106	3546	3628	3576	3555	3527	3783	3187	3727	3730	3507	3246	2961	2667	2210	3962	4085	4041	4155	5123	4700	4652	3734	3966	4039	3898	3986	4125	4290	4076	4213	4602	4403	4531	4492	4936	4806	4437	4405	3842	3838
026	2210	2693	3172	3593	3456	3653	3638	3642	3940	3486	3981	4020	3909	3668	3343	3110	2682	4329	4444	4410	4546	5376	4979	4912	3483	3656	3745	3573	3620	3757	3917	3679	3883	4227	4127	4260	4255	4584	4609	4270	4267	4138	4184
027	1451	2058	2594	3029	3318	3029	3004	2950	3161	2474	3033	3009	2721	2455	2198	1875	1414	3191	3315	3267	3369	4407	3971	3937	3502	3787	3839	3740	3870	4007	4170	3992	4048	4474	4171	4291	4216	4772	4479	4091	4031	3116	3080
028	1584	2174	2697	3117	3516	3099	3072	3000	3173	2419	2984	2935	2573	2303	2093	1738	1292	3055	3181	3127	3210	4319	3875	3855	3731	4033	4077	3995	4140	4274	4435	4272	4297	4733	4392	4506	4416	5015	4652	4260	4186	3034	2963
029	1193	1755	2265	2675	3139	2649	2620	2543	2705	1945	2510	2461	2115	1845	1622	1273	821	2594	2719	2667	2757	3848	3405	3383	3380	3698	3733	3669	3829	3959	4117	3972	3962	4406	4029	4137	4036	4670	4250	3856	3774	2561	2496
030	1754	2328	2839	3249	3697	3222	3193	3113	3264	2480	3042	2978	2574	2303	2128	1760	1339	3058	3184	3127	3197	4346	3899	3887	3926	4235	4275	4200	4350	4483	4644	4486	4498	4938	4581	4693	4596	5213	4819	4426	4346	3072	2979
031	1397	1936	2430	2828	3337	2792	2762	2676	2814	2022	2583	2518	2121	1850	1667	1301	880	2605	2730	2674	2750	3887	3440	3427	3590	3912	3943	3886	4050	4179	4336	4196	4175	4622	4232	4338	4231	4879	4433	4038	3951	2612	2521
032	1887	2415	2897	3284	3824	3239	3209	3115	3227	2405	2954	2867	2404	2140	2020	1644	1285	2886	3010	2949	2999	4197	3748	3750	4079	4402	4433	4376	4539	4669	4826	4685	4665	5112	4720	4825	4715	5368	4910	4515	4424	2951	2826
033	1651	2132	2589	2958	3555	2905	2875	2774	2868	2037	2580	2489	2020	1756	1645	1270	941	2502	2626	2565	2617	3813	3364	3367	3830	4162	4186	4144	4318	4444	4597	4471	4424	4875	4455	4555	4436	5115	4611	4217	4118	2571	2442
034	1453	1877	2305	2659	3302	2598	2567	2461	2542	1705	2244	2151	1685	1420	1309	934	645	2169	2293	2233	2290	3477	3028	3029	3593	3932	3949	3921	4104	4225	4375	4263	4192	4645	4202	4298	4170	4870	4329	3937	3832	2232	2106
035	2074	2608	3091	3478	4013	3433	3403	3308	3417	2592	3139	3048	2573	2311	2204	1828	1477	3053	3176	3113	3158	4368	3919	3924	4266	4587	4619	4559	4720	4850	5008	4864	4850	5296	4908	5014	4906	5555	5103	4708	4617	3130	2998
036	1649	1885	2237	2603	2261	2696	2689	2733	3066	2854	3237	3329	3408	3221	2862	2763	2456	3736	3834	3817	3981	4563	4219	4126	2239	2388	2481	2302	2344	2480	2641	2403	2610	2950	2865	2999	3007	3308	3376	3059	3076	3447	3569
037	1789	2190	2630	3035	2831	3108	3096	3115	3429	3070	3523	3585	3556	3336	2990	2813	2431	3939	4048	4021	4171	4899	4522	4444	2846	3016	3105	2934	2983	3120	3281	3045	3244	3591	3487	3620	3618	3947	3975	3641	3644	3704	3783
038	1550	1527	1727	2024	1536	2137	2137	2209	2552	2530	2809	2934	3138	2999	2643	2644	2448	3388	3470	3466	3641	4045	3743	3636	1491	1644	1734	1562	1622	1760	1923	1701	1873	2235	2117	2251	2258	2582	2630	2320	2346	3045	3213
039	1657	1459	1513	1732	1108	1860	1866	1959	2300	2423	2617	2762	3049	2946	2605	2670	2551	3240	3308	3313	3493	3764	3497	3381	1035	1194	1281	1117	1199	1338	1503	1301	1431	1814	1662	1796	1801	2149	2175	1872	1907	2866	3063
040	1912	1541	1394	1472	631	1614	1629	1749	2068	2383	2456	2623	3009	2954	2643	2782	2752	3118	3168	3184	3367	3455	3240	3114	482	671	743	615	759	890	1050	910	926	1349	1117	1250	1248	1653	1623	1332	1381	2714	2944
041	1370	1426	1696	2032	1656	2134	2130	2188	2529	2429	2749	2861	3022	2867	2509	2482	2260	3300	3387	3379	3550	4027	3706	3605	1655	1838	1922	1762	1837	1976	2140	1925	2076	2452	2301	2434	2427	2792	2786	2458	2471	2975	3127
042	1707	1347	1237	1363	643	1502	1513	1624	1953	2214	2320	2481	2843	2777	2460	2589	2550	2973	3028	3041	3223	3376	3139	3017	612	855	916	810	963	1092	1251	1114	1116	1547	1276	1406	1382	1841	1736	1417	1444	2576	2797
043	1832	2284	2750	3167	3022	3231	3217	3226	3530	3116	3593	3643	3572	3341	3004	2799	2395	3974	4086	4056	4198	4981	4593	4520	3055	3238	3324	3158	3214	3352	3514	3281	3470	3825	3704	3837	3827	4177	4177	3836	3832	3761	3823
044	1450	1297	1417	1685	1186	1803	1805	1886	2230	2282	2515	2650	2903	2786	2439	2485	2347	3119	3193	3194	3372	3713	3426	3315	1176	1374	1452	1305	1403	1542	1707	1513	1620	2017	1827	1959	1948	2344	2306	1982	2000	2758	2942
045	1562	1864	2258	2644	2378	2728	2718	2751	3077	2805	3217	3297	3337	3138	2782	2657	2326	3686	3788	3767	3926	4566	4208	4121	2384	2554	2643	2472	2526	2663	2825	2594	2783	3136	3024	3158	3156	3489	3515	3186	3193	3416	3522
046	1266	1403	1728	2091	1796	2184	2178	2224	2559	2393	2748	2849	2971	2802	2442	2388	2138	3272	3364	3352	3520	4057	3721	3625	1821	2018	2099	1945	2026	2165	2330	2117	2260	2641	2475	2607	2592	2979	2943	2606	2610	2965	3101
047	1578	1939	2363	2764	2551	2839	2828	2851	3171	2846	3282	3352	3355	3144	2793	2641	2285	3722	3828	3804	3958	4648	4279	4197	2572	2751	2838	2671	2729	2867	3029	2799	2983	3340	3218	3351	3344	3691	3698	3362	3364	3471	3563
048	1168	1069	1277	1602	1282	1706	1703	1765	2108	2070	2350	2472	2681	2550	2197	2222	2068	2926	3007	3003	3179	3605	3292	3188	1347	1588	1654	1530	1650	1787	1951	1772	1843	2257	2015	2144	2110	2570	2444	2096	2093	2584	2751
049	1436	889	558	637	540	772	782	894	1222	1553	1596	1764	2170	2140	1856	2054	2125	2259	2308	2325	2507	2666	2412	2292	871	1226	1217	1246	1461	1557	1684	1644	1469	1919	1439	1535	1416	2112	1635	1244	1185	1854	2085
050	1356	983	931	1145	728	1270	1275	1368	1708	1879	2033	2184	2508	2430	2106	2225	2187	2668	2731	2739	2921	3177	2906	2790	865	1168	1209	1141	1313	1438	1592	1472	1432	1876	1534	1655	1595	2146	1904	1544	1533	2285	2491
051	693	748	1134	1540	1525	1611	1599	1624	1947	1735	2100	2194	2316	2157	1798	1780	1595	2613	2706	2693	2861	3436	3084	2993	1684	1971	2021	1929	2074	2207	2368	2211	2233	2666	2355	2476	2411	2955	2702	2327	2292	2311	2443
052	799	418	636	1032	1151	1106	1096	1131	1464	1396	1672	1790	2016	1904	1563	1650	1601	2245	2325	2322	2498	2962	2630	2531	1395	1725	1750	1711	1893	2014	2164	2056	1987	2438	2037	2147	2052	2684	2298	1911	1855	1903	2069
053	944	1381	1862	2290	2284	2344	2328	2329	2628	2225	2690	2745	2714	2499	2150	1993	1645	3094	3203	3176	3326	4076	3690	3616	2397	2645	2712	2585	2694	2833	2997	2803	2899	3306	3069	3195	3150	3626	3462	3095	3067	2864	2939
054	1017	447	299	675	982	752	743	791	1131	1215	1392	1531	1844	1776	1466	1631	1682	2009	2077	2082	2262	2630	2315	2211	1295	1645	1647	1654	1859	1965	2101	2036	1896	2349	1882	1978	1857	2553	2057	1663	1586	1637	1832
055	811	609	832	1149	1893	1088	1057	958	1101	474	981	1003	1024	882	537	697	877	1349	1454	1431	1589	2381	1968	1911	2230	2584	2577	2597	2805	2909	3041	2982	2829	3279	2776	2858	2712	3457	2835	2448	2334	1121	1189
056	959	1490	2005	2443	2533	2481	2462	2446	2723	2230	2731	2765	2665	2432	2097	1892	1499	3075	3189	3156	3295	4130	3727	3663	2670	2931	2993	2875	2991	3129	3294	3104	3188	3601	3343	3467	3413	3914	3710	3336	3298	2883	2929
057	792	1050	1479	1891	1839	1958	1945	1963	2280	1991	2400	2480	2540	2355	1995	1915	1651	2873	2973	2954	3116	3758	3393	3309	1959	2218	2280	2164	2286	2423	2587	2405	2476	2893	2632	2757	2708	3203	3017	2650	2623	2598	2708
058	1261	688	343	541	760	654	656	744	1085	1339	1420	1579	1960	1922	1633	1831	1912	2071	2126	2139	2321	2564	2283	2169	1095	1449	1440	1469	1682	1779	1907	1864	1692	2142	1655	1746	1619	2330	1812	1418	1341	1675	1895
059	602	296	691	1119	1344	1173	1157	1168	1485	1300	1635	1736	1905	1773	1423	1480	1408	2169	2257	2248	2420	2969	2616	2526	1594	1925	1950	1909	2090	2212	2362	2252	2187	2638	2234	2342	2243	2882	2480	2090	2027	1852	1996
060	1459	2035	2563	3003	3118	3031	3010	2982	3240	2664	3197	3207	3018	2765	2462	2191	1747	3462	3583	3542	3664	4596	4177	4125	3247	3498	3564	3438	3542	3681	3846	3646	3752	4156	3920	4046	3995	4478	4296	3922	3884	3321	3331
061	366	494	988	1424	1633	1466	1448	1443	1741	1419	1830	1906	1981	1812	1452	1426	1258	2301	2400	2382	2545	3201	2827	2746	1855	2171	2206	2144	2310	2438	2594	2461	2434	2880	2510	2623	2534	3143	2785	2397	2339	2024	2135
062	1106	726	754	1050	890	1158	1157	1228	1572	1653	1854	1993	2281	2190	1859	1967	1926	2467	2538	2541	2721	3064	2766	2657	1091	1411	1443	1391	1570	1692	1844	1731	1675	2123	1749	1864	1785	2380	2064	1687	1653	2099	2290
063	651	1257	1794	2231	2539	2237	2213	2167	2399	1788	2325	2331	2155	1909	1593	1350	937	2590	2709	2670	2798	3722	3301	3251	2748	3050	3094	3014	3163	3296	3456	3299	3314	3752	3410	3525	3440	4032	3689	3299	3235	2444	2456
064	796	1386	1912	2338	2736	2327	2301	2238	2437	1750	2307	2289	2041	1782	1496	1205	757	2498	2620	2576	2689	3687	3254	3216	2966	3279	3317	3249	3405	3536	3695	3548	3543	3986	3620	3731	3636	4255	3865	3472	3397	2398	2377
065	1006	1599	2126	2551	2940	2539	2513	2448	2642	1936	2497	2470	2189	1925	1659	1344	885	2656	2779	2732	2838	3868	3431	3398	3164	3472	3512	3438	3590	3722	3882	3729	3736	4176	3821	3933	3841	4450	4074	3682	3609	2577	2542
066	1197	758	624	776	1666	680	648	524	629	381	598	692	993	977	749	1055	1329	1148	1225	1223	1401	1979	1595	1518	2030	2382	2355	2414	2633	2722	2837	2818	2608	3045	2501	2566	2403	3181	2475	2100	1971	807	971
067	972	632	701	966	1772	893	861	754	889	373	801	850	990	903	604	849	1081	1247	1341	1327	1495	2200	1798	1733	2122	2477	2462	2499	2712	2809	2935	2893	2715	3160	2639	2714	2561	3321	2664	2280	2160	969	1077
068	862	805	1062	1366	2123	1296	1265	1156	1257	495	1055	1035	916	728	368	467	688	1303	1418	1385	1527	2433	2004	1962	2458	2811	2805	2823	3029	3135	3268	3206	3057	3508	3006	3088	2941	3687	3059	2673	2557	1146	1159
069	1137	1619	2087	2471	3039	2427	2397	2305	2430	1631	2192	2127	1744	1473	1277	914	490	2226	2352	2298	2381	3500	3054	3039	3313	3646	3669	3628	3803	3928	4081	3958	3908	4358	3939	4040	3923	4598	4105	3711	3616	2222	2137
070	1766	1775	1920	2089	2985	1973	1943	1803	1714	947	1275	1113	510	356	633	656	1065	947	1063	997	1026	2267	1823	1851	3343	3696	3675	3722	3937	4032	4154	4119	3928	4369	3825	3889	3721	4505	3762	3401	3262	1149	937
071	1798	1876	2067	2263	3137	2153	2122	1984	1913	1120	1482	1325	724	549	763	676	1016	1155	1268	1201	1217	2472	2030	2062	3489	3843	3827	3864	4076	4175	4301	4256	4080	4524	3990	4057	3894	4672	3948	3582	3446	1363	1151
072	1731	1902	2161	2402	3230	2303	2271	2139	2106	1276	1701	1558	980	765	877	659	874	1430	1547	1480	1502	2751	2307	2333	3571	3924	3916	3938	4143	4249	4381	4320	4168	4617	4103	4177	4021	4784	4100	3726	3596	1607	1413
073	2594	2683	2839	2986	3901	2863	2834	2691	2555	1856	2084	1899	1303	1260	1551	1480	1756	1543	1615	1548	1465	2710	2318	2393	4261	4615	4592	4642	4857	4952	5072	5039	4844	5282	4730	4788	4615	5407	4630	4282	4137	1893	1626
074	2564	2715	2920	3102	3989	2986	2956	2815	2708	1960	2248	2069	1458	1368	1616	1481	1690	1753	1835	1766	1699	2959	2557	2626	4342	4697	4680	4718	4929	5029	5155	5109	4933	5376	4838	4902	4734	5518	4771	4413	4273	2076	1818
075	2625	2662	2776	2892	3827	2765	2736	2592	2433	1782	1955	1766	1194	1196	1517	1502	1826	1376	1437	1373	1275	2502	2119	2200	4192	4544	4515	4576	4794	4884	4999	4978	4767	5199	4637	4690	4512	5311	4510	4170	4022	1749	1476
076	3698	3797	3932	4043	4982	3912	3884	3740	3562	2938	3082	2890	2343	2350	2660	2592	2835	2454	2487	2431	2293	3361	3054	3161	5348	5700	5670	5732	5950	6040	6154	6134	5922	6353	5786	5835	5655	6457	5634	5305	5153	2857	2580
077	3733	3865	4025	4155	5083	4028	3999	3855	3691	3037	3212	3021	2457	2443	2739	2643	2855	2599	2639	2581	2451	3547	3230	3333	5446	5799	5773	5828	6044	6137	6255	6226	6025	6460	5900	5953	5776	6574	5767	5431	5282	2995	2718
078	4060	4194	4350	4473	5406	4344	4315	4172	3999	3359	3519	3328	2773	2767	3066	2972	3180	2895	2928	2872	2734	3786	3489	3598	5769	6122	6095	6152	6368	6461	6578	6551	6347	6780	6217	6268	6089	6889	6073	5742	5591	3297	3020
079	4245	4319	4423	4504	5459	4369	4342	4199	3995	3427	3516	3324	2814	2851	3175	3132	3390	2861	2876	2827	2672	3617	3361	3479	5828	6177	6143	6215	6435	6520	6629	6620	6392	6816	6238	6281	6095	6901	6050	5735	5580	3278	3004
080	4337	4355	4409	4449	5418	4310	4285	4143	3913	3419	3441	3252	2792	2867	3210	3215	3517	2769	2766	2724	2557	3389	3173	3299	5791	6135	6093	6179	6402	6480	6581	6589	6339	6752	6164	6198	6008	6816	5935	5637	5479	3193	2925
081	717	838	1200	1546	2231	1491	1460	1362	1489	739	1300	1276	1094	870	527	426	473	1515	1634	1596	1728	2674	2242	2203	2548	2897	2901	2901	3099	3211	3351	3270	3150	3603	3126	3214	3077	3802	3220	2829	2721	1385	1380
082	1500	2040	2553	2989	3022	3030	3011	2996	3272	2752	3267	3292	3148	2903	2584	2340	1910	3578	3695	3658	3789	4667	4258	4199	3123	3356	3429	3290	3382	3521	3686	3476	3605	3997	3793	3921	3883	4329	4199	3833	3806	3409	3438
083	2128	2273	2492	2695	3563	2585	2554	2415	2336	1552	1894	1727	1114	975	1188	1038	1269	1486	1586	1517	1491	2769	2341	2390	3912	4267	4253	4285	4495	4597	4725	4674	4506	4951	4421	4489	4325	5102	4379	4014	3877	1752	1516
084	1449	1953	2450	2881	2861	2931	2914	2908	3196	2724	3221	3258	3154	2917	2587	2367	1956	3568	3683	3650	3787	4618	4218	4152	2947	3170	3246	3102	3188	3327	3492	3278	3417	3803	3613	3743	3710	4139	4036	3675	3653	3376	3423

DECIBEL - Main Result

Calculation: 040720 Noise, southwest area

Noise sensitive area

WTG	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	101	102	103	104
085	367	842	1361	1800	1989	1834	1814	1798	2079	1645	2114	2165	2145	1940	1585	1467	1183	2515	2623	2597	2749
086	391	924	1439	1858	2317	1844	1818	1754	1958	1309	1853	1852	1685	1447	1119	910	572	2112	2231	2193	2324
087	939	902	1193	1562	1391	1651	1644	1689	2025	1906	2226	2336	2505	2360	2004	2009	1840	2775	2862	2854	3026
088	1236	1841	2379	2816	3076	2824	2800	2753	2978	2327	2879	2868	2624	2363	2082	1783	1327	3083	3205	3161	3272
089	1111	1705	2241	2681	2886	2699	2676	2639	2883	2281	2819	2824	2628	2375	2072	1803	1362	3073	3194	3153	3275
090	1005	1579	2108	2548	2704	2575	2554	2526	2786	2234	2756	2775	2625	2381	2060	1822	1402	3054	3172	3135	3265
091	5360	5337	5343	5335	6311	5192	5169	5032	4770	4370	4316	4134	3741	3849	4202	4238	4558	3638	3611	3581	3403
092	5699	5685	5693	5686	6663	5543	5521	5383	5120	4720	4667	4485	4091	4196	4547	4576	4889	3989	3962	3932	3753
093	5532	5564	5616	5644	6617	5504	5479	5339	5097	4627	4631	4443	4000	4077	4419	4411	4692	3954	3940	3904	3731
094	5915	6041	6169	6256	7210	6121	6095	5951	5745	5173	5267	5075	4565	4591	4904	4826	5031	4607	4615	4569	4408
095	6800	6916	7030	7102	8063	6965	6939	6796	6578	6034	6103	5912	5419	5457	5776	5707	5917	5435	5435	5392	5226
096	5639	5764	5894	5984	6936	5850	5823	5679	5476	4898	4997	4805	4291	4315	4628	4549	4756	4339	4349	4302	4143
097	7013	7136	7255	7329	8289	7193	7166	7023	6806	6259	6331	6140	5645	5680	5998	5924	6128	5663	5664	5621	5455
098	5392	5492	5603	5680	6637	5544	5517	5374	5163	4607	4685	4494	3993	4029	4350	4290	4518	4022	4028	3983	3821
099	5266	5333	5417	5473	6438	5335	5310	5167	4943	4422	4469	4279	3801	3856	4187	4152	4408	3799	3798	3756	3589
100	5907	5941	5991	6016	6989	5875	5851	5710	5465	5004	5001	4814	4376	4454	4796	4787	5064	4323	4307	4272	4098
101	6025	6077	6142	6177	7148	6037	6013	5872	5633	5151	5165	4977	4525	4594	4931	4908	5171	4489	4477	4440	4268
102	5968	6051	6142	6198	7164	6060	6035	5892	5667	5146	5194	5004	4526	4577	4906	4861	5101	4522	4519	4478	4310
103	6679	6751	6828	6870	7839	6730	6705	6564	6327	5835	5859	5670	5211	5272	5605	5568	5814	5183	5173	5135	4963
104	6361	6483	6605	6685	7642	6550	6523	6380	6168	5609	5691	5500	4998	5029	5345	5271	5477	5026	5031	4986	4823
105	6974	7047	7122	7162	8133	7022	6997	6856	6618	6130	6150	5962	5505	5568	5901	5864	6108	5474	5462	5425	5252
106	7086	7129	7178	7196	8170	7054	7030	6891	6639	6191	6179	5994	5563	5642	5983	5968	6234	5501	5480	5447	5271
107	6538	6588	6647	6676	7648	6535	6511	6370	6126	5658	5661	5474	5031	5104	5442	5421	5684	4984	4968	4933	4758
108	6602	6626	6662	6672	7647	6530	6506	6367	6112	5679	5654	5470	5050	5137	5482	5481	5762	4975	4953	4921	4744
109	6620	6622	6638	6631	7608	6488	6466	6328	6065	5662	5613	5431	5033	5132	5481	5497	5793	4935	4906	4877	4698
110	6302	6302	6319	6314	7291	6171	6149	6011	5749	5343	5296	5113	4713	4813	5162	5179	5479	4618	4590	4561	4382
111	7141	7147	7163	7154	8131	7011	6989	6851	6585	6188	6135	5954	5558	5657	6006	6019	6310	5458	5428	5400	5220
112	7120	7144	7177	7181	8157	7038	7015	6877	6618	6195	6162	5979	5566	5655	6001	6000	6279	5484	5459	5428	5250
113	5158	5293	5437	5541	6485	5408	5381	5237	5045	4443	4565	4373	3843	3855	4162	4073	4272	3916	3934	3884	3731
114	4938	5053	5182	5276	6226	5142	5115	4971	4773	4186	4294	4102	3581	3602	3916	3842	4060	3641	3656	3607	3452
115	5809	5811	5834	5838	6814	5695	5672	5533	5277	4855	4820	4636	4226	4322	4671	4686	4987	4141	4117	4086	3908
116	6980	7072	7164	7217	8184	7079	7053	6911	6681	6169	6210	6021	5549	5600	5928	5877	6106	5536	5529	5490	5320
117	5083	4904	4772	4655	5612	4511	4495	4372	4060	3899	3672	3519	3316	3508	3864	4022	4431	3043	2972	2968	2789
118	5425	5219	5059	4916	5859	4773	4759	4642	4320	4218	3955	3811	3650	3854	4206	4381	4799	3348	3268	3271	3096
119	5098	4878	4709	4562	5504	4419	4405	4289	3966	3879	3605	3464	3321	3531	3881	4068	4493	3006	2923	2927	2754
120	5110	4866	4674	4508	5438	4367	4354	4242	3914	3873	3571	3438	3333	3554	3898	4102	4536	2993	2904	2913	2745

WTG	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136
085	3505	3114	3043	2183	2482	2527	2444	2593	2726	2886	2732	2745	3182	2848	2966	2887	3464	3152	2767	2714	2284	2359
086	3246	2822	2775	2576	2905	2931	2885	3058	3183	3337	3212	3167	3617	3213	3318	3211	3864	3419	3025	2942	1966	1976
087	3523	3191	3093	1505	1771	1830	1722	1855	1991	2153	1985	2031	2456	2178	2303	2254	2757	2567	2205	2185	2451	2601
088	4266	3836	3795	3255	3538	3591	3490	3620	3757	3920	3742	3798	4224	3925	4045	3972	4523	4240	3854	3797	2979	2962
089	4216	3794	3745	3052	3327	3384	3277	3402	3539	3703	3521	3587	4008	3723	3845	3778	4313	4056	3674	3623	2938	2943
090	4157	3743	3687	2858	3128	3186	3075	3197	3335	3499	3314	3386	3805	3530	3653	3592	4113	3878	3499	3454	2891	2915
091	3991	3871	4007	6686	7021	6970	7074	7299	7367	7457	7486	7210	7605	7005	7026	6830	7635	6715	6448	6286	4059	3806
092	4322	4212	4349	7037	7372	7321	7425	7650	7718	7807	7837	7561	7955	7354	7375	7179	7983	7060	6795	6633	4410	4158
093	4425	4271	4403	6991	7332	7287	7379	7603	7678	7775	7790	7532	7938	7345	7374	7181	7988	7088	6804	6644	4378	4115
094	5249	5044	5170	7579	7928	7894	7964	8184	8270	8381	8369	8144	8568	7990	8031	7845	8652	7790	7482	7325	5026	4753
095	5987	5816	5947	8433	8781	8744	8820	9041	9125	9231	9227	8992	9411	8827	8864	8675	9483	8604	8306	8148	5857	5587
096	5007	4792	4917	7304	7654	7621	7690	7909	7996	8107	8094	7871	8296	7719	7761	7576	8382	7525	7214	7058	4758	4484
097	6216	6046	6177	8659	9007	8971	9046	9267	9351	9458	9452	9219	9639	9056	9093	8904	9712	8834	8535	8377	6086	5815
098	4664	4455	4581	7007	7356	7320	7394	7615	7699	7807	7800	7569	7990	7410	7449	7262	8069	7204	6897	6740	4443	4170
099	4384	4191	4320	6810	7156	7117	7198	7420	7501	7604	7606	7364	7780	7193	7229	7039	7847	6967	6670	6511	4223	3953
100	4758	4619	4753	7363	7704	7658	7752	7975	8049	8146	8162	7902	8306	7711	7739	7545	8352	7446	7167	7006	4747	4485
101	4957	4808	4941	7522	7865	7821	7910	8134	8210	8309	8320	8066	8474	7882	7911	7718	8526	7626	7343	7182	4913	4649
102	5065	4892	5022	7536	7882	7842	7924	8145	8226	8329	8332	8089	8504	7917	7951	7761	8569	7684	7390	7231	4946	4677
103	5642	5501	5635	8213	8556	8513	8601	8824	8901	9001	9011	8759	9168	8577	8607	8414	9222	8322	8038	7878	5608	5342
104	5624	5436	5565	8012	8361	8326	8398	8619	8704	8812	8804	8575	8996	8415	8454	8267	9074	8204	7901	7744	5448	5176
105	5914	5780	5915	8506	8849	8806	8894	9117	9194	9294	9304	9051	9459	8866	8895	8703	9510	8607	8326	8166	5898	5634
106	5860	5754	5890	8545	8884	8836	8933	9157	9229	9324	9344	9079	9479	8881	8905	8710	9516	8598	8329	8167	5924	5665
107	5401	5272	5407	8022	8364	8318	8411	8634	8709	8806	8821	8562	8967	8372	8399	8206	9013	8105	7827	7666	5408	5146
108	5324	5218	5354	8022	8359	8310	8410	8634	8705	8798	8822	8552	8950	8351	8374	8178	8984	8064	7796	7635	5398	5141
109	5225	5138	5275	7983	8317	8265	8371	8596	8663	8752	8783	8505	8897	8295	8314	8117	8920	7991	7733	7570	5355	5103
110	4928	4832	4969	7666	8001	7949	8054	8278	8346	8436	8466	8189	8582	7982	8001	7805	8609	7683	7421	7259	5038	4786
111	5719	5645	5783	8505	8839	8786	8893	9118	9185	9272	9305	9025	9415	8813	8830	8633	9435	8501	8247	8084	5878	5627
112	5793	5703	5841	8531	8868	8817	8920	9144	9213	9304	9331	9058	9453	8853	8873	8677	9481	8555	8294	8131	5906	5651
113	4658	4416	4536	6852	7203	7173	7236	7454	7544	7657	7638	7424	7852	7281	7327	7143	7948	7106	6787	6633	4331	4055
114	4369	4129	4250	6593	6944	6911	6979	7198	7285	7397	7383	7162	7588	7013	7057	6873	7678	6830	6514	6359	4057	3782
115	4506	4388	4523	7188	7525	7475	7577	7801	7871	7963	7988	7717	8114	7515	7538	7343	8148	7230	6961	6799	4563	4308
116	6020	5873	6006	8557	8902	8861	8945	9167	9246	9349	9353	9108	9520	8931	8963	8772	9580	8686	8398	8239	5960	5693
117	2957	2969	3108	5980	6288	6219	6357	6581	6627	6692	6765	6441	6794	6186	6184	5983	6765	5801	5590	5427	3418	3220
118	3124	3188	3325	6222	6521	6447	6595	6816	6856	6914	6999	6663	7000	6393	6384	6182	6952	5979	5789	5627	3705	3523
119	2773	2833	2969	5867	6165	6091	6239	6461	6500	6558	6644	6307	6646	6038	6030	5828	6600	5627	5434	5272	3357	3180
120	2666	2758	2892	5797	6089	6012	6166	6386	6421	6474	6568	6224	6553	5947	5934	5732	6496	5520	5339	5177	3328	3165

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 10 through 26, 101 through 104, 115 through 136, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

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07/21/2004 23:17 / 6

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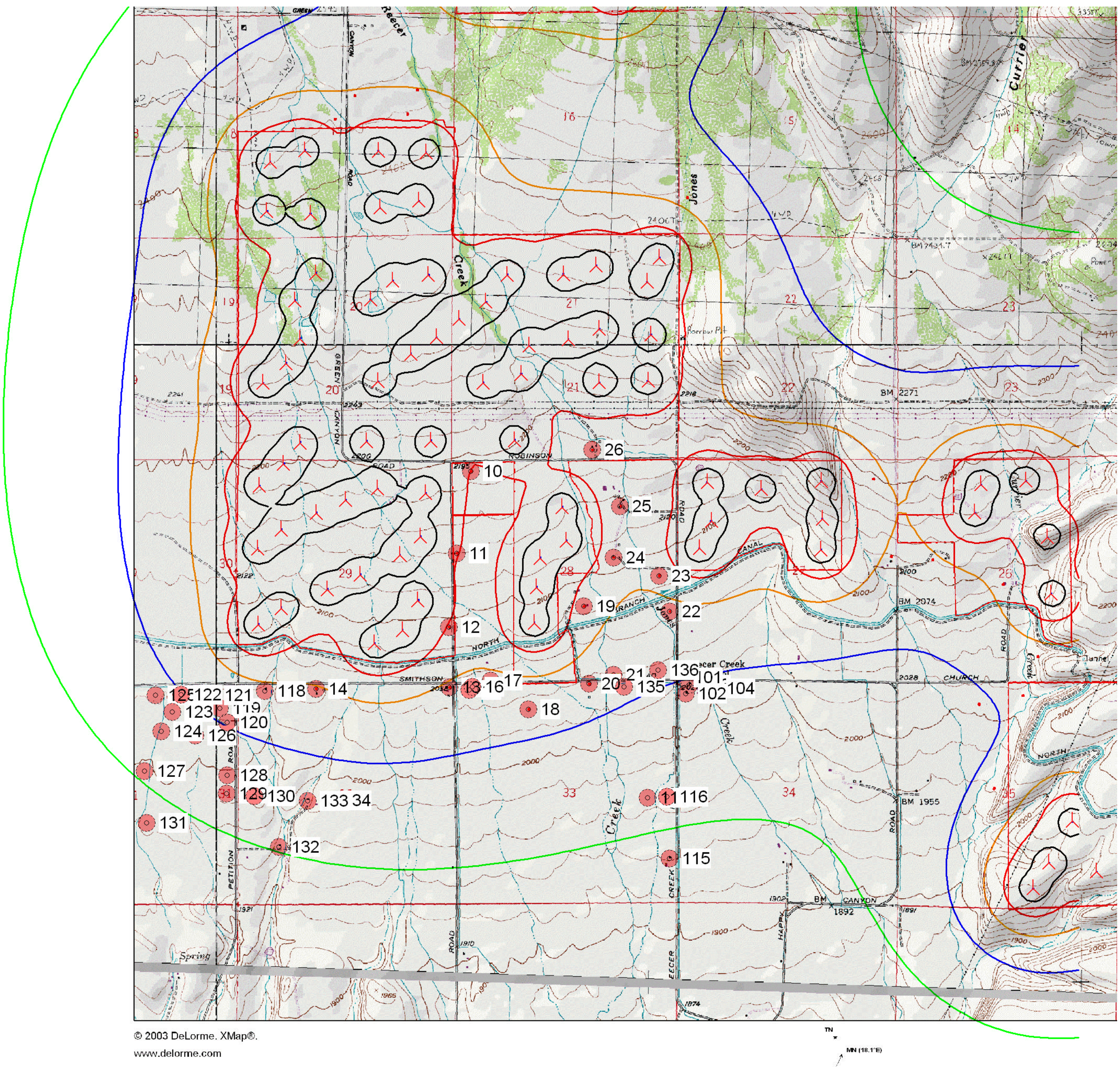
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:30/2.3.0.216

DECIBEL - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040720 Noise, southwest area **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



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0 500 1000 1500 2000 m

Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:45,000, Map center UTM NAD27 Zone: 10 East: 682,464 North: 5,220,054

New WTG — Noise sensitive area

Height above sea level from active line object

35 dB(A) — 40 dB(A) — 45 dB(A) — 50 dB(A) — 55 dB(A)

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 01 through 09, 137 through 147, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

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CA-92506 Riverside, USA

Calculated:
07/20/2004 22:09/2.3.0.216

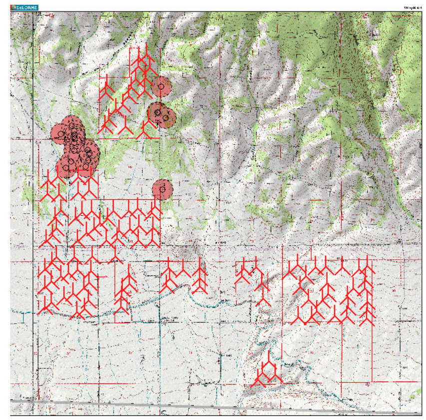
DECIBEL - Main Result

Calculation: 040720 Noise, northern area

ISO 9613-2

The calculation is based on the international norm "ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors"

Wind speed in 10 m height: 8.0 m/s
Meteorological correction factor, C0: 0.0 dB



Scale 1:200,000

New WTG   Noise sensitive area

WTGs

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
001	683,014	5,226,319	1,110	001	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
002	682,804	5,226,234	1,074	002	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
003	682,791	5,226,001	1,025	003	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
004	683,105	5,225,970	1,025	004	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
005	682,740	5,225,651	961	005	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
006	682,994	5,225,693	980	006	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
007	681,975	5,225,474	920	007	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
008	682,634	5,225,428	927	008	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
009	682,981	5,225,355	923	009	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
010	681,946	5,225,268	900	010	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
011	682,569	5,225,217	900	011	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
012	682,426	5,224,961	880	012	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
013	682,232	5,224,844	863	013	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
014	683,114	5,224,561	846	014	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
015	682,061	5,224,572	825	015	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
016	682,499	5,224,392	819	016	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
017	681,965	5,224,388	803	017	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
018	682,979	5,224,272	826	018	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
019	681,632	5,223,025	731	019	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
020	680,746	5,223,014	742	020	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
021	681,284	5,223,026	737	021	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
022	680,495	5,222,921	743	022	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
023	681,306	5,222,614	723	023	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
024	680,481	5,222,564	729	024	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
025	681,589	5,222,672	721	025	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
026	680,800	5,222,554	728	026	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
027	682,253	5,222,153	705	027	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
028	682,664	5,222,171	709	028	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
029	682,712	5,221,699	690	029	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
030	682,901	5,222,242	715	030	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
031	682,937	5,221,783	695	031	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
032	683,278	5,222,135	714	032	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
033	683,318	5,221,753	697	033	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
034	683,306	5,221,415	685	034	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
035	683,360	5,222,311	722	035	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
036	680,493	5,221,315	691	036	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
037	680,706	5,221,921	708	037	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
038	680,489	5,220,566	666	038	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
039	680,490	5,220,109	651	039	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 01 through 09, 137 through 147, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

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Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:09/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, northern area

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
040	680,514	5,219,556	634	040	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
041	680,661	5,220,731	671	041	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
042	680,675	5,219,682	638	042	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
043	680,852	5,222,121	717	043	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
044	680,659	5,220,251	656	044	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
045	680,656	5,221,461	695	045	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
046	680,776	5,220,888	675	046	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
047	680,753	5,221,644	700	047	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
048	680,913	5,220,382	660	048	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
049	681,367	5,219,446	635	049	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
050	681,010	5,219,827	645	050	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
051	681,354	5,220,572	666	051	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
052	681,532	5,220,095	653	052	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
053	681,332	5,221,353	689	053	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
054	681,673	5,219,767	644	054	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
055	682,558	5,220,102	647	055	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
056	681,566	5,221,558	694	056	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
057	681,263	5,220,913	676	057	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
058	681,567	5,219,546	638	058	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
059	681,676	5,220,233	657	059	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
060	681,675	5,222,134	709	060	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
061	681,707	5,220,549	666	061	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
062	681,245	5,219,941	648	062	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
063	682,099	5,221,366	685	063	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
064	682,377	5,221,436	680	064	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
065	682,429	5,221,643	685	065	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
066	682,530	5,219,631	636	066	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
067	682,538	5,219,890	641	067	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
068	682,745	5,220,236	648	068	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
069	682,948	5,221,392	681	069	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
070	683,722	5,220,210	638	070	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
071	683,802	5,220,409	641	071	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
072	683,762	5,220,692	652	072	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
073	684,611	5,220,451	655	073	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
074	684,595	5,220,725	680	074	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
075	684,609	5,220,225	644	075	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
076	685,724	5,220,530	658	076	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
077	685,764	5,220,737	664	077	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
078	686,091	5,220,775	663	078	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
079	686,261	5,220,367	678	079	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
080	686,301	5,219,957	647	080	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
081	682,706	5,220,478	654	081	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
082	681,415	5,222,087	709	082	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
083	684,158	5,220,654	651	083	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
084	681,259	5,221,945	705	084	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
085	681,731	5,220,931	677	085	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
086	682,344	5,220,953	673	086	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
087	681,123	5,220,481	664	087	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
088	682,103	5,221,953	698	088	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
089	681,910	5,221,823	697	089	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
090	681,750	5,221,684	697	090	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
091	687,250	5,219,497	668	091	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
092	687,601	5,219,511	680	092	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
093	687,511	5,219,965	687	093	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
094	687,945	5,220,852	720	094	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
095	688,830	5,220,812	741	095	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
096	687,669	5,220,826	715	096	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
097	689,042	5,220,901	748	097	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
098	687,421	5,220,582	700	098	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
099	687,279	5,220,288	692	099	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
100	687,888	5,219,951	699	100	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
101	688,026	5,220,123	702	101	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA	Receptors 01 through 09, 137 through 147, all turbines	07/21/2004 22:50 / 3
Huckell/Weinman Associates, Inc.	120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height	Licensed user:
	Apparent sound power level (LWA) of 104 dBA applied	**Wind Engineers, Inc.**
	No corrections for lack of background noise made	7660 Whitegate Avenue
	No tonal noise considered (no information available)	CA-92506 Riverside, USA
	1.5 dB uncertainty recommended	
	Noise limit set to 50 dBA, no noise distance requirement	
	Layout as of 06/20/04	Calculated:
	Residences located on 7/16/04 added	07/20/2004 22:09/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, northern area

	UTM NAD27 Zone: 10				WTG type						Noise data				
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Creator	Name	LwA,ref	Pure tones	Octave data
			[m]					[kW]	[m]	[m]			[dB(A)]		
102	687,992	5,220,421	709	102	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
103	688,697	5,220,308	720	103	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
104	688,391	5,220,848	731	104	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
105	688,993	5,220,311	724	105	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
106	689,076	5,219,960	714	106	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
107	688,537	5,220,075	711	107	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
108	688,567	5,219,790	703	108	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
109	688,546	5,219,547	698	109	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
110	688,227	5,219,566	694	110	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
111	689,071	5,219,520	700	111	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
112	689,083	5,219,735	706	112	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
113	687,186	5,220,886	700	113	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
114	686,969	5,220,695	696	114	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
115	687,742	5,219,655	684	115	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
116	689,009	5,220,533	733	116	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
117	686,507	5,218,310	620	117	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
118	686,696	5,217,949	620	118	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
119	686,344	5,218,001	616	119	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No
120	686,235	5,217,814	600	120	Yes	GE Wind Energy	1.5sle 77m Class III	1,500	77.0	65.0	USER	User Defined	104.0	No	No

Calculation Results

Sound Level

Noise sensitive area		UTM NAD27 Zone: 10			Demands	Sound Level	Demands fulfilled ?
No	Name	East	North	Z	Noise	Calculated	Noise
				[m]	[dB(A)]	[dB(A)]	
01	01	683,428	5,225,473	919	50.0	46.0	Yes
02	02	683,575	5,224,656	856	50.0	43.4	Yes
03	03	683,340	5,224,798	863	50.0	46.6	Yes
04	04	683,362	5,224,784	863	50.0	46.4	Yes
05	05	683,552	5,222,758	744	50.0	43.8	Yes
06	06	680,958	5,223,243	747	50.0	48.4	Yes
07	07	681,096	5,223,419	753	50.0	45.7	Yes
08	08	681,486	5,223,297	743	50.0	48.7	Yes
09	09	681,551	5,223,473	749	50.0	45.3	Yes
137	137	681,166	5,223,712	764	50.0	42.8	Yes
138	138	681,154	5,223,921	772	50.0	41.7	Yes
139	139	680,798	5,224,135	780	50.0	39.8	Yes
140	140	681,149	5,224,236	782	50.0	41.0	Yes
141	141	681,078	5,224,377	792	50.0	40.5	Yes
142	142	681,179	5,224,127	779	50.0	41.3	Yes
143	143	681,182	5,224,034	776	50.0	41.5	Yes
144	144	681,159	5,224,089	778	50.0	41.3	Yes
145	145	681,529	5,223,732	760	50.0	43.2	Yes
146	146	681,569	5,223,657	756	50.0	43.6	Yes
147	147	681,556	5,223,614	754	50.0	43.9	Yes

Distances (m)

	Noise sensitive area																			
WTG	01	02	03	04	05	06	07	08	09	137	138	139	140	141	142	143	144	145	146	147
001	942	1755	1556	1574	3601	3700	3477	3386	3200	3196	3035	3111	2796	2742	2859	2929	2901	2983	3029	3073
002	984	1756	1533	1554	3556	3515	3293	3219	3032	3007	2841	2903	2594	2535	2661	2733	2703	2808	2858	2902
003	827	1557	1322	1344	3331	3312	3089	3002	2816	2807	2647	2730	2411	2360	2472	2541	2514	2596	2643	2688
004	593	1395	1195	1213	3243	3471	3247	3125	2941	2976	2829	2948	2614	2578	2666	2729	2706	2737	2777	2820
005	711	1299	1043	1067	3005	2996	2772	2667	2481	2497	2347	2464	2129	2094	2182	2245	2222	2269	2312	2356
006	487	1189	960	981	2988	3186	2962	2831	2648	2696	2555	2693	2351	2324	2397	2457	2437	2448	2485	2528
007	1453	1797	1523	1549	2452	2235	2231	2045	1939	1757	1783	1488	1417	1565	1644	1607	1798	1862	1907	
008	795	1217	946	972	2823	2754	2530	2421	2235	2258	2112	2246	1904	1878	1952	2013	1992	2024	2067	2110
009	462	917	663	686	2659	2925	2702	2544	2364	2448	2323	2501	2147	2140	2181	2232	2219	2178	2208	2250

Project:
030415 Desert Claim Wind Power Project, WA

Huckell/Weinman Associates, Inc.

Description:
Receptors 01 through 09, 137 through 147, all turbines
120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height
Apparent sound power level (LWA) of 104 dBA applied
No corrections for lack of background noise made
No tonal noise considered (no information available)
1.5 dB uncertainty recommended
Noise limit set to 50 dBA, no noise distance requirement
Layout as of 06/20/04
Residences located on 7/16/04 added

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Licensed user:
Wind Engineers, Inc.
7660 Whitegate Avenue
CA-92506 Riverside, USA

Calculated:
07/20/2004 22:09/2.3.0.216

DECIBEL - Main Result

Calculation: 040720 Noise, northern area

Noise sensitive area

WTG	01	02	03	04	05	06	07	08	09	137	138	139	140	141	142	143	144	145	146	147
010	1496	1740	1471	1496	2980	2253	2035	2024	1838	1741	1563	1613	1304	1244	1375	1451	1418	1592	1654	1699
011	896	1152	877	903	2648	2548	2324	2204	2019	2058	1919	2075	1726	1711	1766	1823	1806	1813	1853	1896
012	1125	1189	928	953	2474	2260	2036	1911	1726	1774	1643	1826	1468	1469	1500	1551	1538	1522	1560	1604
013	1351	1356	1109	1132	2469	2046	1822	1717	1531	1555	1419	1600	1242	1245	1274	1326	1312	1316	1360	1403
014	965	471	328	334	1855	2527	2319	2061	1904	2125	2062	2355	1992	2044	1983	2003	2011	1789	1790	1823
015	1637	1516	1299	1318	2348	1727	1504	1399	1212	1241	1116	1336	972	1002	988	1031	1023	994	1039	1083
016	1425	1108	934	948	1944	1922	1707	1492	1320	1496	1425	1720	1359	1421	1346	1365	1374	1173	1185	1222
017	1821	1632	1435	1452	2275	1525	1302	1191	1004	1047	936	1194	830	887	828	859	860	788	831	875
018	1282	709	638	639	1619	2268	2067	1783	1636	1898	1858	2185	1830	1904	1806	1813	1829	1547	1538	1568
019	3036	2537	2462	2467	1938	708	665	309	455	830	1016	1388	1304	1461	1192	1105	1164	714	635	594
020	3639	3271	3148	3159	2818	312	535	792	927	815	995	1122	1287	1403	1194	1109	1152	1062	1044	1008
021	3253	2812	2714	2722	2284	392	436	338	521	696	904	1211	1218	1367	1106	1013	1070	747	692	648
022	3888	3535	3408	3419	3061	564	781	1060	1192	1037	1198	1251	1469	1568	1386	1308	1344	1314	1302	1267
023	3560	3053	2984	2989	2251	719	832	706	893	1107	1316	1604	1630	1778	1518	1425	1482	1140	1076	1031
024	4141	3735	3628	3637	3077	830	1053	1244	1404	1337	1515	1603	1801	1909	1712	1629	1669	1569	1542	1503
025	3351	2807	2754	2758	1965	851	895	633	802	1123	1323	1663	1625	1780	1512	1422	1481	1062	985	943
026	3928	3481	3389	3397	2760	707	914	1011	1187	1214	1412	1581	1718	1844	1618	1529	1576	1385	1345	1302
027	3522	2831	2860	2855	1433	1693	1715	1377	1495	1901	2082	2459	2358	2515	2247	2165	2224	1737	1652	1619
028	3389	2647	2713	2705	1064	2015	2004	1630	1713	2149	2311	2709	2561	2717	2456	2381	2438	1930	1846	1819
029	3841	3080	3162	3153	1352	2337	2360	2014	2120	2538	2714	3098	2980	3137	2871	2792	2850	2352	2267	2237
030	3274	2506	2593	2583	831	2186	2155	1765	1827	2274	2423	2830	2654	2807	2553	2483	2539	2025	1943	1921
031	3723	2943	3042	3031	1153	2459	2463	2097	2186	2619	2784	3179	3036	3191	2930	2854	2912	2404	2320	2293
032	3341	2538	2664	2650	681	2571	2532	2136	2185	2636	2775	3186	2991	3141	2894	2828	2882	2368	2289	2270
033	3722	2914	3045	3031	1032	2791	2777	2396	2466	2910	3063	3468	3297	3450	3196	3125	3181	2668	2585	2563
034	4060	3252	3383	3369	1365	2976	2983	2618	2705	3139	3303	3700	3551	3706	3447	3372	3429	2920	2836	2810
035	3163	2355	2487	2473	487	2576	2521	2118	2150	2603	2731	3145	2932	3078	2838	2777	2829	2318	2240	2225
036	5090	4545	4499	4502	3382	1983	2189	2217	2403	2490	2689	2836	2994	3117	2894	2805	2853	2630	2577	2533
037	4475	3964	3901	3905	2967	1346	1548	1582	1767	1849	2050	2216	2357	2484	2256	2166	2215	1989	1939	1894
038	5720	5124	5103	5104	3767	2718	2917	2907	3095	3218	3420	3582	3729	3856	3627	3537	3586	3332	3274	3229
039	6116	5495	5487	5487	4049	3169	3365	3340	3527	3666	3869	4038	4179	4308	4077	3986	4036	3769	3708	3664
040	6596	5948	5955	5953	4414	3714	3907	3865	4052	4207	4412	4588	4723	4854	4619	4528	4579	4298	4235	4190
041	5490	4888	4870	4871	3531	2530	2723	2695	2883	3024	3228	3407	3539	3670	3435	3344	3395	3124	3064	3019
042	6412	5758	5769	5766	4212	3572	3761	3705	3891	4060	4266	4455	4579	4712	4474	4381	4434	4139	4074	4030
043	4228	3720	3655	3659	2774	1127	1321	1336	1522	1622	1825	2015	2136	2267	2033	1941	1992	1747	1695	1651
044	5911	5283	5279	5278	3828	3007	3198	3156	3343	3498	3703	3887	4015	4147	3911	3819	3870	3588	3525	3481
045	4877	4328	4282	4285	3173	1807	2007	2015	2202	2308	2510	2678	2818	2946	2717	2626	2676	2433	2378	2334
046	5297	4694	4676	4676	3347	2362	2551	2511	2699	2851	3056	3247	3369	3502	3264	3172	3224	2942	2880	2835
047	4671	4127	4079	4082	3013	1612	1808	1808	1996	2109	2312	2491	2622	2752	2519	2428	2479	2228	2172	2127
048	5678	5035	5039	5037	3551	2861	3043	2971	3156	3340	3547	3755	3861	3998	3754	3662	3715	3406	3340	3295
049	6370	5659	5704	5699	3968	3819	3982	3853	4031	4271	4480	4723	4795	4939	4685	4592	4648	4289	4216	4172
050	6142	5468	5490	5487	3880	3416	3593	3503	3686	3888	4097	4313	4411	4551	4303	4211	4265	3939	3871	3826
051	5322	4649	4669	4666	3100	2700	2859	2728	2908	3146	3355	3606	3670	3815	3559	3466	3522	3165	3093	3049
052	5702	4998	5039	5033	3342	3200	3353	3202	3378	3636	3845	4106	4159	4306	4047	3955	4011	3637	3562	3519
053	4623	3993	3988	3987	2627	1927	2079	1950	2131	2365	2574	2833	2889	3035	2778	2685	2741	2387	2316	2272
054	5970	5246	5300	5294	3532	3549	3697	3535	3708	3977	4186	4455	4500	4648	4388	4295	4352	3968	3891	3849
055	5441	4666	4761	4751	2836	3525	3625	3370	3518	3869	4069	4400	4368	4524	4255	4166	4225	3773	3690	3652
056	4335	3692	3694	3692	2320	1791	1919	1741	1915	2191	2399	2689	2710	2861	2598	2506	2564	2174	2099	2056
057	5048	4400	4405	4403	2940	2350	2512	2394	2576	2801	3010	3255	3325	3469	3215	3122	3178	2832	2761	2717
058	6212	5490	5543	5537	3776	3747	3902	3752	3927	4185	4394	4653	4709	4856	4597	4505	4561	4186	4111	4068
059	5525	4813	4859	4853	3146	3094	3238	3070	3242	3516	3725	4000	4038	4187	3926	3833	3891	3502	3426	3383
060	3771	3158	3142	3141	1978	1321	1409	1178	1345	1658	1861	2185	2167	2321	2054	1963	2022	1605	1527	1485
061	5216	4512	4552	4547	2878	2796	2934	2757	2928	3209	3417	3699	3729	3879	3617	3524	3582	3188	3111	3069
062	5947	5259	5290	5286	3641	3314	3481	3365	3545	3772	3981	4218	4296	4439	4187	4094	4149	3802	3730	3686
063	4317	3606	3650	3644	2012	2197	2285	2026	2177	2525	2724	3059	3023	3179	2910	2821	2881	2434	2352	2313
064	4172	3436	3497	3490	1769	2298	2361	2063	2198	2578	2770	3127	3057	3215	2946	2860	2919	2448	2363	2328
065	3958	3224	3284	3277	1583	2173	2221	1904	2030	2424	2611	2978	2892	3050	2781	2697	2756	2275	2190	2156
066	5911	5133	5230	5220	3290	3939	4050	3812	3965	4303	4505	4826	4808	4963	4695	4605	4664	4221	4139	4100
067	5654	4878	4973	4963	3042	3707	3812	3566	3716	4061	4262	4588	4563	4719	4450	4360	4420	3972	3890	3851
068	5281	4497	4601	4590	2648	3498	3585	3310	3450	3818	4014	4358	4307	4464	4194	4107	4167	3701	3618	3581
069	4109	3324	3429	3417	1494	2718	2746	2401	2506	2925	3101	3485	3365	3522	3257	3178	3236	2737	2652	2622
070	5271	4448	4604	4588	2554	4104	4147	3812	3919	4336	4513	4894	4778	4935	4670	4591	4649	4149	4064	4035
071	5078	4253	4413	4397	2362	4015	4048	3702	3802	4226	4398	4786	4657	4813	4550	4473	4531	4026	3942	3914

DECIBEL - Main Result

Calculation: 040720 Noise, northern area

Noise sensitive area

WTG	01	02	03	04	05	06	07	08	09	137	138	139	140	141	142	143	144	145	146	147
072	4793	3968	4128	4112	2077	3791	3814	3459	3553	3982	4151	4543	4403	4559	4298	4222	4280	3772	3688	3661
073	5159	4331	4529	4509	2538	4598	4600	4227	4301	4744	4898	5302	5130	5282	5029	4959	5015	4502	4420	4397
074	4889	4061	4262	4242	2285	4424	4416	4035	4101	4548	4696	5103	4920	5070	4821	4754	4809	4294	4213	4193
075	5379	4550	4746	4726	2745	4737	4748	4381	4461	4900	5059	5460	5297	5450	5195	5124	5180	4668	4585	4561
076	5450	4652	4889	4866	3112	5484	5456	5061	5106	5559	5691	6104	5888	6032	5796	5737	5788	5277	5200	5185
077	5281	4489	4729	4706	2996	5420	5384	4985	5023	5477	5603	6017	5792	5934	5702	5645	5696	5187	5111	5098
078	5400	4625	4874	4850	3222	5696	5652	5250	5281	5734	5854	6269	6033	6173	5947	5892	5942	5437	5362	5350
079	5839	5061	5307	5283	3613	6033	5999	5602	5642	6095	6222	6636	6411	6553	6322	6264	6315	5806	5731	5717
080	6219	5432	5675	5651	3925	6273	6251	5860	5910	6361	6497	6909	6697	6842	6605	6544	6597	6085	6007	5991
081	5047	4267	4366	4356	2432	3271	3353	3072	3210	3582	3777	4125	4068	4225	3956	3869	3928	3460	3376	3340
082	3939	3356	3325	3326	2240	1243	1370	1212	1393	1644	1853	2139	2165	2315	2054	1961	2018	1649	1578	1534
083	4874	4044	4224	4206	2190	4116	4126	3758	3840	4278	4438	4838	4678	4832	4576	4503	4560	4048	3965	3941
084	4141	3566	3531	3533	2433	1332	1483	1371	1556	1769	1979	2238	2294	2439	2183	2090	2146	1807	1740	1695
085	4849	4156	4188	4184	2580	2438	2568	2379	2548	2838	3045	3337	3356	3507	3243	3151	3209	2808	2731	2689
086	4648	3902	3972	3964	2172	2677	2764	2496	2642	3000	3198	3538	3494	3651	3381	3293	3352	2896	2813	2775
087	5498	4842	4853	4851	3329	2767	2938	2839	3022	3231	3440	3668	3755	3896	3646	3554	3608	3276	3207	3163
088	3761	3078	3102	3098	1658	1725	1779	1479	1617	1993	2185	2542	2474	2632	2362	2276	2335	1869	1786	1749
089	3953	3286	3301	3298	1890	1710	1792	1534	1689	2030	2230	2566	2530	2686	2417	2328	2387	1947	1865	1826
090	4144	3488	3496	3494	2098	1749	1854	1634	1800	2110	2315	2629	2622	2776	2509	2418	2477	2060	1981	1940
091	7094	6334	6587	6563	4930	7323	7298	6904	6949	7401	7532	7946	7725	7868	7635	7577	7628	7118	7041	7026
092	7277	6533	6790	6766	5190	7620	7589	7192	7232	7685	7811	8226	7997	8138	7909	7852	7903	7395	7319	7306
093	6856	6124	6384	6359	4845	7327	7286	6885	6916	7369	7487	7903	7663	7801	7577	7524	7573	7069	6996	6984
094	6462	5794	6064	6039	4789	7385	7314	6906	6910	7358	7452	7865	7592	7719	7517	7474	7519	7033	6966	6960
095	7135	6511	6784	6758	5625	8239	8162	7753	7750	8194	8282	8692	8410	8532	8338	8299	8342	7863	7798	7795
096	6291	5606	5875	5849	4548	7133	7066	6658	6666	7115	7213	7626	7358	7487	7281	7237	7282	6793	6725	6719
097	7240	6632	6906	6880	5796	8416	8335	7927	7920	8363	8446	8856	8569	8690	8499	8461	8503	8029	7965	7962
098	6314	5603	5868	5842	4439	6989	6932	6527	6543	6994	7101	7516	7259	7392	7178	7130	7177	6681	6611	6602
099	6459	5727	5988	5963	4471	6978	6931	6528	6554	7007	7121	7537	7291	7428	7208	7156	7204	6703	6630	6619
100	7098	6383	6647	6621	5165	7672	7626	7224	7250	7703	7817	8233	7986	8122	7903	7851	7900	7398	7326	7315
101	7054	6353	6619	6594	5192	7726	7674	7270	7290	7742	7852	8267	8013	8147	7932	7883	7930	7432	7361	7352
102	6808	6119	6387	6362	5018	7579	7520	7113	7128	7578	7682	8096	7835	7966	7756	7709	7755	7262	7192	7185
103	7378	6719	6990	6964	5699	8277	8213	7806	7816	8265	8364	8777	8509	8637	8432	8388	8433	7944	7876	7869
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106	7893	7233	7504	7478	6192	8757	8697	8291	8305	8755	8857	9271	9007	9137	8929	8883	8929	8437	8368	8361
107	7432	6753	7023	6997	5661	8214	8158	7752	7769	8219	8325	8739	8479	8611	8400	8353	8399	7905	7835	7827
108	7662	6971	7239	7213	5827	8356	8306	7902	7924	8376	8486	8902	8648	8782	8567	8518	8565	8067	7995	7986
109	7830	7128	7394	7369	5937	8440	8396	7994	8021	8474	8589	9005	8758	8894	8675	8623	8672	8170	8098	8087
110	7611	6896	7159	7134	5661	8146	8105	7705	7735	8188	8306	8722	8480	8617	8395	8342	8391	7888	7814	7803
111	8203	7522	7791	7765	6399	8926	8877	8473	8496	8948	9058	9473	9219	9353	9138	9089	9137	8638	8567	8558
112	8056	7386	7656	7630	6303	8850	8796	8391	8409	8860	8966	9381	9122	9254	9042	8995	9041	8546	8476	8468
113	5930	5220	5486	5461	4088	6659	6596	6189	6200	6650	6753	7167	6904	7035	6826	6779	6825	6333	6263	6256
114	5947	5216	5478	5453	3991	6529	6474	6069	6089	6540	6650	7065	6813	6947	6731	6681	6729	6230	6159	6150
115	7243	6510	6770	6745	5214	7674	7638	7239	7274	7727	7849	8264	8028	8167	7942	7887	7937	7431	7357	7344
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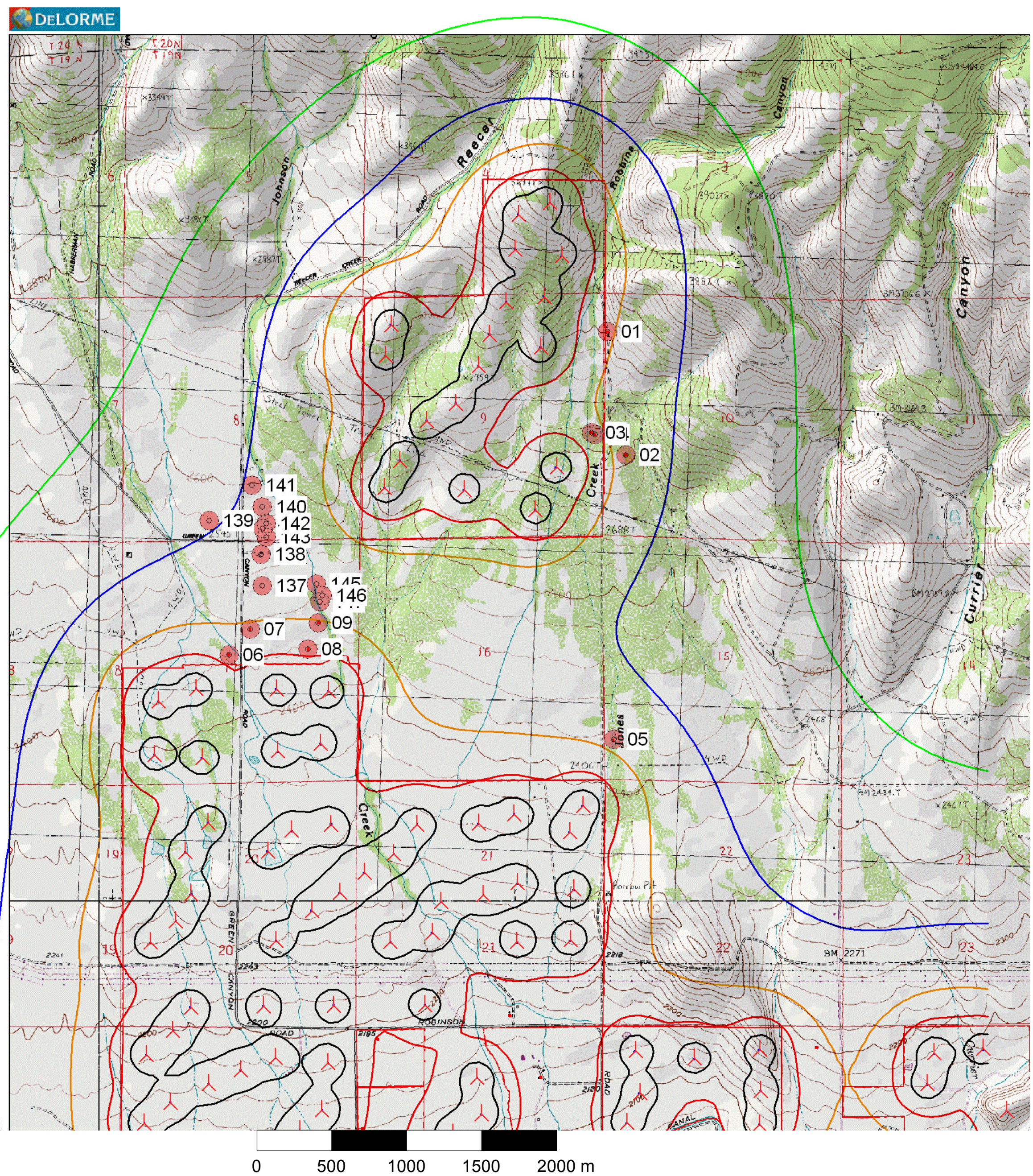
117	7797	6991	7220	7198	5340	7425	7442	7077	7157	7597	7755	8156	7989	8141	7888	7818	7874	7361	7278	7256
118	8203	7398	7627	7605	5746	7807	7828	7466	7549	7987	8147	8547	8384	8537	8283	8212	8268	7755	7673	7649
119	8021	7208	7431	7410	5516	7516	7543	7187	7274	7709	7873	8269	8116	8269	8013	7940	7997	7485	7402	7378
120	8157	7341	7560	7539	5625	7571	7604	7254	7346	7777	7944	8338	8192	8347	8088	8014	8071	7561	7477	7452

Project:	Description:	Printed/Page
030415 Desert Claim Wind Power Project, WA	Receptors 01 through 09, 137 through 147, all turbines	07/21/2004 22:50 / 6
Huckell/Weinman Associates, Inc.	120 GE 1.5sle (180MW) 77m rotor diameter, 64.7m hub height	Licensed user:
	Apparent sound power level (LWA) of 104 dBA applied	**Wind Engineers, Inc.**
	No corrections for lack of background noise made	7660 Whitegate Avenue
	No tonal noise considered (no information available)	CA-92506 Riverside, USA
	1.5 dB uncertainty recommended	
	Noise limit set to 50 dBA, no noise distance requirement	
	Layout as of 06/20/04	Calculated:
	Residences located on 7/16/04 added	07/20/2004 22:09/2.3.0.216

DECIBEL - 040711 DCWPP USGS, z13, 31250, overlays

Calculation: 040720 Noise, northern area **File:** 040711 DCWPP USGS, z13, 34375, overlays.bmi



Map: 040711 DCWPP USGS, z13, 31250, overlays , Print scale 1:45,000, Map center UTM NAD27 Zone: 10 East: 681,988 North: 5,223,902

New WTG   Noise sensitive area

Height above sea level from active line object

35 dB(A)   40 dB(A)   45 dB(A)   50 dB(A)   55 dB(A)

APPENDIX G

Aesthetics

Contents

APPENDIX G

AESTHETICS

1. BASELINE VISUAL ASSESSMENT CONDITIONS

1.1 Visual Assessment Unit 1: Northwest Valley

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents, agricultural workers, motorists on Reecer Creek Road, motorists on smaller county roads, and outdoor recreation users of the John Wayne Trail.

Rural residents:
Viewer exposure: 2—The number of residents is small, but some of them are very close to the project and will have direct views of the turbines.
Viewer sensitivity: 3—Rural residents are highly sensitive to landscape change visible from their homes, especially residents with a foreground view of the project.

Agricultural Workers:
Viewer Exposure: 2—Agricultural workers would be able to view the project from many distances intermittently over a long period of time.
Viewer Sensitivity: 1—Agricultural workers are engaged in their farm activities.

Motorists on Reecer Creek Road:
Viewer exposure: 2—This road is the most heavily trafficked road in the unit. Northbound motorists will have a range of direct views of the project.
Viewer sensitivity: 2—Motorists driving on local roads are somewhat aware of changes in the visual environment and some of the motorists will be on their way to their homes.

Motorists on county roads:
Viewer exposure: 1—Stretches of county roads throughout the unit, many of them unpaved, allow glimpses of the project, but they are not heavily trafficked.
Viewer sensitivity: 2—Motorists driving on local roads are somewhat aware of changes in the visual environment and many of the motorists will be on their way to their homes.

John Wayne Trail users:
Viewer exposure: 1—There are quite a few hikers and bikers on the John Wayne trail, but most views to the north are blocked by vegetation, landforms, and built structures.
Viewer sensitivity: 2—Because of the engineered character of the trail, along a former rail line, and the adjacent power lines, the users of the trail would not be as sensitive to changes in the landscape as outdoor recreation users in a more natural environment.

Visual Quality of Key Views-Existing

Key View 1A: **Figure G8** shows an existing view looking northeast across the Northwest Valley Visual Assessment Unit from the intersection of Smithson Road and Robbins Road.

Vividness: 3—View contains a memorable skyline: the Wenatchee Mountains, foothills, Naneum Canyon, and the north-south ridge running across the valley and the valley floor. View offers a range of vegetation characteristic of the region: Ponderosa Pine forest, shrub-steppe, and pasture.
Intactness: 3—No encroaching elements intrude into this view.
Unity: 3—Layered progression of visual elements from the valley floor, over the north-south ridge, and up the foothills to the horizon. Strong and harmonious vegetation patterns: fine texture of the pasture, coarse shrub-steppe, and smooth rangeland. Farm buildings nestled into the hills in the middleground evoke working rural landscape.

Overall Visual Quality: 3.0—High.

Key View 1B: **Figure G9** shows an existing view looking northwest across the Northwest Valley Visual Assessment Unit from the intersection of Hungry Junction and Lookabout Lane.

Vividness: 3— Memorable scene with the Wenatchee Mountains skyline including Mount Stuart, the foothills, and a broad section of the expansive valley floor. Full expression of characteristic regional vegetation: ponderosa pine forest, rangeland, and shrub-steppe in the middle ground, as well as riparian corridors and pasture.
Intactness: 3—High visual integrity, no encroaching elements in this landscape. Farm buildings and small power lines fit the working landscape.
Unity 3—Clear visual composition and progression from the rolling topography in the foreground to the horizon. Farm buildings dotting the middleground evoke the working landscape.

Overall Visual Quality: 3.0—High.

Key View 1C: **Figure G10** shows an existing view looking northeast across the Northwest Valley Visual Assessment Unit along Smithson Road near U.S. Highway 97.

Vividness: 2—Diverse visual patterns of wetlands and pasture, however, the baseline of the mountains against the valley floor is unclear. High vegetation species diversity: pasture, windrows, riparian, shrub-steppe, and forest.
Intactness: 2—Dendritic pattern of small creeks interrupted by Smithson Road.
Unity: 2—Traditional fencing and fields fit with topography and riparian vegetation. Progression from foreground to middleground and background is unclear.

Overall Visual Quality: 2.0— Moderate.

Key View 1D: **Figure G11** shows an existing view looking southwest across the Northwest Valley Visual Assessment Unit from immediately north of the project area.

Vividness: 2—Typical view across the valley to the Manastash Ridge allows an appreciation of the larger form of the valley. Visual patterns of non-irrigated rangeland and wind rows are simple but unremarkable.
Intactness: 2—Power lines encroaching in close and distant middleground. Disturbed and uncultivated lands in middleground.

Unity: 2— Progression from foreground to middleground and background is blurred, but enclosure of valley floor by ridge is clear.

Overall Visual Quality: 2.0—Moderate.

Key View 1E: **Figure G12** shows an existing view looking northwest across the Northwest Valley Visual Assessment Unit from Reecer Creek Road.

Vividness: 2—Wenatchee Mountains skyline present, but low vegetation diversity in foreground and middleground. Distinct visual patterns of field, farmstead, and mountains, but extent of field is monotonous.
Intactness: 2—Wide open, but interrupted somewhat by ranch home at farm that blurs boundary between valley floor and foothills. Power lines compromise the horizon line.
Unity: 2—Field, farms, and mountains clear, but not visually integrated.

Overall Visual Quality: 2.0—Moderate.

Key View 1F: **Figure G13** shows an existing view looking northwest across the Northwest Valley Visual Assessment Unit from Smithson Road at the CTC Farm.

Vividness: 2—Wenatchee Mountains foothills are present, but low vegetation diversity in foreground and middleground. Distinct visual patterns exist of field, farmstead, and mountains.
Intactness: 2—Wide open, but interrupted somewhat by cluttered ranch homes. Power lines compromise the horizon line.
Unity: 3—Clear progression from foreground through background along diagonals over farms and fields.

Overall Visual Quality: 2.33—Moderate.

Key View 1G: **Figure G14** shows an existing view looking southeast across the Northwest Valley Visual Assessment Unit from Reecer Creek Road just north of the project boundary.

Vividness: 2— View across the valley to Manastash Ridge allows an appreciation of the larger form of the valley. Visual patterns of non-native hedgerow and irrigated fields are unremarkable.
Intactness: 2—Wide open view beyond hedgerow. Rural buildings at great distance are not intrusive.
Unity: 2—Hedgerow blurs distinction between foreground and middleground, but general progression beyond hedgerow is clear and unified.

Overall Visual Quality: 2.0—Moderate.

1.2 Visual Assessment Unit 2: Northeast Valley

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents, agricultural workers, motorists on county roads, and airport users.

Rural residents:
Viewer Exposure: 1—Relatively few residents will be exposed to the project area, but some may have filtered views to the turbines on the eastern half of the project area.
Viewer Sensitivity: 3— Rural residents are highly sensitive to landscape change visible from their homes.

Agricultural Workers:
Viewer Exposure: 2—Agricultural workers would be able to view the project from many distances intermittently over a long period of time.
Viewer Sensitivity: 1—Agricultural workers are engaged in their farm activities.

Motorists on county roads:
Viewer exposure: 1—Stretches of county roads throughout the unit, many of them unpaved, allow glimpses of the project, but they are not heavily trafficked and most views are filtered or blocked by vegetation and landforms.
Viewer sensitivity: 2—Motorists driving on local roads are somewhat aware of changes in the visual environment and many of the motorists will be on their way to their homes.

Airport users:
Viewer Exposure: 2—Although it is a small airport, the project area will be clearly visible from the runway and planes flying in and out of Bowers Field.
Viewer Sensitivity: 2—Many fliers are aware of the landscape character, but are likely distracted by other activities.

Visual Quality of Key Views-Existing

Key View 2A: **Figure G16** shows an existing view looking southwest across the Northeast Valley Visual Assessment Unit from Wilson Creek Road.

Vividness: 2—Distinct visual patterns of the mountain background and the shrub-steppe vegetation foreground. Full expression of native vegetation diversity. Power lines diminish appreciation of natural diversity.
Intactness: 1—The power lines are very intrusive elements in the landscape.
Unity: 2—The background mountains and the power lines are competing dominant elements. Power lines dissect progression from foreground to background especially where the valley floor and the lower foothills meet.

Overall Visual Quality: 1.67—Moderate.

Key View 2B: **Figure G17** shows an existing view looking west across the Northeast Valley Visual Assessment Unit from Wilson Creek Road on Rabbit Hill.

Vividness: 2—Limited view of distant mountains. Distinctive patches of native vegetation and riparian corridor along Wilson Creek.
Intactness: 2—Continuous band of riparian vegetation associated with Wilson Creek and native shrub-steppe vegetation surrounding farm. Some landform disturbance around the foreground farm.
Unity: 2—Manmade structures not integrated with the landscape so somewhat cluttered visual pattern in the foreground.

Overall Visual Quality: 2.0—Moderate.

Key View 2C: **Figure G18** shows an existing view looking northwest across the Northeast Valley Visual Assessment Unit from the north end of Bowers Field at Hungry Junction Road.

Vividness: 2—Partial expression of the Wenatchee Mountains and Mount Stuart in the background, but undifferentiated plane of fields against foothills and mountain backdrop. Low vegetation species diversity. Memorable historic farm fencing.
Intactness: 3—Strong and established visual character as the fence, windrows, and pasture are all elements part of the working landscape. View to the mountains free of obstruction.
Unity: 3—Clear visual composition and integration of built and natural elements.

Overall Visual Quality: 2.67—High.

1.3 Visual Assessment Unit 3: Greater Ellensburg

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are city residents, suburban residents, university students, and tourists.

City residents:
Viewer exposure: 1—The highest concentration of people in the Kittitas Basin is in Ellensburg, but nearly all residents are on the flat areas of the city where trees and structures block most views toward the project.
Viewer sensitivity: 2—Residents in the city are used to more cluttered landscape patterns and more accepting of landscape changes.

Suburban residents:
Viewer exposure: 2—Subdivisions at the edge of the city contain a growing number of Ellensburg's residents, but the majority of residents are on flat areas where trees and structures block or filter most views toward the project. Some residents at the current edge of the urban area may have long views to the north that include the project area.
Viewer sensitivity: 2—Residents in suburban areas of Ellensburg are used to landscape change, but tend to appreciate the open spaces that contrast with urban density.

University students:
Viewer exposure: 1—There are over 7,000 students at Central Washington University, but there is only one small hill on campus offering a very distant view of the project. Trees and structures block most other views out of the campus.
Viewer sensitivity: 1—Students are engaged in school activities.

Tourists:
Viewer exposure 1—Many tourists visit Ellensburg, but their attention is focused on the city center and the rodeo.
Viewer sensitivity 2—Tourists are relatively observant of their surroundings.

Visual Quality of Key Views-Existing

Key View 3A: **Figure G20** shows an existing view looking north across the Greater Ellensburg Visual Assessment Unit over the Burlington Northern Railroad near U.S. Highway 97 and Cascade Way.

Vividness: 2—Memorable expression of the intrinsic foothills and mountains. Bold patterns of mountain background and urban fabric. Low vegetation species diversity relating to pasture and urban setting.
Intactness: 1—Discordance between suburban development and the rural landscape.
Unity: 1—Ellensburg's outskirts interrupt the natural visual progression from valley to mountains.

Overall Visual Quality: 1.33—Low.

Key View 3B: **Figure G21** shows an existing view looking northwest across the Greater Ellensburg Visual Assessment Unit from a hill on the Central Washington University campus.

Vividness: 1—Exotic trees, lawn, and institutional buildings populate this bland landscape.
Intactness: 2—Consistently flat lawn with some clusters of trees obscuring surrounding landscape.
Unity: 1—Built features do not fit with the character of the region.

Overall Visual Quality: 1.33—Low.

Key View 3C: **Figure G22** shows an existing view looking northwest across the Greater Ellensburg Visual Assessment Unit from Reed Park in Ellensburg.

Vividness: 3—Memorable juxtaposition of city and mountains. Rare view out from the city.
Intactness: 2—City view disrupted by power lines, but overall grouping of green city and brown hills is retained.
Unity: 3—Continuous view across the city, over the valley floor, and up to the foothills and mountains conveys the range of valley conditions in one view.

Overall Visual Quality: 2.67—High.

1.4 Visual Assessment Unit 4: Yakima River

Viewer Group Exposure and Sensitivity

The primary viewer groups in this unit are rural residents, motorists on I-90, motorists on State Route 10, motorists on the Thorp Highway, and outdoor recreation users of the river corridor.

Rural residents:
Viewer exposure: 1—There are relatively few homes in the corridor and views to the northeast are blocked or filtered by the thick riparian vegetation along the Yakima River and any glimpses of the project would be at a great distance.

Viewer sensitivity: 2— Rural residents are sensitive to landscape change visible from their homes.

Motorists on I-90:
Viewer exposure: 2—There are very many motorists on I-90 and this is the beginning of the Mountains to Sound Greenway, but the project area is not near the highway corridor and most views are blocked by vegetation and landform.
Viewer sensitivity: 1—Motorists on I-90 are driving fast and paying attention to the road.

Motorists on State Route 10:
Viewer exposure: 1—Most motorists' views to the project area are blocked by landforms and vegetation.
Viewer sensitivity: 2—Viewers are on a designated scenic highway.

Motorists on the Thorp Highway:
Viewer exposure: 1—Most motorists' views to the project area are blocked by riparian vegetation.
Viewer sensitivity: 2—This local highway is used by local residents or by leisurely drivers aware of their surroundings.

River corridor users:
Viewer exposure: 1—Distance and thick surrounding vegetation prevent significant exposure.
Viewer sensitivity: 3—River rafters and hikers enjoying the corridor are very aware of their surroundings.

Visual Quality of Key Views-Existing

Key View 4A: **Figure G24** shows an existing view looking north across the Yakima River Visual Assessment Unit from the intersection of the Thorp Highway and Weaver Road.

Vividness: 3—Riparian corridor is dominant feature fully expressing this regional characteristic. Range of vegetation types.
Intactness: 3—Strong visual character. There are no encroaching elements in the landscape.
Unity: 3—Clear visual composition and coherent patterns.

Overall Visual Quality: 3.0—High.

1.5 Visual Assessment Unit 5: Southwest Valley

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents, agricultural workers, and motorists on county roads.

Rural residents:
Viewer exposure: 1—There are some residents in this unit, but this unit is the furthest from the Project Area, placing the project in the distant background of any views north across the valley.

Viewer exposure: 2—Rural residents are sensitive to landscape changes.

Agricultural workers:
Viewer exposure: 1—Agricultural workers would be able to view the project area for long periods of time. However, they are only exposed to very distant views of the project.
Viewer sensitivity: 1—Agricultural workers will be actively engaged in farming and ranching.

Motorists on county roads:
Viewer exposure: 1—Stretches of county roads throughout the unit, many of them unpaved, allow glimpses of the project, but they are not heavily trafficked.
Viewer sensitivity: 2—Motorists driving on local roads are somewhat aware of changes in the visual environment and many of the motorists will be on their way to their homes.

Visual Quality of Key Views-Existing

Key View 5A: **Figure G26** shows an existing view looking north from the Southwest Valley Visual Assessment Unit at the intersection of Killmore Road and Robinson Road.

Vividness: 3—Memorable regional landscape elements including mountains, foothills, river corridor.
Intactness: 2—Some discordance in overall rural landscape due to large suburban residences in the middleground.
Unity: 2—Reduced compositional harmony due to suburban development that is neither integrated in the pastoral landscape nor hidden.

Overall Visual Quality: 2.33—Moderate.

1.6 Visual Assessment Unit 6: Hayward Hill

Viewer Group Exposure and Sensitivity

The primary viewer groups of this unit are rural residents and motorists on unpaved county roads.

Rural residents:
Viewer exposure: 1—There are very few residents on Hayward Hill.
Viewer sensitivity: 3—Rural residents are highly sensitive to landscape change visible from their homes, especially residents with such a clear view of the project.

Motorists on unpaved county roads:
Viewer exposure: 1—There are very few motorists on Hayward Hill.
Viewer sensitivity: 2—Motorists on these unpaved roads will be moving slowly so they are somewhat aware of changes in the visual environment.

Visual Quality of Key Views-Existing

Key View 6A: **Figure G28** shows an existing view looking east from the Hayward Hill Visual Assessment Unit at the top of the hill.

Vividness—3: Memorable skyline of mountains, canyon, foothills, and north-south ridges. Diverse range of vegetation communities: ponderosa pine forest, rangeland, shrub-steppe, riparian corridors, wind rows and pasture.
Intactness—3: Undisrupted forms, view free of discord, and established visual character, interrupted only slightly by U.S. Highway 97 in the middleground.
Unity: 3—Clear visual composition and layering of foreground, middleground, and background.

Overall Visual Quality: 3.0—High.

1.7 Visual Assessment Unit 7: Dry Creek Slope

Viewer Group Exposure and Sensitivity

The primary viewer groups in this unit are rural residents and motorists on U.S. Highway 97.

Rural residents:
Viewer Exposure1—There are few residents in this unit and most of their views are blocked by landforms and vegetation.
Viewer Sensitivity 3— Rural residents are highly sensitive to landscape change visible from their homes, especially residents with a foreground view of the project.

Motorists on U.S. Highway 97:
Viewer Exposure 2— There are many motorists on U.S. Highway 97, but most views are blocked by landform.
Viewer Sensitivity 1— Motorists on U.S. Highway 97 are driving fast and paying attention to the road.

Visual Quality of Key Views-Existing

Key View 7A: **Figure G30** shows an existing view looking to the northwest from the Dry Creek Slope Visual Assessment Unit off U.S. Highway 97.

Vividness: 3—Memorable expression of the rolling coulees across Dry Creek Slope leading to the foothills of the Wenatchee Mountains.
Intactness: 2—Some encroachment by the power lines.
Unity: 2—Gradual topographical progression with limited middleground.

Overall Visual Quality: 2.33—Moderate.

1.8 Visual Assessment Unit 8: Table Mountain Slope

Viewer Group Exposure and Sensitivity

The primary viewer group of this unit are rural residents at Sun East and outdoor recreational users.

Rural residents:
Viewer Exposure: 2—There are over 100 homes in Sun East and many homes have direct views over the project.

Viewer Sensitivity 3— Rural residents are highly sensitive to landscape change visible from their homes.

Outdoor recreational users:
Viewer exposure: 2— The Wenatchee Mountains are an outdoor recreation destination and some users access the mountains from this unit, but many views are blocked by the forest after rising above the foothills.
Viewer sensitivity: 3—Campers, hunters, horseback riders, and hikers enjoying nature are very aware of their surroundings.

Visual Quality of Key Views-Existing

Key View 8A: **Figure G32** shows an existing view looking south from the Table Mountain Slope Visual Assessment Unit over the Kittitas Basin.

Vividness—3: Memorable display of the open sky, mountains, ridge running north-south through the valley, flat valley, creeks and canyons. Diverse plant communities: ponderosa pine forest, riparian vegetation, shrub-steppe, rangeland, and pasture. Farms dot the valley.
Intactness: 3—Strong visual character. Undisrupted skyform, landcover, landform, built forms.
Unity: 3—Clear visual composition and sense of enclosure, harmonious patterns across the valley. Built structure of paved road follows natural creek form.

Overall Visual Quality: 3.0—High.

Key View 8B: **Figure G33** shows an existing view looking southwest from the Sun East development in the Table Mountain Slope Visual Assessment Unit.

Vividness: 3— View across the valley to Manastash Ridge allows an appreciation of the larger form of the valley as well as its distinctive landforms and a diverse array of native shrub steppe and riparian vegetation. There is even a glimpse of the top of Mt. Rainier from this elevation.
Intactness: 2—View over stunning valley cluttered by numerous rural residential structures with little integration in the landscape.
Unity: 3—Clear, uninterrupted progression from foreground through background along undulating landforms.

Overall Visual Quality: 2.67—High.

2. OPERATION PERIOD IMPACT ASSESSMENT

2.1 Visual Assessment Unit 1: Northwest Valley

Visual Quality of Key Views-With Project

Key View 1A: **Figure G34** shows a simulated view of the proposed project looking northeast across the Northwest Valley Visual Assessment Unit from the intersection of Smithson Road and Robbins Road.

Vividness: 2—Dramatic height and light color of turbines are vivid elements, but they diminish appreciation of the intrinsic features of the region such as mountains, foothills, and the ridge.
Intactness: 1—The white turbines contrast sharply with the brown and green foothills.
Unity: 2—Visual progression from foreground to background is severed by the turbines. Their arrangement does not clearly relate to topography or a discrete form.

Overall Visual Quality: 1.67—Moderate.
Level of Visual Impact: 1.33—High.

Key View 1B: **Figure G35** shows a simulated view of the proposed project looking northwest across the Northwest Valley Visual Assessment Unit from the intersection of Hungry Junction and Lookabout Lane.

Vividness: 3—The turbines at this distance do not reduce the vividness of the scene dominated by strong landscape features such as mountains, foothills, and the farm-dotted valley.
Intactness: 2—The white turbines contrast mildly with the brown and green foothills.
Unity: 2—Turbines clutter the seam between valley and foothill slopes and disrupt transition from middleground to background.

Overall Visual Quality: 2.33—Moderate.
Level of Visual Impact: 0.67—Moderate.

Key View 1C: **Figure G36** shows a simulated view of the proposed project looking northeast across the Northwest Valley Visual Assessment Unit along Smithson Road near U.S. Route 97.

Vividness: 2—No significant change. Turbines only barely visible.
Intactness: 2—No significant change. Turbines no more disruptive than existing small power poles and fence posts.
Unity: 2—No significant change. Turbines are very minor element.

Overall Visual Quality: 2.0—Moderate.
Level of Visual Impact: 0.0—Low.

Key View 1D: **Figure G37** shows a simulated view of the proposed project looking southwest across the Northwest Valley Visual Assessment Unit from immediately north of the Project Area.

Vividness: 2—Dramatic height and light color of turbines are vivid elements, but they diminish appreciation of the intrinsic features of the region.

Intactness: 1—Turbines are disruptive elements in the landscape, especially where they break the skyline of the southern ridge.
Unity: 1—Topographic form of basin less clear with scattered turbines lacking definite end or shape to their arrangement.

Overall Visual Quality: 1.33—Low.
Level of Visual Impact: 0.67—Moderate.

<u>Key View 1E</u>: **Figure G38** shows a simulated view of the proposed project looking northwest across the Northwest Valley Visual Assessment Unit from Reecer Creek Road.

Vividness: 1—Dramatic height and light color of turbines diminish appreciation of intrinsic features of the region such as farmland and foothills.
Intactness: 1—Turbines break up the skyline and interrupt the view to the mountains.
Unity: 1—Visual progression from middleground to background is disrupted by the turbines and the scattered arrangement of the turbines doesn't reflect topography or recognizable form.

Overall Visual Quality: 1.0—Low.
Level of Visual Impact: 1.0—High.

<u>Key View 1F</u>: **Figure G39** shows a simulated view of the proposed project looking northwest across the Northwest Valley Visual Assessment Unit from Reecer Creek Road.

Vividness: 1—Dramatic height and light color of turbines diminish appreciation of intrinsic features of the region such as farmland and foothills.
Intactness: 1—Turbines break up the skyline and interrupt the view to the foothills.
Unity: 2—Visual progression from middleground to background is disrupted by the turbines. Turbine layout doesn't reinforce topography, but does appear to be grouped in somewhat recognizable lines.

Overall Visual Quality: 1.33—Low.
Level of Visual Impact: 1.0—High.

<u>Key View 1F</u>: **Figure G40** shows a simulated view looking southeast across the Northwest Valley Visual Assessment Unit from Reecer Creek Road just north of the project boundary.

Vividness: 1—Dramatic height and light color of turbines diminish appreciation of intrinsic features of the region such as farmland.
Intactness: 1—Turbines break up the skyline and interrupt the view to Manastash Ridge.
Unity: 1—Visual progression from middleground to background is disrupted by the turbines and the turbine layout appears as a large scattered group stretching across the entire scene.

Overall Visual Quality: 1.0—Low.
Level of Visual Impact: 1.0—High.

2.2 Visual Assessment Unit 2: Northeast Valley Floor

<u>Visual Quality of Key Views-With Project</u>

<u>Key View 2A</u>: **Figure G41** shows a simulated view of the proposed project looking southwest across the Northeast Valley Visual Assessment Unit from Wilson Creek Road.

Vividness: 2—No significant change. Turbines are not strong feature in this view compared with transmission lines.
Intactness: 1—No significant change. Power lines already disrupt view and most of turbines do not break skyline.
Unity: 1—The sense of continuity between foreground and background is already lowered by the power lines, but the turbines further block the flow of views under the powerlines to the mountains.

Overall Visual Quality: 1.33— Low.
Level of Visual Impact: 0.33—Low.

<u>Key View 2B</u>: **Figure G42** shows a simulated view of the proposed project looking west across the Northeast Valley Visual Assessment Unit from Wilson Creek Road on Rabbit Hill.

Vividness: 2—No significant change. Turbines mostly blocked by vegetation and farm structures.
Intactness: 2—No significant change. Turbines do not break skyline.
Unity: 2—No significant change. Scattered farm structures more noticeable.

Overall Visual Quality: 2.0—Moderate.
Level of Visual Impact: 0.0—Low.

<u>Key View 2C</u>: **Figure G43** shows an existing view looking northwest across the Northeast Valley Visual Assessment Unit from the north end of Bowers Field at Hungry Junction Road.

Vividness: 2— No significant change. Turbines are not strong feature in this view.
Intactness: 2— Some contrast between light-colored turbines against brown foothills.
Unity: 3— No significant change.

Overall Visual Quality: 2.33—Moderate.
Level of Visual Impact: 0.33—Low.

2.3 Visual Assessment Unit 3: Greater Ellensburg

<u>Visual Quality of Key Views-With Project</u>

<u>Key View 3A</u>: **Figure G44** shows a simulated view of the proposed project looking north across Greater Ellensburg Visual Assessment Unit over the Burlington Northern Railroad near U.S. Highway 97 and Cascade Way.

Vividness: 2—No significant change. Turbines are not strong feature at this distance.
Intactness: 1— No significant change. Suburban development is much more intrusive.
Unity: 1—No significant change.

Overall Visual Quality: 1.33—Low.
Level of Visual Impact: 0.0—Low.

<u>Key View 3B</u>: **Figure G45** shows a simulated view of the proposed project looking northwest across the Greater Ellensburg Visual Assessment Unit from a hill on the Central Washington University campus.

Vividness: 1—No significant change. Turbines are completely obscured by trees and buildings.
Intactness: 2— No significant change.
Unity: 1—No significant change.

Overall Visual Quality: 1.33—Low.
Level of Visual Impact: 0.0—Low.

<u>Key View 3C</u>: **Figure G46** shows a simulated view of the proposed project looking northwest across the Greater Ellensburg Visual Assessment Unit from Reed Park in Ellensburg.

Vividness: 2—Turbines diminish dramatic view of the mountains contrasted with city.
Intactness: 2—Turbines in distance contrast slightly with brown foothills, but do not block or interrupt view to scenic elements and do not break the skyline.
Unity: 2—The turbines in the middleground compromise separation of city and mountains by rural valley.

Overall Visual Quality: 2.0—Moderate.
Level of Visual Impact: 0.67—Moderate.

2.4 Visual Assessment Unit 4: Yakima River

<u>Visual Quality of Key Views-With Project</u>

<u>Key View 4A</u>: **Figure G47** shows a simulated view of the proposed project looking north across the Yakima River Visual Assessment Unit from the intersection of the Thorp Highway and Weaver Road.

Vividness: 3—No significant change. Parts of turbines visible over riparian vegetation are not strong features at this distance.
Intactness: 2—Turbines contrast somewhat with brown foothills but do not break the skyline.
Unity: 3—No significant change.

Overall Visual Quality: 2.67—High.
Level of Visual Impact: 0.33—Low.

2.5 Visual Assessment Unit 5: Southwest Valley

Visual Quality of Key Views-With Project

Key View 5A: **Figure G48** shows a simulated view of the proposed project looking north from the Southwest Valley Visual Assessment Unit at the intersection of Killmore Road and Robinson Road.

Vividness: 3—No significant change. Turbines are not strong features at this distance.
Intactness: 2—Turbines contrast somewhat with brown foothills but do not break the skyline and are much less noticeable than suburban development.
Unity: 2—No significant change.

Overall Visual Quality: 2.33—Moderate.
Level of Visual Impact: 0.0—Low.

2.6 Visual Assessment Unit 6: Hayward Hill

Visual Quality of Key Views-With Project

Key View 6A: **Figure G49** shows a simulated view of the proposed project looking east from the Hayward Hill Visual Assessment Unit at the top of the hill.

Vividness: 3—No significant change. Intrinsic character of valley to foothills progression remains dominant.
Intactness: 2—The white turbines contrast with the brown and green foothills.
Unity: 2—Turbines obscure the seam between middleground and background, appear to continue endlessly to the left and right of view and lack formal arrangement or relationship to topography.

Overall Visual Quality: 2.33—Moderate.
Level of Visual Impact: 0.67—Moderate.

2.7 Visual Assessment Unit 7: Dry Creek Slope

Visual Quality of Key Views-With Project

Key View 7A: **Figure G50** shows a simulated view of the proposed project looking northwest from the Dry Creek Visual Assessment Unit off U.S. Highway 97.

Vividness: 3—No significant change. Turbines do not block foothills or foreground shrub-steppe.
Intactness: 2—No significant change. Turbines share visual band with power lines that already interrupt view of foothills and turbines do not break skyline.
Unity: 1—Scattered turbine arrangement clutters middleground without revealing topography. No clear form to groups of turbines.

Overall Visual Quality: 2.0—Moderate.
Level of Visual Impact: 0.33—Low.

2.8 Visual Assessment Unit 8: Table Mountain Slope

Visual Quality of Key Views-With Project

Key View 8A: **Figure G51** shows a simulated view of the proposed project looking south from the Table Mountain Slope Visual Assessment Unit over Kittitas Basin.

Vividness: 3—No significant change. Intrinsic character of foothills to valley progression remains dominant.
Intactness: 2—The leftmost turbine intrudes on the view. The majority of the turbines lower on the valley floor blend somewhat with the mixture of tones in the valley.
Unity: 2— Scattered turbine arrangement clutters middleground without revealing topography.

Overall Visual Quality: 2.33—Moderate.
Level of Visual Impact: 0.67—Moderate.

Key View 8B: **Figure G52** shows a simulated view of the proposed project looking southwest from the Sun East development in the Table Mountain Slope Visual Assessment Unit.

Vividness: 2—Ribbon of turbines diminishes appreciation of Mt. Rainier, but the overall experience of the valley is still dominant.
Intactness: 2—The turbines do clutter some of the middleground, but their impact is not much more than the existing rural residential buildings.
Unity: 2—Turbines blur transition from middleground to background, but at this elevation most of the turbines appear to be in a narrow band of the field of vision and distinct clusters are apparent.

Overall Visual Quality: 2.0—Moderate.
Level of Visual Impact: 0.67—Moderate.

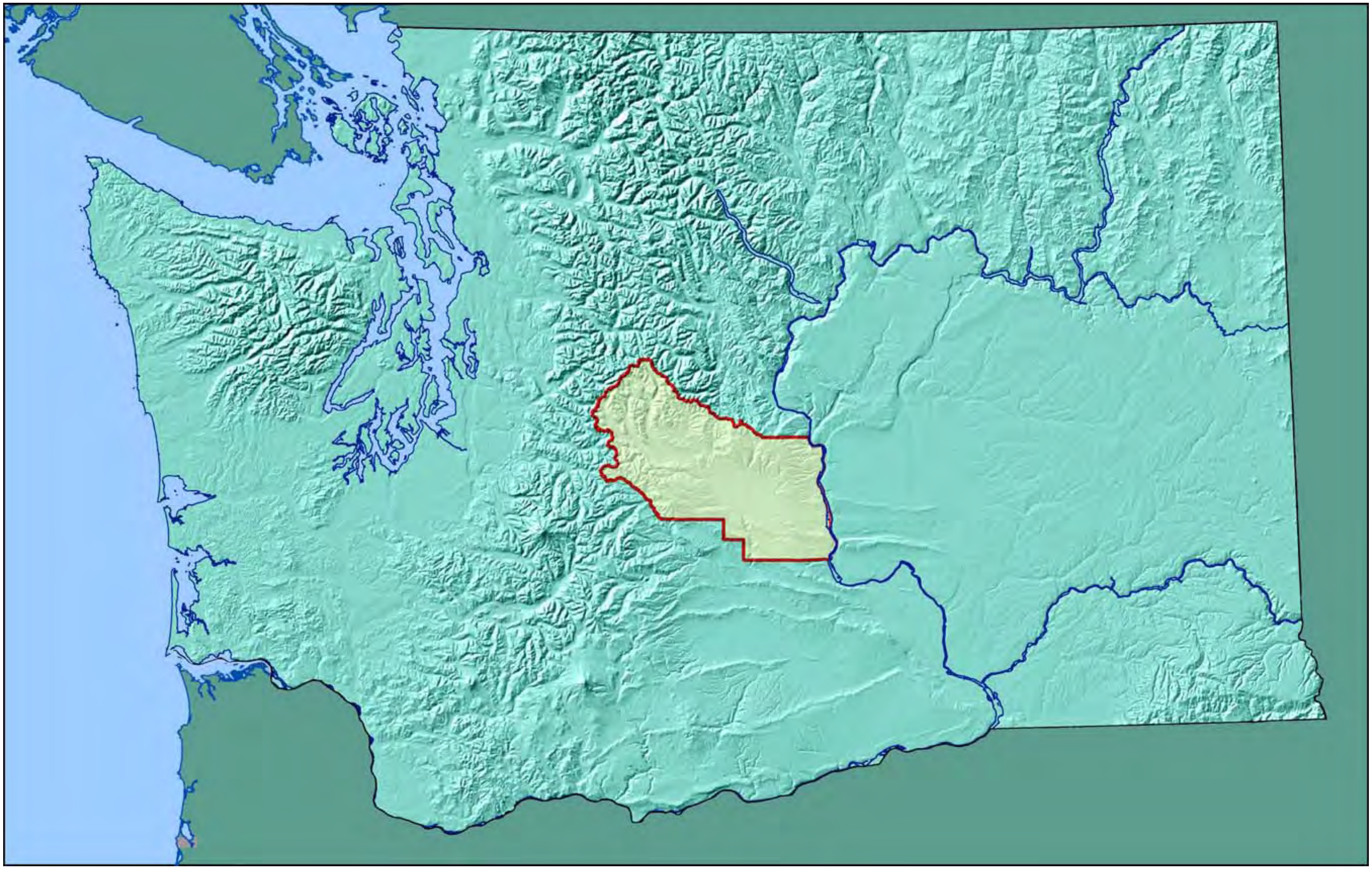


Figure G1
Kittitas County, roughly coterminous with the Kittitas Basin.

Figure G2
Project Area.

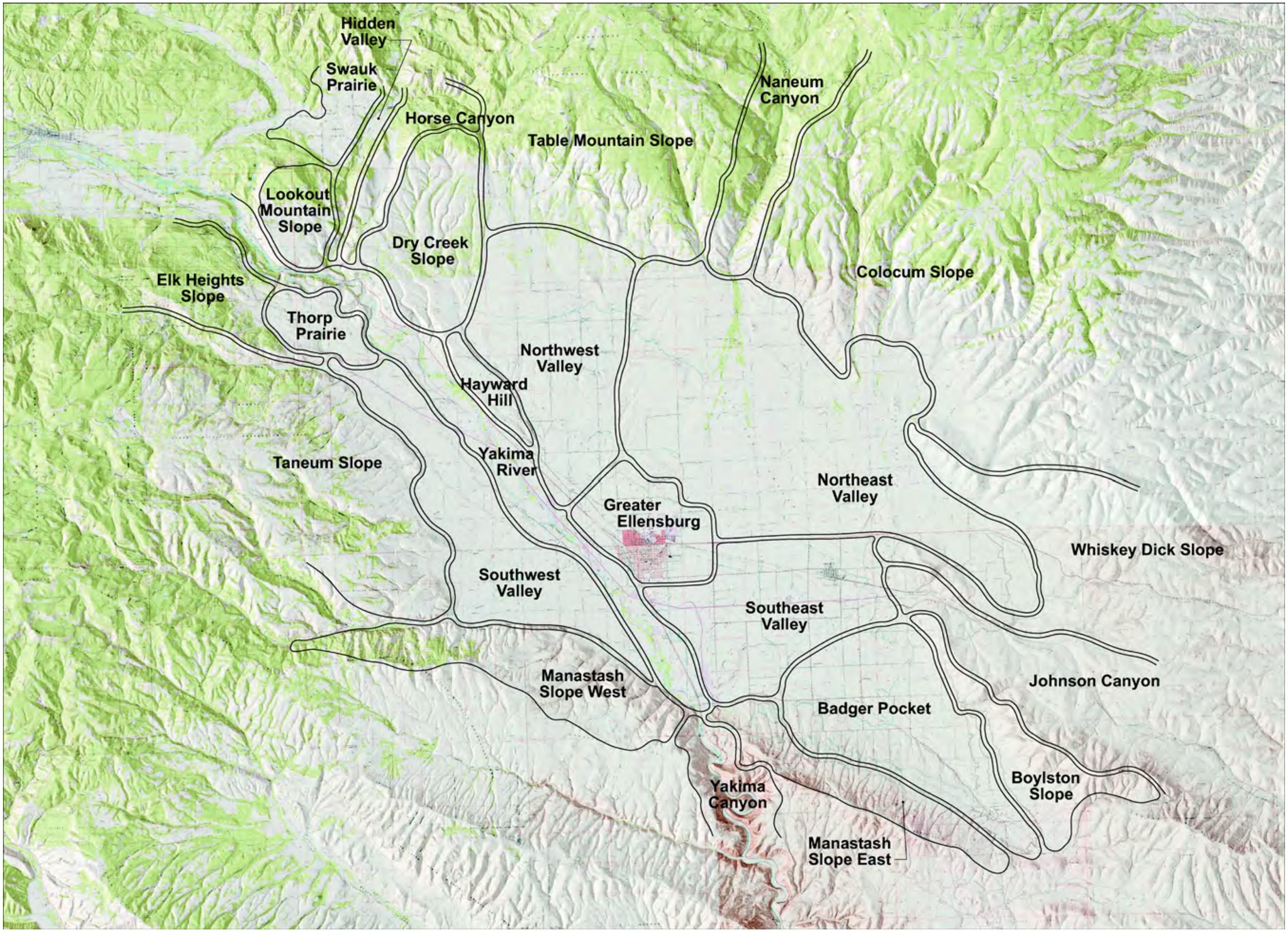


Figure G3
Landscape Units of the Kittitas Basin.

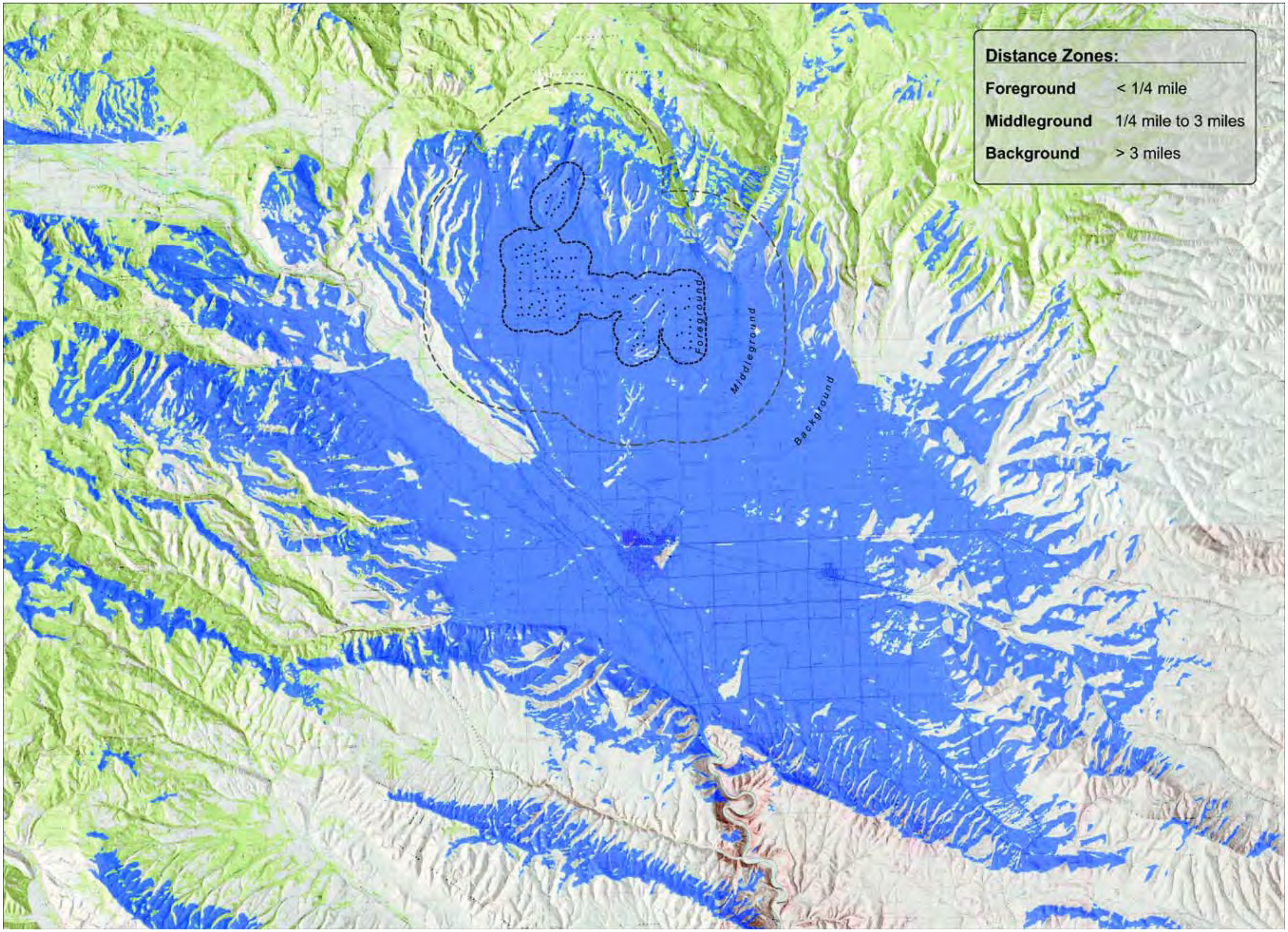


Figure G4
Viewshed of turbine blades indicated by shaded area.

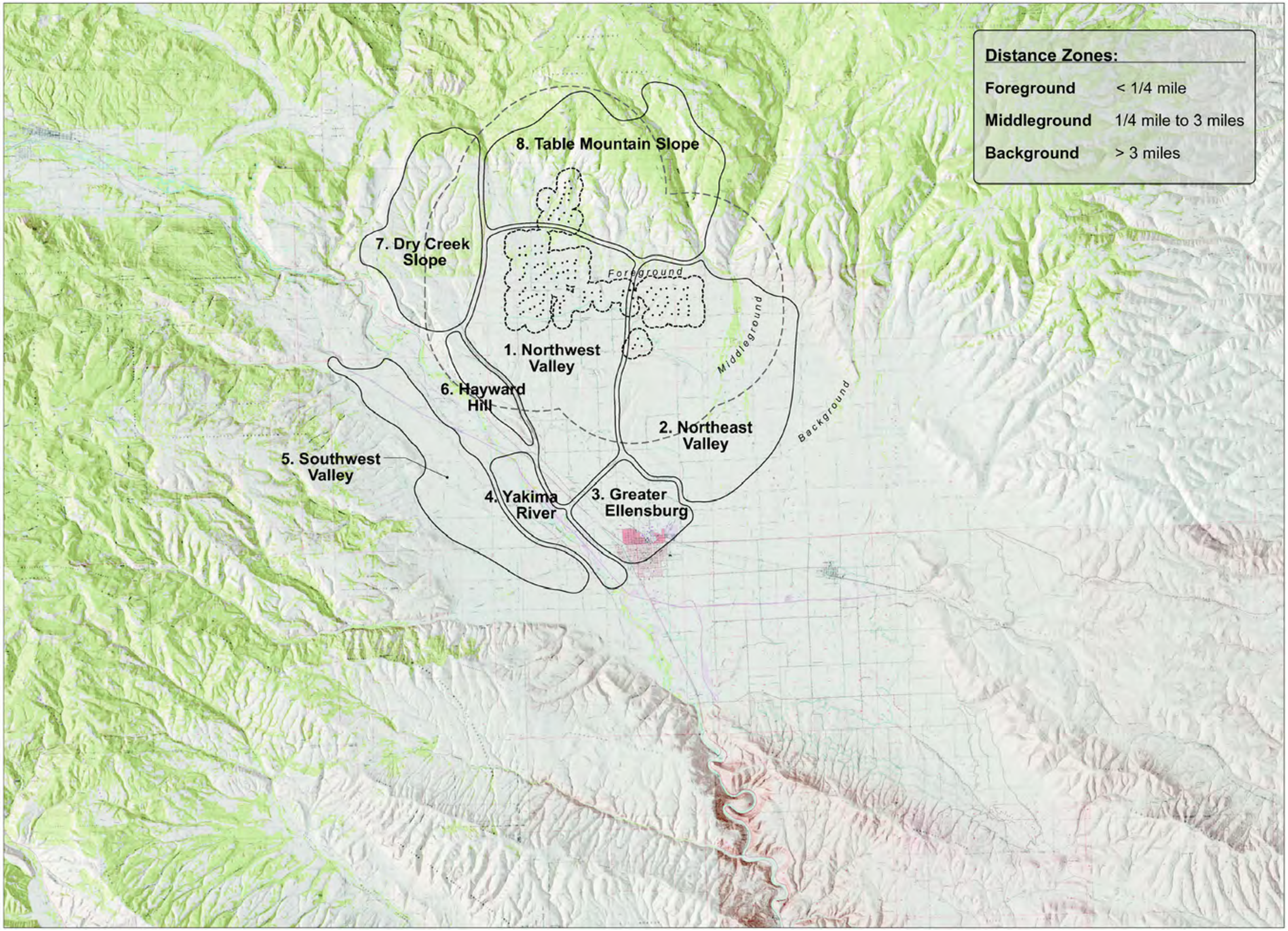


Figure G5
Visual Assessment Units.

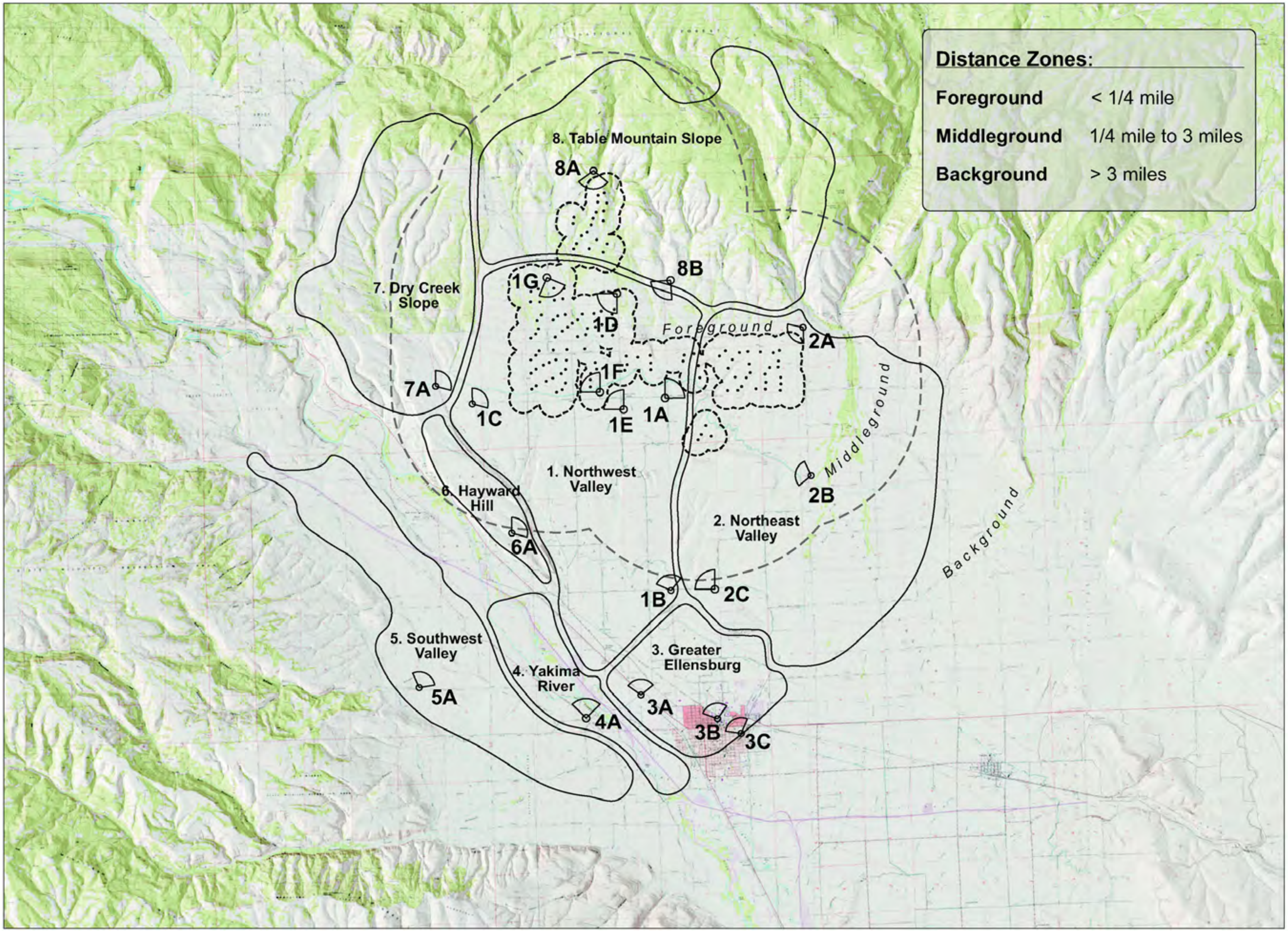


Figure G6
Key View Locations and Directions.

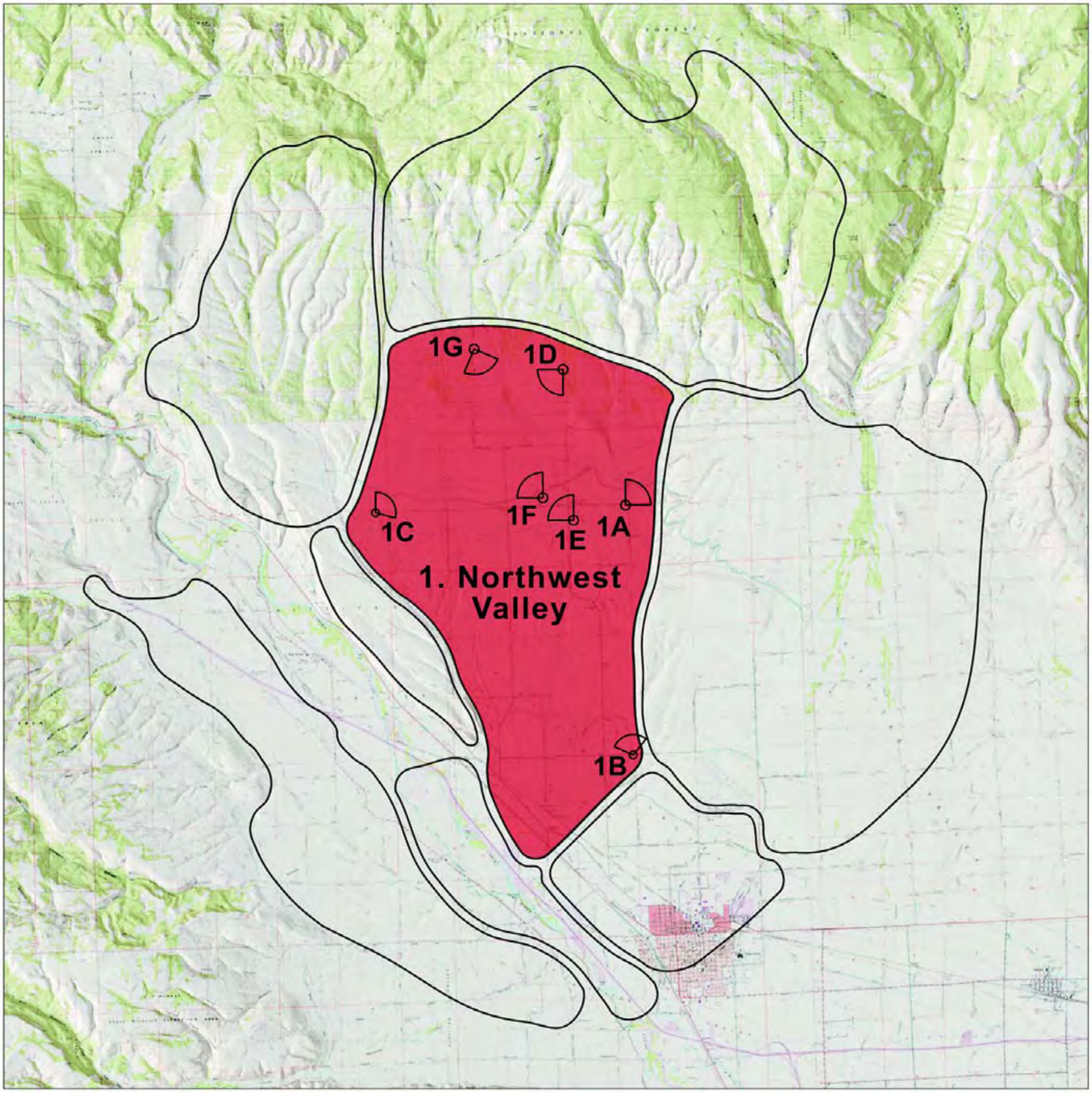


Figure G7
Visual Assessment Unit 1: Northwest Valley

Figure G8
Key View 1A – Existing View looking northeast across the Northwest Valley Visual Assessment Unit from the intersection of Smithson Road and Robbins Road.

Figure G9
Key View 1B – Existing view looking northwest across the Northwest Valley Visual Assessment Unit from the intersection of Hungry Junction and Lookabout Lane.

Figure G10
Key View 1C – Existing view looking northeast across the Northwest Valley Visual Assessment Unit along Smithson Road near U.S. Highway 97.

Figure G11
Key View 1D – Existing view looking southwest across the Northwest Valley Visual Assessment Unit from immediately north of the project area.

Figure G12
Key View 1E – Existing view looking northwest across the Northwest Valley Visual Assessment Unit from Reecer Creek Road.

Figure G13
Supplementary Key View 1F – Existing view looking northwest across the Northwest Valley Visual Assessment Unit from Smithson Road near CTC farm.

Figure G14
Supplementary Key View 1G – Existing view looking southeast across the Northwest Valley Visual Assessment Unit from Reecer Creek Road immediately north of project boundary.

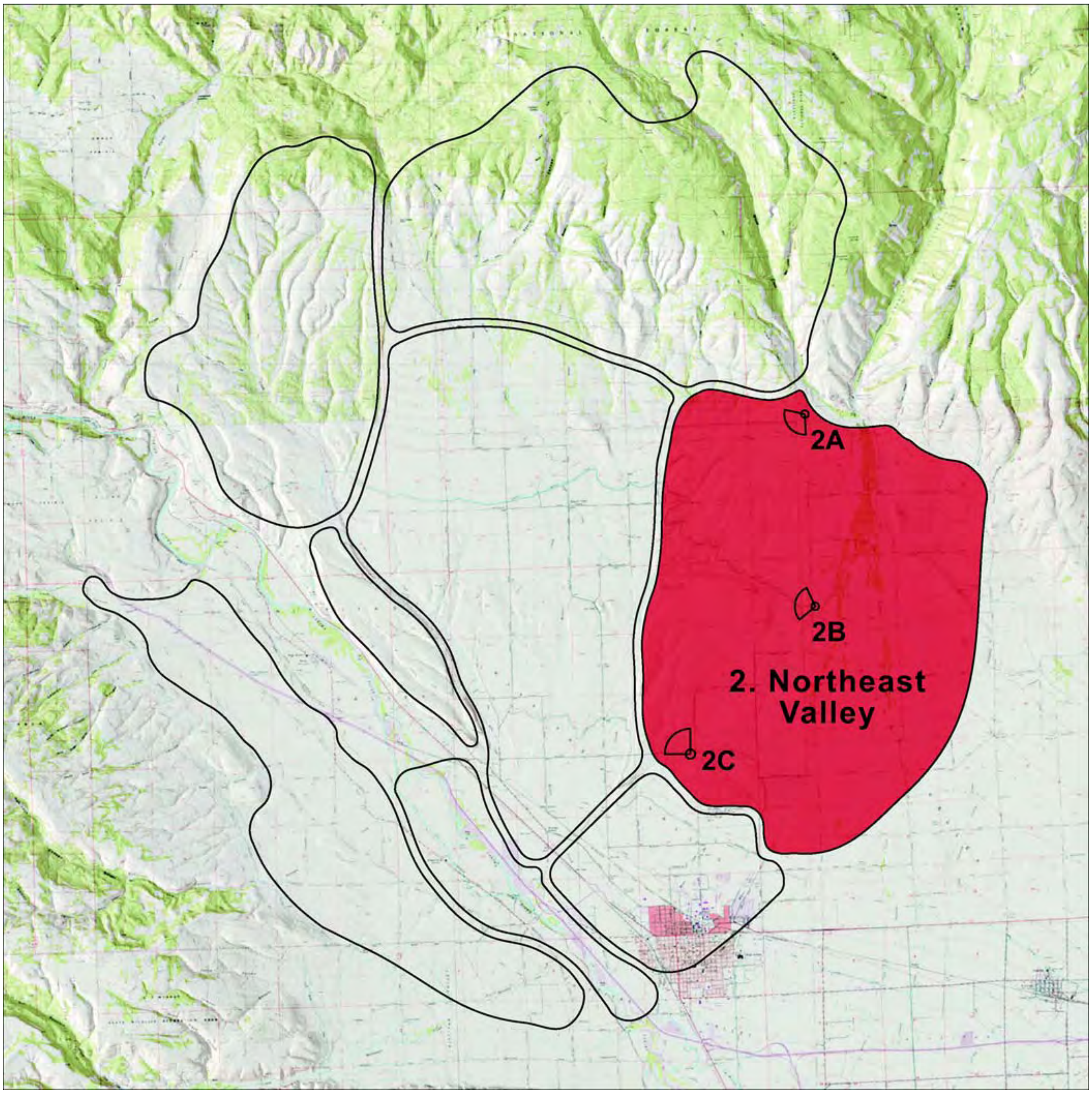


Figure G15
Visual Assessment Unit 2: Northeast Valley

Figure G16
Key View 2A – Existing view of project area looking southwest across the Northeast Valley Visual Assessment Unit from Wilson Creek Road.

Figure G17
Key View 2B – Existing view looking southwest across the Northwest Valley Visual Assessment Unit from Wilson Creek Road.

Figure G18
Key View 2C – Key view looking northwest across the Northeast Valley Visual Assessment Unit from the north end of Bowers Field at Hungry Junction Road.

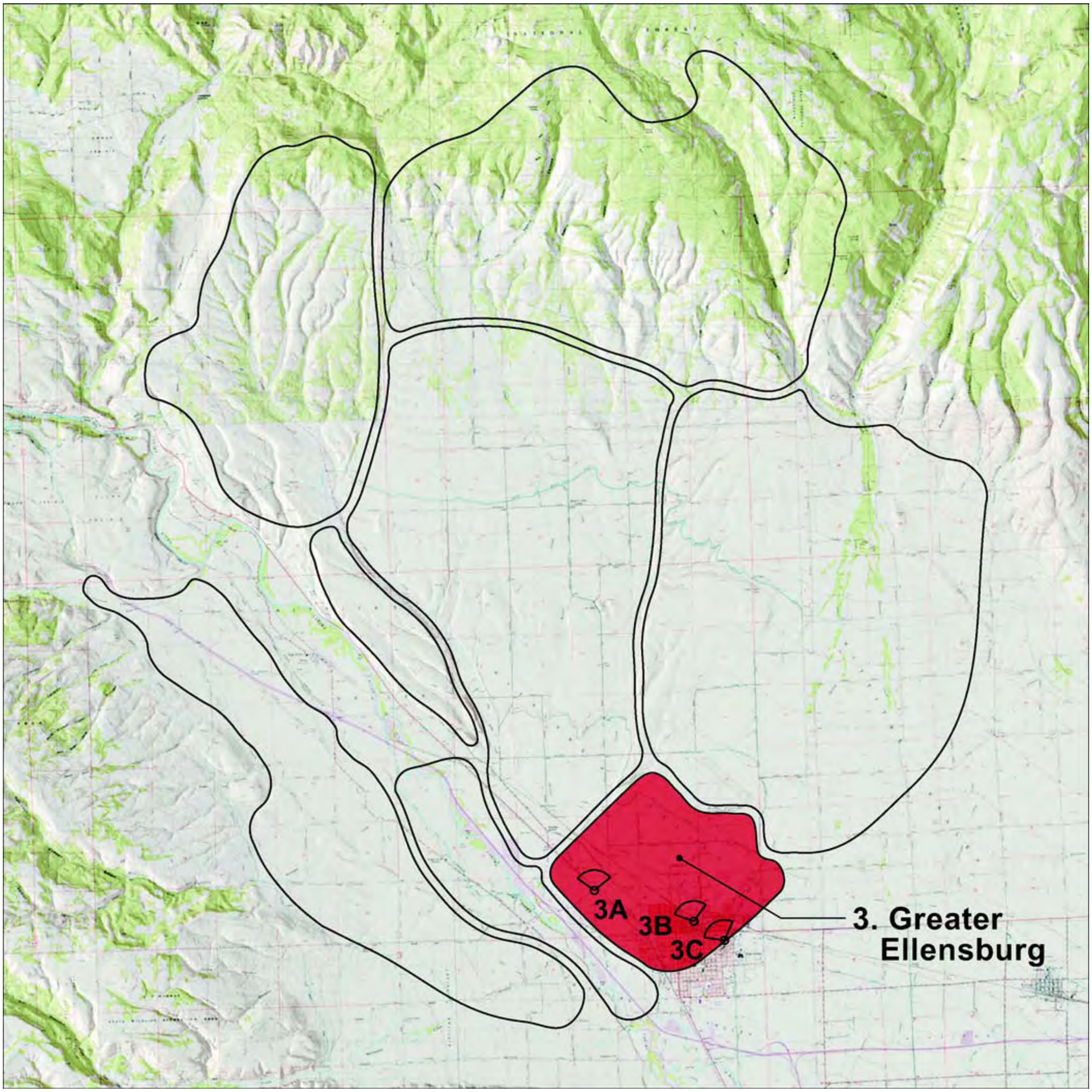


Figure G19
Visual Assessment Unit 3: Greater Ellensburg

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Key View 3A – Existing view north across the Greater Ellensburg Visual Assessment Unit over the Burlington Northern Railroad near U.S. Highway 97 and Cascade Way.

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Key View 3B – Existing view across the Greater Ellensburg Visual Assessment Unit from the Central Washington University campus.

Figure G22
Key View 3C – Existing view looking northwest across the Greater Ellensburg Visual Assessment Unit from Reed Park in Ellensburg.

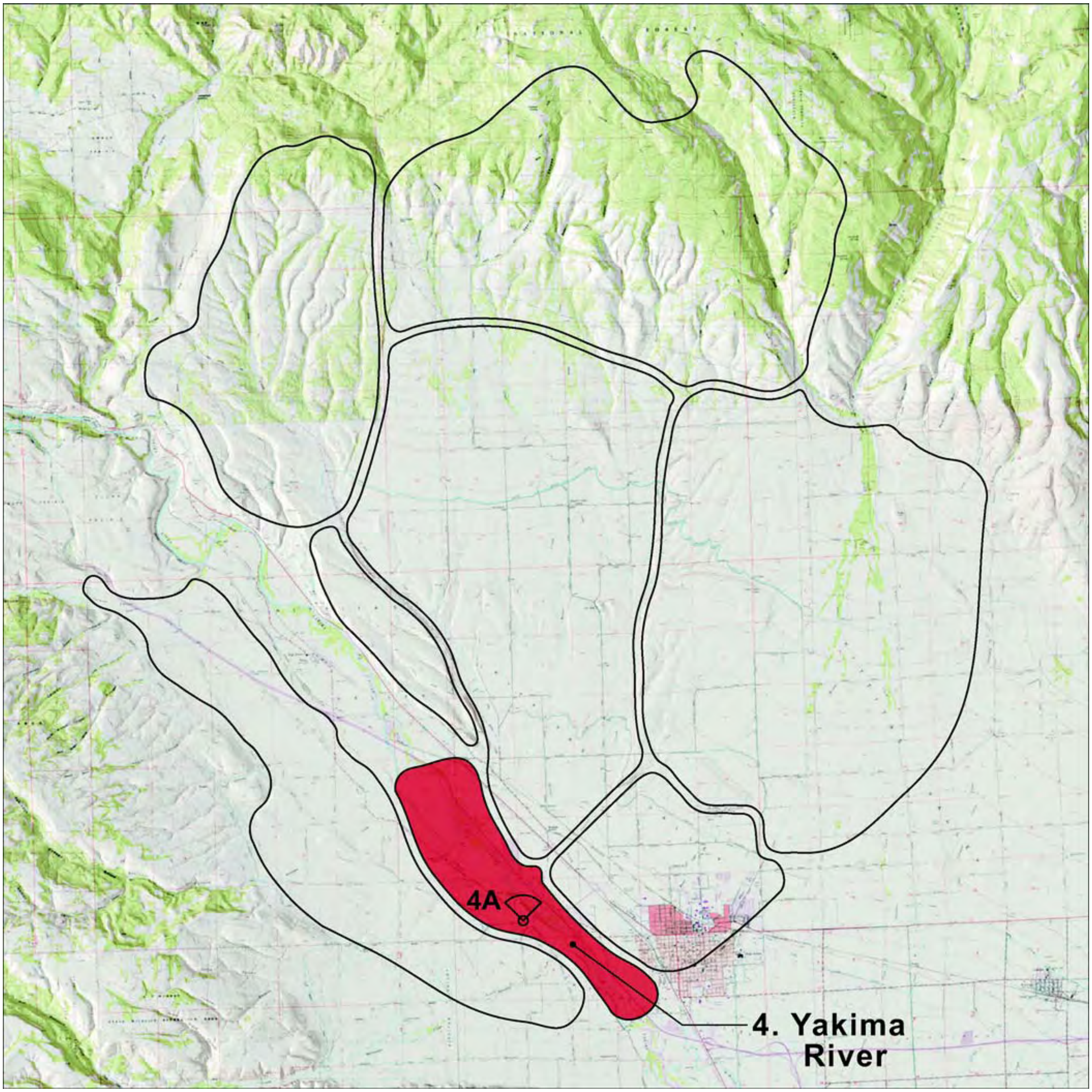

Figure G23
Visual Assessment Unit 4: Yakima River

Figure G24
Key View 4A – Existing view looking north across the Yakima River Visual Assessment Unit from the intersection of the Thorp Highway and Weaver Road.

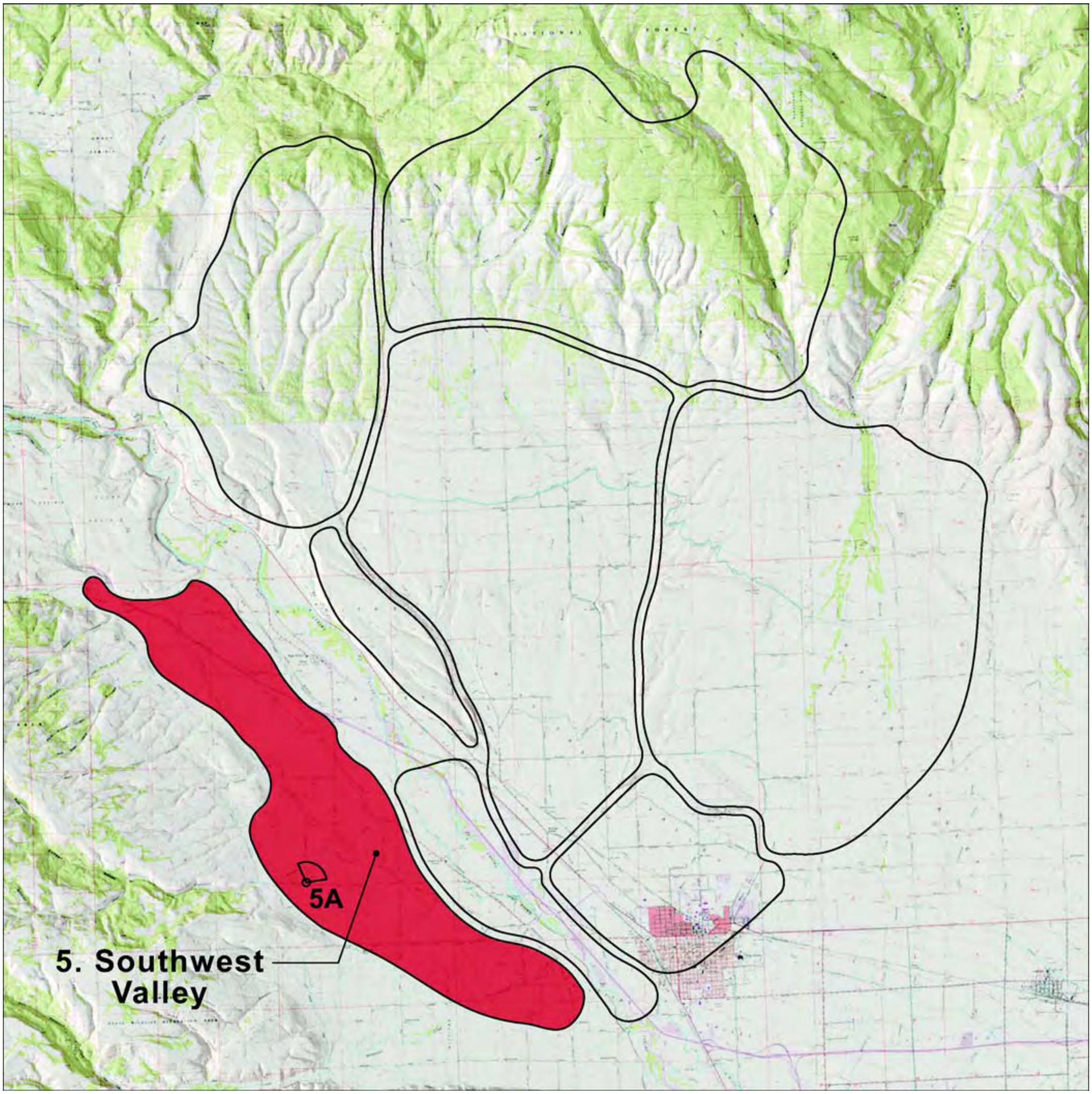

Figure G25
Visual Assessment Unit 5: Southwest Valley

Figure G26
Key View 5A – Existing view looking north from the Southwest Visual Assessment Unit at the intersection of Killmore Road and Robinson Road.

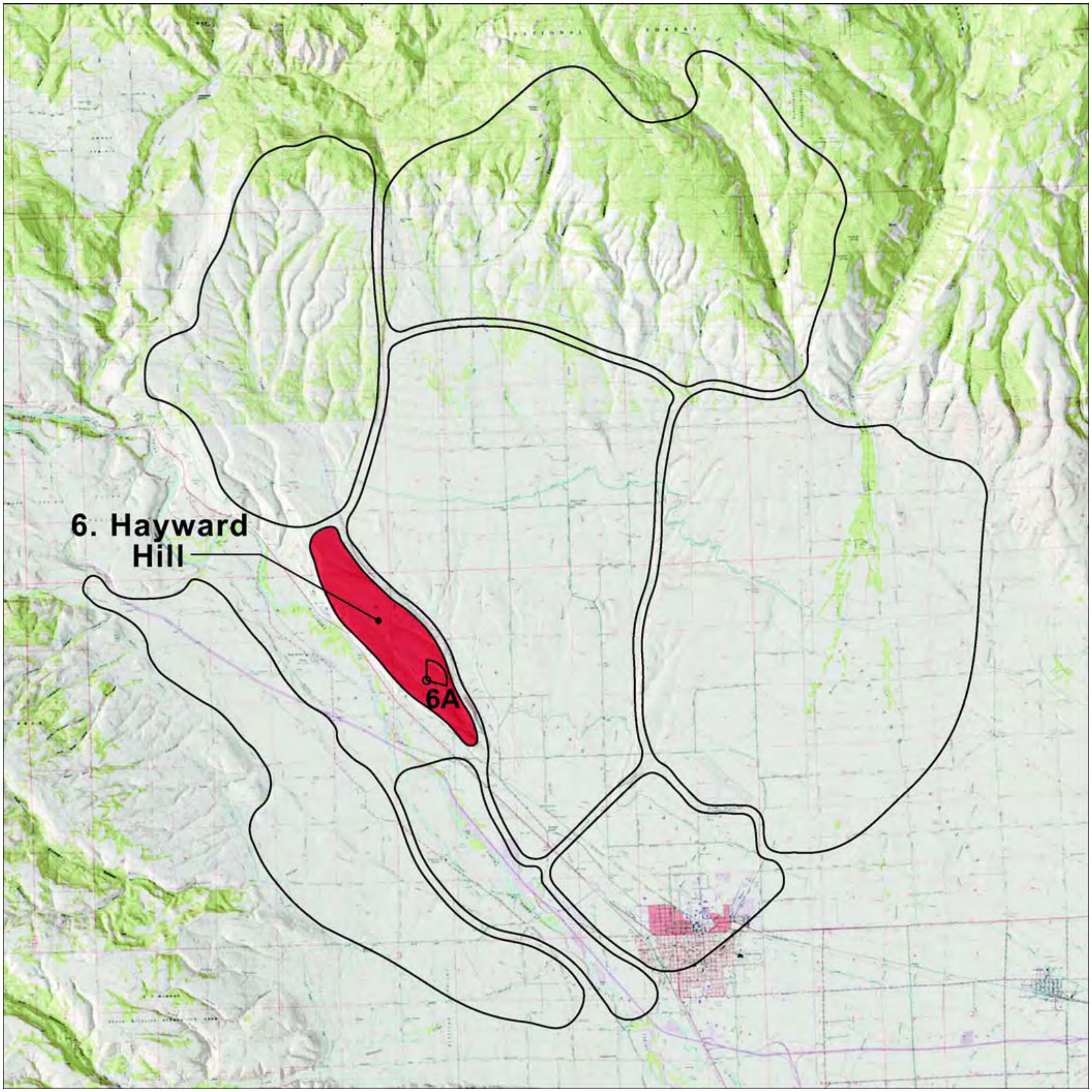

Figure G27
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Key View 6A – Existing view looking east from the Hayward Hill Visual Assessment Unit at the top of the hill.

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Visual Assessment Unit 7: Dry Creek Slope

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Key View 1A – Simulated view looking northeast across the Northwest Valley Visual Assessment Unit from the intersection of Smithson Road and Robbins Road.

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Key View 1B – Simulated view looking northwest across the Northeast Valley Visual Assessment Unit from the intersection of Hungry Junction and Lookabout Lane.

Figure G36
Key View 1C – Simulated view looking northeast across the Northwest Valley Visual Assessment Unit along Smithson Road near U.S. Highway 97.

Figure G37
Key View 1D – Simulated view looking southwest across the Northwest Valley Visual Assessment Unit from immediately north of the project area.

Figure G38
Key View 1E – Simulated view looking northwest across the Northwest Valley Visual Assessment Unit from Reecer Creek Road.

Figure G39
Key View 1E – Simulated view looking northwest across the Northwest Valley Visual Assessment Unit from Smithson Road near CTC farm.

Figure G40
Supplementary Key View 1G – Simulated view looking southeast across the Northwest Valley Visual Assessment Unit from Reecer Creek Road immediately north of project boundary.

Figure G41
Key View 2A – Simulated view looking southwest across the Northwest Valley Visual Assessment Unit from Wilson Creek Road.

Figure G42
Key View 2B – Simulated view looking west across the Northeast Valley Visual Assessment Unit from Wilson Creek Road on Rabbit Hill.

Figure G43
Key View 2C – Simulated view looking northwest across the Northwest Valley Visual Assessment Unit from the north end of Bowers Field at Hungry Junction Road.

Figure G44
Key View 3A – Simulated view north across the Greater Ellensburg Visual Assessment Unit over the Burlington Northern Railroad near U.S. Highway 97 and Cascade Way.

Figure G45
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Figure G46
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Figure G47
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Figure G49
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Figure G50
Key View 7A – Simulated view looking northwest from the Dry Creek Slope Visual Assessment Unit off U.S. Highway 97.

Figure G51
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Figure G52
Key View 8B – Simulated View

APPENDIX H

Air Transportation

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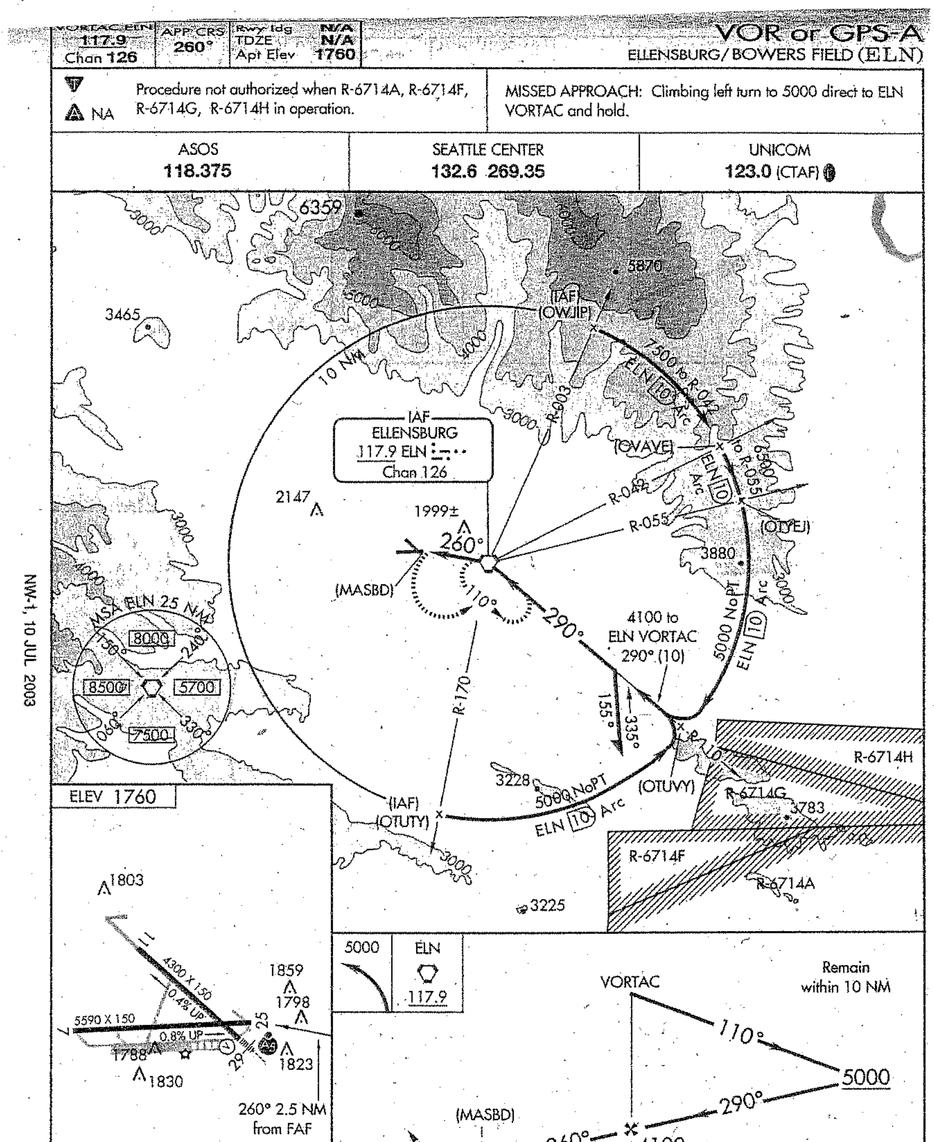


FAF to MAP 2.5 NM					
Knots	60	90	120	150	180
Min:Sec	2:30	1:40	1:15	1:00	0:50

CATEGORY	A	B	C	D
CIRCLING	3100-1¼ 1340 (1400-1¼)	3100-1½ 1340 (1400-1½)	NA	

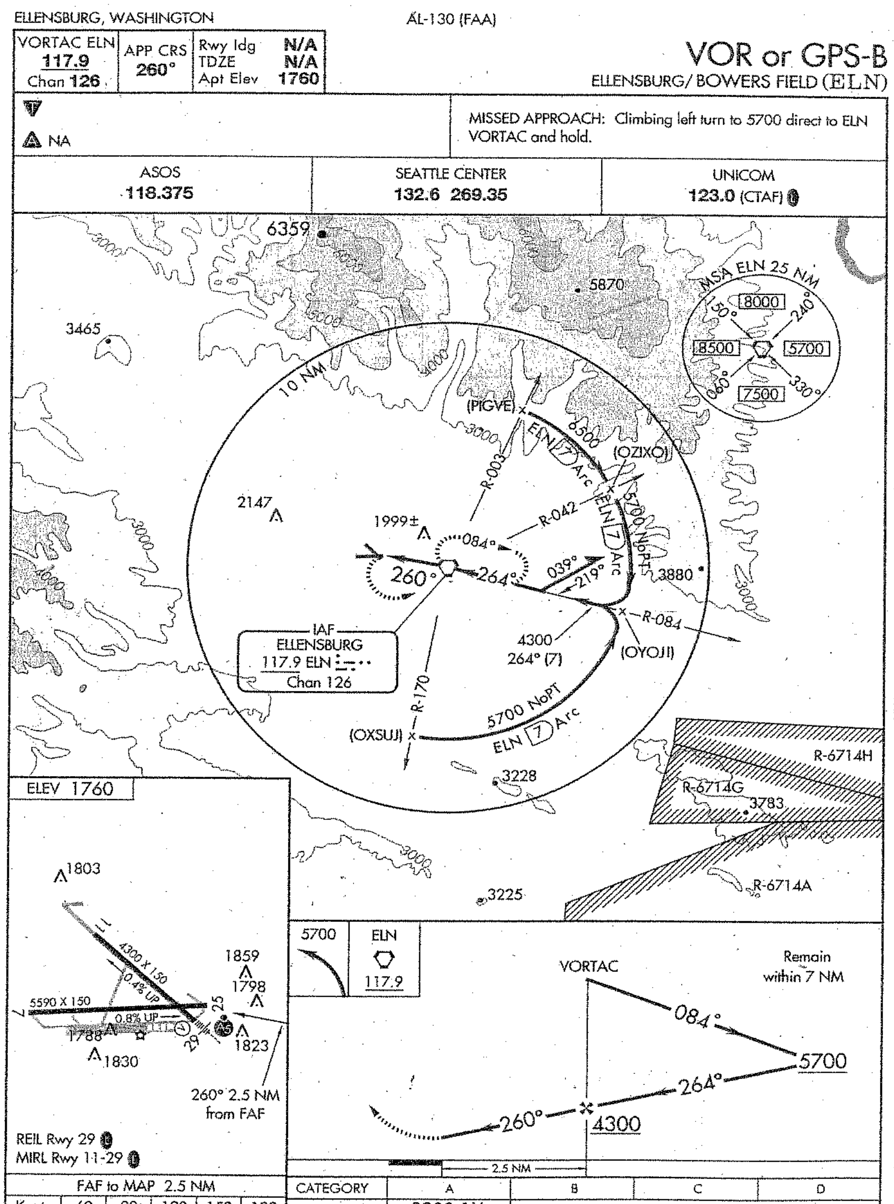
ELLENSBURG, WASHINGTON
Amdt 2B 03191

47°02′N-120°32′W

135

ELLENSBURG/BOWERS FIELD (ELN)
VOR or GPS-A

Figure H2
Instrument Arrival Procedure 2

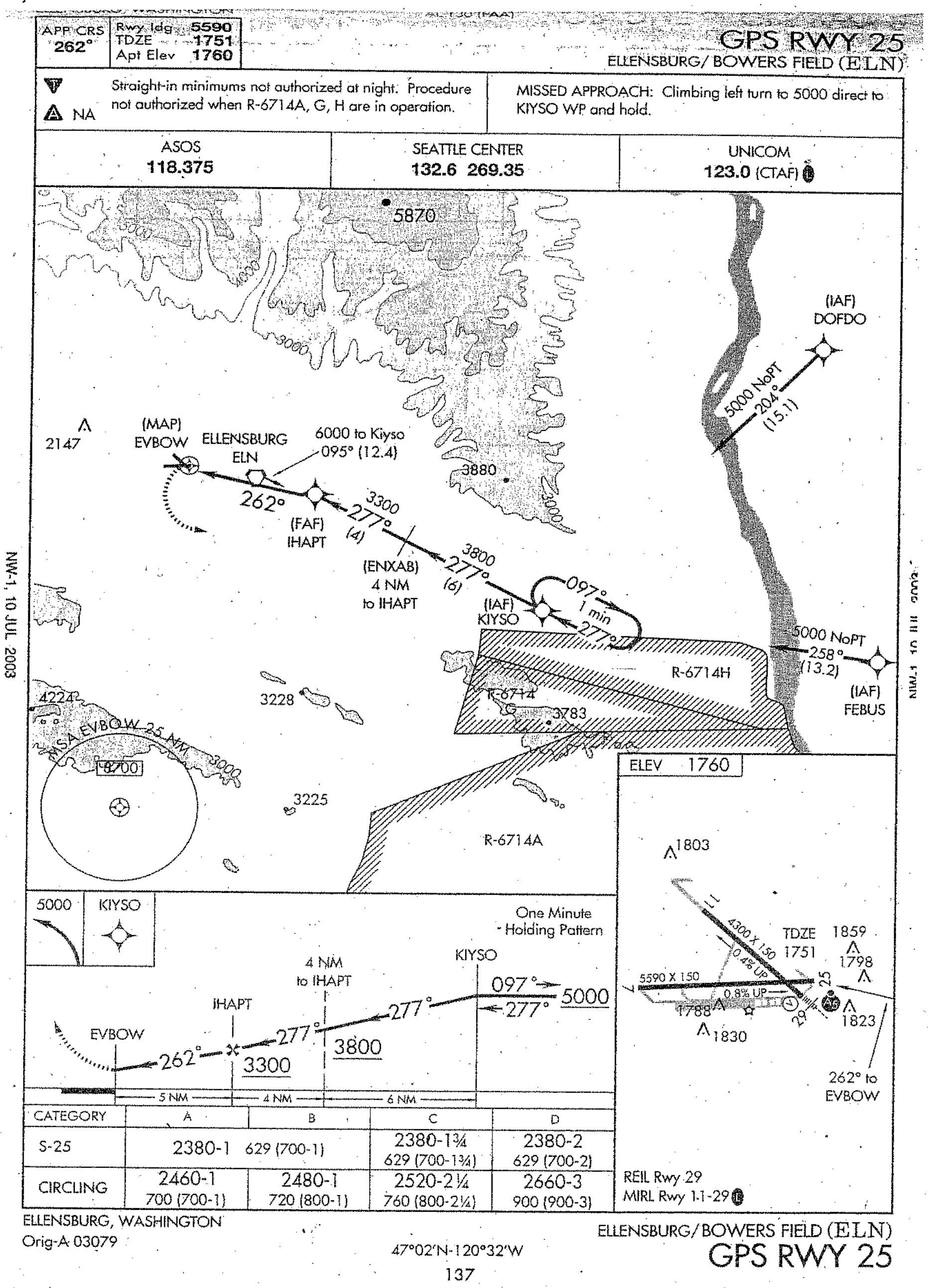


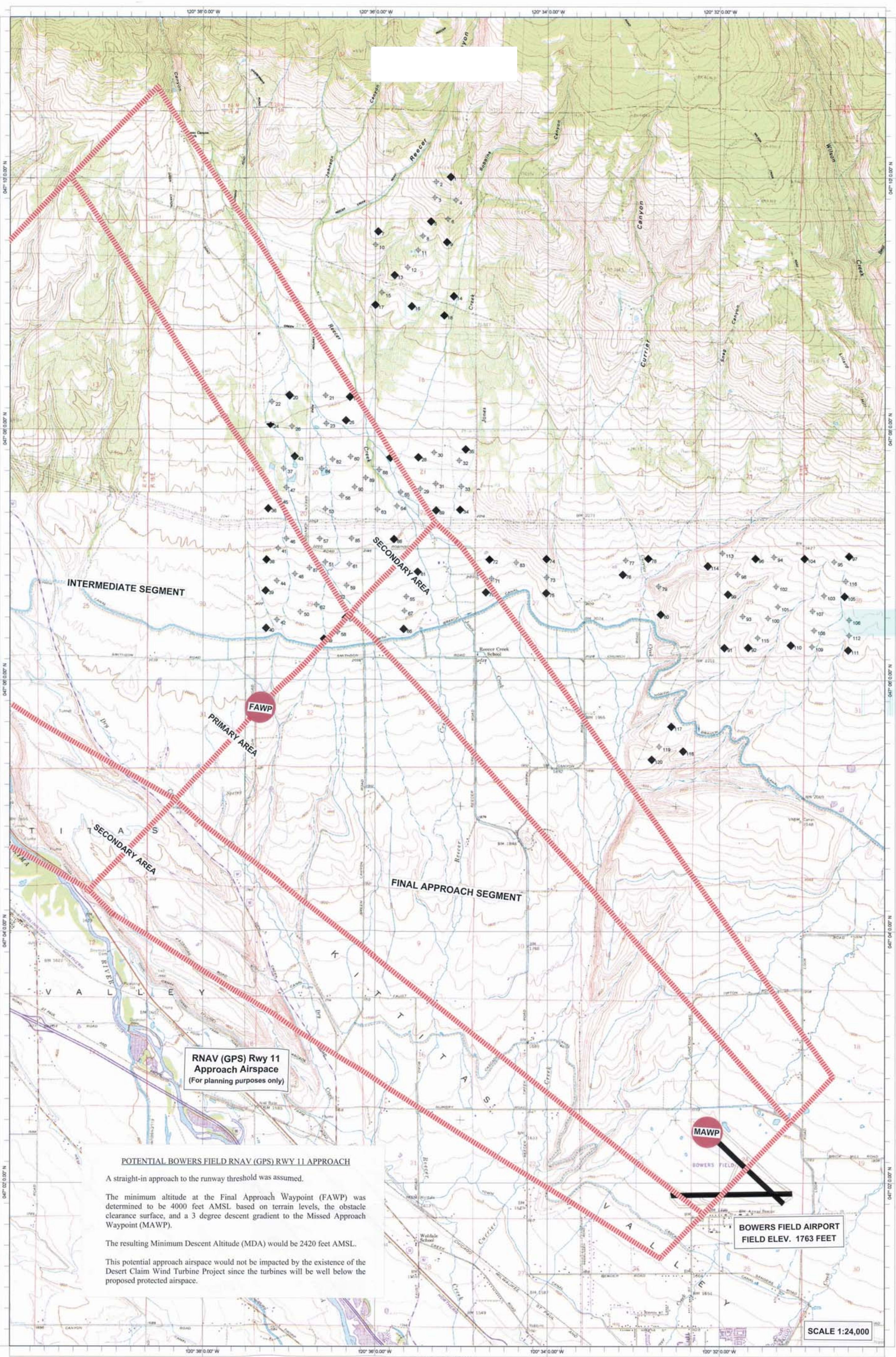
Knots	60	90	120	150	180
Min:Sec	2:30	1:40	1:15	1:00	0:50

CATEGORY	A	B	C	D
CIRCLING	3300-1¼ 1540 (1600-1¼)		NA	

ELLENSBURG, WASHINGTON
ELLENSBURG/BOWERS FIELD (ELN)

Figure H3
Instrument Arrival Procedure 3





Source: Aviation Systems, Inc.

Huckell/Weinman Associates, Inc. HWA	Kittitas County Desert Claim Wind Power Project EIS	Figure H4 Hypothetical IFR Approach to Runway 11

TABLE H1

Proposed Desert Claim Wind Turbine Elevations

Relative to Obstruction Standards and VFR Traffic Pattern

Turbines 1 to 120

All turbines 340 feet AGL

Turbine Number	Latitude (NAD 83)	Longitude (NAD 83)	Site Elevation AMSL (feet)	Structure Height AGL (feet)	Total Height AMSL (feet)
1	47-10-00.179	120-35-11.054	3629	340	3969
2	47-09-57.659	120-35-21.172	3514	340	3854
3	47-09-50.135	120-35-22.108	3360	340	3700
4	47-09-48.803	120-35-07.276	3360	340	3700
5	47-09-38.867	120-35-25.060	3143	340	3483
6	47-09-39.947	120-35-12.928	3209	340	3549
7	47-09-33.899	120-36-01.601	3028	340	3368
8	47-09-31.739	120-35-30.424	3031	340	3371
9	47-09-29.039	120-35-14.044	3035	340	3375
10	47-09-27.239	120-36-03.293	2946	340	3286
11	47-09-24.971	120-35-33.808	2956	340	3296
12	47-09-16.835	120-35-40.972	2917	340	3257
13	47-09-13.235	120-35-50.332	2841	340	3181
14	47-09-03.191	120-35-08.895	2776	340	3116
15	47-09-04.595	120-35-58.829	2710	340	3050
16	47-08-58.331	120-35-38.344	2684	340	3024
17	47-08-58.727	120-36-03.653	2638	340	2978
18	47-08-53.975	120-35-15.735	2707	340	3047
19	47-08-14.951	120-36-21.436	2402	340	2742
20	47-08-15.490	120-37-03.485	2434	340	2774
21	47-08-15.347	120-36-37.961	2415	340	2755
22	47-08-12.718	120-37-15.546	2438	340	2778
23	47-08-01.99	120-36-37.492	2375	340	2715
24	47-08-01.162	120-37-16.678	2395	340	2735
25	47-08-03.575	120-36-23.992	2369	340	2709
26	47-08-00.551	120-37-01.613	2385	340	2725
27	47-07-46.115	120-35-53.283	2310	340	2650
28	47-07-46.296	120-35-33.735	2323	340	2663
29	47-07-30.960	120-35-32.150	2264	340	2604
30	47-07-48.348	120-35-22.394	2339	340	2679
31	47-07-33.480	120-35-21.386	2280	340	2620
32	47-07-44.532	120-35-04.682	2336	340	2676
33	47-07-32.112	120-35-03.350	2287	340	2627
34	47-07-21.169	120-35-04.393	2241	340	2581
35	47-07-50.112	120-35-00.542	2369	340	2709
36	47-07-20.735	120-37-17.957	2264	340	2604
37	47-07-40.139	120-37-06.977	2329	340	2669
38	47-06-56.507	120-37-19.216	2185	340	2525
39	47-06-47.711	120-37-19.828	2136	340	2476
40	47-06-23.783	120-37-19.504	2083	340	2423
41	47-07-01.655	120-37-10.828	2198	340	2538
42	47-06-27.707	120-37-11.692	2096	340	2436
43	47-07-46.475	120-36-59.741	2352	340	2692
44	47-06-46.139	120-37-11.620	2152	340	2492
45	47-07-25.307	120-37-10.001	2274	340	2614

TABLE H1

Proposed Desert Claim Wind Turbine Elevations

Relative to Obstruction Standards and VFR Traffic Pattern

Turbines 1 to 120

All turbines 340 feet AGL

Turbine Number	Latitude (NAD 83)	Longitude (NAD 83)	Site Elevation AMSL (feet)	Structure Height AGL (feet)	Total Height AMSL (feet)
46	47-07-06.623	120-37-05.140	2215	340	2555
47	47-07-31.139	120-37-05.141	2303	340	2643
48	47-06-50.135	120-36-59.380	2162	340	2502
49	47-06-19.391	120-36-39.219	2083	340	2423
50	47-06-32.063	120-36-55.599	2116	340	2456
51	47-06-55.823	120-36-38.211	2185	340	2525
52	47-06-40.235	120-36-30.435	2142	340	2482
53	47-07-21.131	120-36-38.104	2260	340	2600
54	47-06-29.472	120-36-24.243	2113	340	2453
55	47-06-39.444	120-35-41.798	2123	340	2463
56	47-07-27.534	120-36-26.728	2283	340	2623
57	47-07-06.983	120-36-42.028	2215	340	2555
58	47-06-22.416	120-36-29.571	2093	340	2433
59	47-06-44.555	120-36-23.415	2156	340	2496
60	47-07-46.079	120-36-20.716	2326	340	2666
61	47-06-54.743	120-36-21.507	2178	340	2518
62	47-06-35.519	120-36-44.295	2126	340	2466
63	47-07-20.807	120-36-01.707	2251	340	2591
64	47-07-22.788	120-35-48.423	2238	340	2578
65	47-07-29.448	120-35-45.651	2251	340	2591
66	47-06-24.216	120-35-43.813	2087	340	2427
67	47-06-32.604	120-35-43.058	2106	340	2446
68	47-06-43.584	120-35-32.725	2126	340	2466
69	47-07-20.808	120-35-21.422	2231	340	2571
70	47-06-41.748	120-34-46.464	2093	340	2433
71	47-06-48.120	120-34-42.360	2106	340	2446
72	47-06-57.336	120-34-43.836	2139	340	2479
73	47-06-48.661	120-34-03.947	2146	340	2486
74	47-06-57.553	120-34-04.307	2231	340	2571
75	47-06-41.353	120-34-04.380	2113	340	2453
76	47-06-50.101	120-33-11.062	2159	340	2499
77	47-06-56.760	120-33-08.866	2178	340	2518
78	47-06-57.662	120-32-53.314	2175	340	2515
79	47-06-44.270	120-32-45.861	2218	340	2558
80	47-06-30.986	120-32-44.565	2119	340	2459
81	47-06-51.468	120-35-34.238	2149	340	2489
82	47-07-44.829	120-36-33.10	2329	340	2669
83	47-06-55.681	120-34-25.116	2133	340	2473
84	47-07-40.391	120-36-40.696	2316	340	2656
85	47-07-07.091	120-36-19.815	2218	340	2558
86	47-07-07.199	120-35-50.690	2201	340	2541
87	47-06-53.123	120-36-49.263	2175	340	2515
88	47-07-39.779	120-36-00.663	2290	340	2630
89	47-07-35.783	120-36-10.023	2290	340	2630
90	47-07-31.427	120-36.17.799	2287	340	2627

TABLE H1

Proposed Desert Claim Wind Turbine Elevations

Relative to Obstruction Standards and VFR Traffic Pattern

Turbines 1 to 120

All turbines 340 feet AGL

Turbine Number	Latitude (NAD 83)	Longitude (NAD 83)	Site Elevation AMSL (feet)	Structure Height AGL (feet)	Total Height AMSL (feet)
91	47-06-15.110	120-32-00.284	2198	340	2538
92	47-06-15.768	120-31-43.615	2241	340	2581
93	47-06-30.014	120-31-47.179	2257	340	2597
94	47-06-58.274	120-31-25.291	2369	340	2709
95	47-06-56.043	120-30-43.386	2428	340	2768
96	47-06-57.698	120-31-38.396	2343	340	2683
97	47-06-58.707	120-30-33.198	2451	340	2791
98	47-06-50.066	120-31-50.528	2300	340	2640
99	47-06-40.706	120-31-57.692	2280	340	2620
100	47-06-29.151	120-31-29.359	2287	340	2627
101	47-06-34.587	120-31-22.555	2306	340	2646
102	47-06-44.271	120-31-23.707	2326	340	2666
103	47-06-39.879	120-30-50.442	2362	340	2702
104	47-06-57.663	120-31-04.159	2402	340	2742
105	47-06-39.663	120-30-46.402	2372	340	2712
106	47-06-28.215	120-30-33.018	2343	340	2683
107	47-06-32.499	120-30-58.398	2333	340	2673
108	47-06-23.247	120-30-57.390	2310	340	2650
109	47-06-15.399	120-30-58.758	2287	340	2627
110	47-06-16.335	120-31-13.842	2280	340	2620
111	47-06-13.995	120-30-33.917	2303	340	2643
112	47-06-20.943	120-30-33.017	2320	340	2660
113	47-07-00.146	120-32-01.220	2316	340	2656
114	47-06-54.170	120-32-11.804	2280	340	2620
115	47-06-19.719	120-31-36.703	2254	340	2594
116	47-06-46.827	120-30-35.322	2402	340	2742
117	47-05-37.454	120-32-37.256	2047	340	2387
118	47-05-25.574	120-32-28.831	2037	340	2377
119	47-05-27.626	120-32-45.428	2018	340	2358
120	47-05-21-686	120-32-50.864	2001	340	2341

APPENDIX I

Comments on the Draft EIS

Contents

Table I-1
Draft EIS Comment Log

1. Comments from Agencies

Comment Record No.	Agency	Name of Source	Date of Record	Date Received	No. of Comments
1	Washington Department of Fish and Wildlife (WDFW)	Ted Clausing Regional Habitat Program Mgr.	1-30-04	1-30-04	17
2	Washington State Department of Transportation (WSDOT)	Salah Al-Tamimi, PE Regional Planning Engineer	1-29-04	2-02-04	8
3	Kittitas County Public Works Department	Paul Bennett, PE Director of Public Works	1-30-04	1-30-04	9
4	Kittitas County Fire Marshall	Derald Gaidos Fire Marshal	1-29-04	2-02-04	10

2. Comments from Organizations

Comment Record No.	Organization	Name of Source	Date of Record	Date Received	No. of Comments
5	Kittitas Audubon Society	Keith Johnson President	1-28-04	1-30-04	16
6	Kittitas County Airport Advisory Committee	Shan Rowbotham Chairman	1-29-04	1-29-04	9
7	McCullough, Hill, Fisko, Kretschmer, Smith	Courtney Flora	1-30-04	1-30-04	2
8	The Phoenix Group	Debbie Strand, CecD Executive Director	1-30-04	1-30-04	1
9	Renewable Northwest Project	Sonja Ling Policy Associate	1-30-04	1-30-04	6
10	Residents Opposed to Kittitas Turbines	Ed Garrett	1-23-04	1-23-04	1

Table I-1
Draft EIS Comment Log (cont'd)

3. Comments from Individuals

Comment Record ID	Individual	Date of Record	Date Received	No. of Comments
11	Loran and Judy Allen	Not indicated	1-30-04	12
12	Lee Bates	12-23-03/1-22-04	1-22-04	30
13	Jack Boyovich	1-22-04	1-22-04	1
14	Linda Brown	1-22-04	1-23-04	7
15	Emilia Burdyshaw	1-26-04	1-26-04	16
16	Lee and Chris Burtchett	1-10-04	1-20-04	15
17	Lee and Chris Burtchett	1-20-04	1-20-04	12
18	Chris Burtchett	1-25-04	1-26-04	5
19	Judy Corey	1-19-04	1-19-04	2
20	Shirley Dawson	1-10-04	1-20-04	4
21	Arthur DePalma	1-20-04	1-20-04	6
22	William Erickson	1-16-04	1-20-04	3
23	Randy Fischer	1-21-04	1-21-04	4
24	John and Barbara Foster	1-26-04	1-26-04	6
25	Ed Garrett	1-19-04	1-19-04	6
26	Ed Garrett	1-19-04	1-20-04	5
27	Ed Garrett and Rosemary Monaghan	1-29-04	1-30-04	73
28	Gene Johnson	1-29-04	1-30-04	4
29	Jill Kuhn	Not indicated	1-30-04	45
30	Eric Larsen	1-30-04	1-30-04	32
31	Janet Lee	1-19-04	1-19-04	2
32	Janet Lee	1-27-04	1-27-04	5
33	Hal and Gloria Lindstrom	1-30-04	1-30-04	8
34	Mitch Meffert	1-08-04	1-08-04	1
35	Mitch Meffert	1-19-04	1-19-04	2
36	Janet Nelson	1-29-04	2-02-04	19
37	Felicia Persson	1-20-04	1-20-04	5
38	Felicia Persson	1-25-04	1-30-04	120
39	Ray and Betty Ridenour	1-28-04	1-30-04	5
40	Mike Robertson	1-25-04	1-25-04	1
41	Michael and Elizabeth Robertson	1-19-04	1-19-04	36
42	Geoff Saunders	1-30-04	1-30-04	24
43	Linda and Charles Schantz	1-30-04	1-30-04	128
44	Al and Diane Schwab	Not indicated	1-20-04	18
45	Diane Schwab	1-22-04	1-22-04	2
46	Gloria Sharp and Boyd Rear	Not indicated	1-30-04	2
47	Jeff Slothower	1-30-04	1-30-04	12
48	Clem Staloch	Not indicated	1-29-04	9
49	Linda Waits	1-21-04	1-21-04	1
50	John Winbauer	1-30-04	1-30-04	5
51	Woody Woodcock	1-29-04	1-30-04	13

Table I-1
Draft EIS Comment Log (cont'd)

4. Comments from Individuals (in identical form letter)

Comment Record No.	Individual	Date of Record	Date Received	Number of Comments
52	Kathleen L. Armstrong	12-31-03	1-22-04	2
53	Roy D. Armstrong	12-31-03	1-22-04	2
54	Dean Auve'	11-18-03	1-22-04	2
55	Rosemarie Auve'	11-08-03	1-22-04	2
56	Cynthia Bourasaw	11-18-03	1-22-04	2
57	David W. Bourasaw	11-19-03	1-22-04	2
58	David J. Boyovich Sr.	1-20-04	1-22-04	2
59	Patricia A. Boyovich	1-20-04	1-22-04	2
60	Keley D. Dormaier	11-24-03	1-22-04	2
61	Ellen B. Finch	11-20-03	1-22-04	2
62	Marvin G. Finch	11-18-03	1-22-04	2
63	Janet L. Gudgel	11-16-03	1-22-04	2
64	Jerry L. Gudgel	11-15-03	1-22-04	2
65	George Grigg	1-11-04	1-22-04	2
66	Karen V. Grigg	1-11-04	1-22-04	2
67	Jean L. Jackson	1-11-03	1-22-04	2
68	Robert Jackson	1-11-03	1-22-04	2
69	Eloise Kirchmeyer	12-10-03	1-22-04	2
70	Charles McCosh	12-08-03	1-22-04	2
71	Elizabeth F. Lasell-McCosh	12-06-03	1-22-04	2
72	Allison Muraites	1-11-04	1-22-04	2
73	Carl Michael	1-11-04	1-22-04	2
74	Teri Michael	1-11-04	1-22-04	2
75	Michael F. Thompson	12-06-03	1-22-04	2
76	Gaylen C. Waschell	12-23-03	1-22-04	2
77	Rozella Waschell	12-23-03	1-22-04	2
78	Gregory Willette	11-18-03	1-22-04	2

Table I-1
Draft EIS Comment Log (cont'd)

5. Comments from January 20, 2004
Public Testimony

Comment Record No.	Individual	Number of Comments
T1	Phyllis Whitbeck	1
T2	Ginger Morrison	1
T3	Arthur DePalma	7
T4	Dwight Lee Bates	8
T5	Ed Garrett	4
T6	Jeff Howard	1
T7	Bertha Morrison	1
T8	Chris Burtchett	3
T9	Dana Lind	1
T10	David Sager	1
T11	Diane Schwab	5
T12	Jack Boyovich	6
T13	Holly Pinkart	6
T14	William Erickson	6
T15	Rocky Farrell	1
T16	Roger Weaver	1
T17	Eloise Kirchmeyer	2
T18	Michael Gossler	1
T19	Kirk Diehl	3
T20	David Lee	2
T21	Leslie White	1
T22	Linda Schantz	8
T23	Desmond Knudson	6
T24	Woody Woodcock	7
T25	Helen Wise	2
T26	Felicia Persson	3
T27	Keith Johnson	6
T28	Ron Nelson	2
T29	Chris Cole	4
T30	Dan Quinn	4

Table I-2
Issues Based on Draft EIS Comments

Issue Code	**Summary of Issue**	**Corresponding Comments**
	PROGRAMMATIC/POLICY ISSUES	
EIS	**SEPA/EIS Process and Scope**	
1	**General adequacy of DEIS content and analysis** Multiple comments relating to the overall adequacy of the material presented in the DEIS, as opposed to comments addressing page- or section-specific technical content in the DEIS. Comments in this category generally reflect one of four themes: (1) general criticism of the content and approach in the DEIS, such as statements that the DEIS minimizes the project's effects, that conclusions were hastily made based on other wind projects, or that the DEIS lacks quantitative and qualitative information on impacts; (2) comments related to the information sources used to develop the DEIS, such as comments that the majority of the studies cited were developed by wind energy proponents and that the DEIS should use other sources with information on impacts of existing projects; (3) comments concerning the level of site-specific detail in the DEIS, generally requesting identification of impacts to individual residences or from specific turbines; and (4) comments that were complimentary with respect to the approach and content of the DEIS.	6-1, 7-1, 9-1, 15-1, 17-1, 18-2, 19-1, 25-1, 27-66, 27-72, 29-1, 30-1, 38-117, 43-120, 43-125, 43-128, 45-1, 47-2, 51-13, T7-1, T8-1, T11-1, T29-1
2	**Geographic scope and scale of analysis** Comments about the appropriate range of the impact analysis, including statements that **Section 2.2.1.3** should indicate residences within one-half mile radius of project in order to clearly indicate the number of residences impacted by the proposed project; or that analysis should include residences up to 2 miles away.	38-15, 43-40
3	**Adequacy of maps provided in DEIS** General comments about the DEIS maps, including statements that maps indicating property ownership should have been included; maps need greater detail; maps are not legible, do not depict enough of the area; difficult to determine extent of impacts; **Figure 1.1** does not indicate roads; and **Figure 3.10.2** does not show the project location.	15-12, 44-6, 44-8, T11-2
4	**Evaluation of project against Kittitas County criteria for wind farm approval** Statements about and comparison of DEIS content with the general criteria (identified in the DEIS) to be used by the Kittitas County Board of Commissioners to determine the final land use approval decision for the project; suggestion that these criteria have not been met; and objection to perceived implication that DEIS indicates criteria are met.	16-2, 16-5, 16-6, 17-3, 29-2, 29-7, 29-8, 38-3, 41-3, 43-121, 44-4, 51-1, T8-2, T24-1
5	**Responsibility of Kittitas County** Comment that Kittitas County has a responsibility to ensure that potential impacts from the project are assessed in a complete and unbiased manner, mitigation measures are required and enforced, and a system to report problems and enforce mitigation will be in place.	30-32
6	**Time needed for a decision on the project** Comments relating to the timing of the EIS and/or the County decision, including requests to not make a hasty decision, take more time to analyze data on problems from other wind farms, and stall decision until BLM finalizes an EIS on wind power in the western states. Also includes a comment that it seems senseless to go through the review of the DEIS without the approval of the appropriate zoning requirements.	18-5, 24-5, 29-3, 29-4
7	**Need for project power/power market issues** Comments that the EIS has not shown a need for the project, contains inadequate discussion of current wind power production or how much capacity utilities are seeking, or does not adequately assess market for wind energy production in the state.	23-4, 41-30, 47-1

Table I-2
Issues Based on Draft EIS Comments (cont'd)

8	**Need for subsequent environmental review** Includes a request to correct Fact Sheet to indicate that subsequent environmental review may be required, and statement that DEIS does not mention future expansion of the proposed project while the Desert Claim application leaves the door open for expansion.	27-5, 51-8
9	**Description of the applicant and/or its objectives for the proposed action** Comments addressing the DEIS description of the applicant; about existence of buyer for the power; whether energy from project would remain in Pacific Northwest; reference to site-specific criteria identified as needed for a wind facility; inclusion of statements considered to be marketing projections or political positions; lack of federal or state requirements to purchase wind power.	27-6, 38-4, 41-2, 42-1, 42-3
10	**Approach to mitigation in the DEIS** Comments relating to the general approach to mitigation as discussed in the DEIS, such as statements that contingency measures should be in place if the EIS is wrong about impacts; measures are not long-term in focus, do not obligate the applicant to corrective actions after construction; need comprehensive mitigation before construction; include a 24-hour hotline to address residents' concerns and impacts. Also editorial comments to use prescriptive wording on mitigation, replace certain words in the DEIS.	27-58, 27-67, 38-34, 38-118, 43-67, 44-16, 51-12, T11-5
11	**Number of wind farms proposed** Question why so many wind farms are proposed for this area, as impact would be significantly less with just one proposed.	36-4
12	**Unique aspects of the proposed project configuration** Comments that the disassociative properties of Desert Claim make it incomparable to either of the alternatives or the Kittitas Valley Wind Power Project, and create need to address impacts to "captive" properties.	37-5, T26-3
13	**Cost and accessibility of the DEIS** Comments about cost of hardbound copy of DEIS, how cost was derived, who paid the production/printing cost; difficult to analyze document on CD, but printed document was too costly to purchase.	11-12, 38-2, 51-3
14	**Selected EIS terminology** Requests to replace "wind farms" with "wind factories," "non-participating land owners" with "unwilling landowners" or "captive landowners."	37-4, 38-1, 43-122
15	**Editorial correction on page 5-2** Comment that DEIS incorrectly identifies project location as "King County" (p.5.2)	38-115
16	**Comments on Kittitas Valley EIS** Comment presented in testimony at the Desert Claim DEIS public meeting that was actually based on content of the Kittitas Valley Wind Power Project EIS.	T18-1
ALT	**Alternatives**	
1	**Definition of the No Action Alternative** Comments addressing the No Action Alternative as defined in the EIS. These comments generally fit one of three types: (1) consideration of other energy-supply actions that might be undertaken if the Desert Claim project were not developed; (2) characterization of future land use and development conditions in the vicinity of the project area if the project were not approved; and (3) objections to specific aspects of and/or requested specific changes to the EIS description of the No Action Alternative, including requests to strike specific entries.	5-4, 9-2, 9-3, 27-10, 27-11, 27-12, 27-17, 29-13, 30-4, 38-5, 38-7, 38-10, 42-6, 43-49, 44-1, 47-4, T11-1, T27-2
2	**Scale of Proposed Action** Question regarding determination of wind turbine quantity for proposal and suggestion that a smaller-scale project be considered.	14-6, 36-5

Table I-2
Issues Based on Draft EIS Comments (cont'd)

3	**Adequacy of Alternative 1** Comment that Alternative 1 is not a practical alternative.	29-11
4	**Adequacy of Alternative 2** Comments that Alternative 2 is not practical or viable; can't be evaluated.	29-12, 29-14
5	**Alternative generation technologies** Comments that DEIS does not, but should, discuss alternatives to wind power that could cut greenhouse emissions and reduce dependence on foreign oil (e.g., restructuring the power grid, conservation, solar power, hydrogen power, homeowner incentives).	36-1, 36-6, T14-5, T27-1, T29-4
6	**Alternative sites** Comments that EIS should consider other sites for the project where impacts to residents may be less, or alternative sites with potentially suitable wind (including several specific areas). Also includes more general comments that a proper location would be out of view or in an unpopulated area, and comments expressing skepticism that the proposed area provides adequate wind to support a project.	39-1, 48-1, 48-6
7	**Proximity to transmission lines** Comments that no alternate site was provided that was not already near existing transmission lines; offsite alternative locations that involved incurring the cost of transporting the power produced were not included.	41-4, 41-29, 41-31
PD	**Project Description**	
1	**General comments on specificity of construction description** Request for clarification of construction actions (e.g., use of blasting for foundations, earthwork, assembly of turbines); include cubic yards of earth disturbed/removed.	11-1, 43-43
2	**Description of operation and maintenance activities and schedules** Request for clarification regarding turbine operation and maintenance schedules; meaning of "controlling turbine operations to meet scheduled power deliveries." Also comment that O&M activities should include a process for complaint resolution and a wildlife monitoring program.	14-4, 27-4, 38-28
3	**Project decommissioning** Comments relating primarily to decommissioning of the project, including questions regarding decommissioning plan or responsibility for decommissioning; comments that decommissioning plan is not shown, need a plan with provisions for accelerating decommissioning if impacts are more adverse than contemplated, and a bond should be required; statement that re-powering should not be permitted without a formal process.	12-22, 14-7, 24-4, 38-31, 38-119, 51-4, T4-2, T28-2
4	**Specific quantities and locations for project facilities** Comments that the project description should include specific numbers for turbine heights, length of overhead cable, number and location of met towers, area of graveled roads; question why **Table 2-1** includes turbines larger than 1.5 MW; 23 miles of access roads should be included in permanent impact acreage; access road connections to public roads should be on **Figure 2.12**; and proposed connections to the Kittitas Reclamation District (KRD) access road are not clear.	16-3, 38-16, 38-20, 38-21, 38-91, 43-42, 44-3
5	**Energy production capacity of the project** Comments requesting revisions to statements regarding the capacity of the proposed wind energy facility, including that DEIS overestimates actual production by using the nameplate capacity of 180 MW, as actual production is usually less than 30 percent of capacity, and that project will, at best, only contribute 60 MW of intermittent power.	27-1, 27-8, 29-28, 30-3, 41-1, 42-2

Table I-2
Issues Based on Draft EIS Comments (cont'd)

6	**Disposition of project output** Comments that project does not have a buyer for the energy; references to buyer and location should be revised; DEIS should state that power contracts do not exist; power will not go to Kittitas County; purchase agreements should be required for the EIS.	27-2, 27-3, 27-7, 27-9, 29-10, 42-4
7	**Use of hazardous materials** Comments that DEIS should list hazardous materials to be used, address their impacts.	43-45, T13-3
8	**Project power collection system and related facilities** Comments that DEIS should clearly identify location of transformers, electrical equipment, substations and O&M facility; identify location of collection lines and whether they encroach on adjacent property; explain cable installation on non-leased property; lines for communication network should be underground; concern regarding size and visual impact of collection lines; difference between Fact Sheet and Chapter 1.	27-51, 38-18, 43-41, 43-46, 50-3
9	**Configuration of the proposed project area** Comments that alternatives in DEIS do not realistically represent the project; project is unique in its patchwork appearance, is identified as 5,237 acres but encompasses many more acres; project is actually 4 or 5 micro-sites that surround unwilling landowners.	37-3, 38-14
10	**Description of Kittitas County objectives** Comment that only the County objectives specifically contained in KCC17.61A.010 or its appendices should be referenced in the DEIS (re page 2-41).	38-32
11	**Transmission interconnection point** Comment that DEIS identifies potential interconnection point at Woldale substation. Additional development, potential impacts and mitigation for this should be addressed.	38-19
12	**Project visitor center** Comments that DEIS does not address location and potential impacts of visitors center.	38-22, 43-44
13	**Phasing of project construction** Concern regarding potential for greater impact should the project be constructed in phases, and statement that option to construct project in phases should be removed.	38-23
14	**Use of local resources for project construction and operation** Comments that use of local contractors and suppliers should be quantified, as DEIS is vague on this point, and DEIS should provide actual number of local O&M staff.	38-24, 38-29
15	**Timing of restoration plans** Comment that plans for restoration should be determined prior to commencement of the project, and that reasonable deadlines and maximum impact limits should be set.	38-25
16	**Project traffic management plan** Comments that waiting for completion of project to repair roads is not acceptable; applicant should maintain roads in pre-construction condition throughout project construction; traffic plan should stress that community access cannot be compromised.	38-26, 38-27
	ELEMENT/RESOURCE ISSUES	
ER	**Earth Resources**	
1	**Impacts on Ellensburg Blue agate** Comment that DEIS does not mention impact on blue agate specific to area west of Ellensburg.	27-59
2	**Erosion impact analysis and conclusion** Comment disagreeing with the methods and/or conclusion of the erosion impact analysis.	29-15

Table I-2
Issues Based on Draft EIS Comments (cont'd)

3	**Landslide hazards and mitigation** Comments that landslide hazard discussion should be clarified; include site-specific geotechnical study and removal of turbines if risk cannot be acceptably mitigated.	29-16, 38-35, 38-36, 38-99
4	**Ongoing baseline impacts on earth resources** Comment that impacts of the proposed project neglect to include the same ongoing impacts addressed in the No Action Alternative (see also **Table 1-1**).	38-6
AQ	**Air Quality**	
1	**Dust impacts during operation** Concern that turbine operation would create/disperse dust clouds and pollen down wind.	12-30, 51-5, T9-1, T24-6
2	**Air quality impacts during construction** Comments relating primarily to dust from project construction, including comments that construction dust will adversely affect air quality; potential for cumulative impacts could be significant; impact would be major if mitigation does not work; request to remove statement referring to construction dust relative to other activities.	29-17, 38-40, 38-100, 43-50
3	**Mitigation for dust impacts** Comments that there is no mention of dust mitigation during construction or if turbine action results in increased dust; watering of road and soil surfaces during construction should be included; include reduction in speed limit to 20 mph; include more specifics on dust mitigation and indicate source for water needed for dust control.	38-37, 38-38, 43-26, 43-47, 43-48
4	**Greenhouse gases from backup power source** Comment that DEIS had no discussion of backup power that would be required to be on line when wind farm not producing electricity, resulting in more greenhouse gases.	36-3
5	**Air quality impacts under No Action Alternative** Comment that text should note current land use is both agricultural and residential, possible development of some other energy facility is remote and should be removed.	38-39
WR	**Water Resources**	
1	**Impacts on surface water resources and water supplies** Comments primarily concerning impacts of road and utility crossings of watercourses, including construction-related Best Management Practices (BMPs); potential to significantly impact residents' use of water for irrigation and stock; information on water use and discharge. Includes comments on permits related to surface water, i.e., that Hydraulic Project Approval (HPA) required from Washington Department of Fish and Wildlife (WDFW) and whether Washington Department of Ecology (WDOE) approval required for relocation of ephemeral or intermittent streams.	1-15, 15-3, 16-4, 29-18, 38-42, 43-51, T13-2
2	**Mitigation for potential surface water or groundwater impacts** Comments that DEIS does not address mitigation for impacts to groundwater and wells from blasting, other construction activities or operation; compensation should be provided; need 2000-foot setback; address mitigation for potential loss of water quality/quantity from crossings over watercourses; identify which water quality protections will be in place. Includes requests for assurances that water flow will not be changed from current conditions, turbine placement would not occur in areas where it would impact groundwater, and that blasting would not have adverse impacts on wells.	11-2, 27-39, 29-19, 42-22, 43-1, 43-2, 43-3, 43-52, 43-54, 43-56, 43-59, T12-2

Table I-2
Issues Based on Draft EIS Comments (cont'd)

3	**Groundwater impact analysis** Comments indicating concern regarding analysis of potential groundwater impacts; well locations indicated on maps are not accurate, should be verified prior to turbine placement and blasting; need more information; disagreement with conclusion of no significant impacts; need to evaluate potential for concrete to leach minerals into the groundwater.	27-40, 38-41, 38-44, 42-23, 43-27, 43-55, 43-58, T8-3, T12-1
4	**Use of stream water for dust control** Comment that use of stream water for dust control should not be allowed.	43-53
5	**Impacts of surface water disturbance on wildlife** Questioning DEIS assertion of temporary disruption to priority habitat (p. 3-47).	38-43
PA	**Plants and Animals**	
1	**General adequacy of studies and information on plants and animals, particularly avian studies** Multiple comments primarily related to the overall adequacy of the plants and animals studies and analysis documented in the DEIS, particularly with respect to birds. One comment expressed general satisfaction with background studies and information collected on fish, wildlife and habitats, while most were critical. Multiple comments reflected a theme that the avian studies were inadequate to determine level of avian use of the project area and provide sufficient base for estimation of impacts. Some made general statements about the adequacy of the avian studies, such as the surveys were cursory and incomplete, models are inaccurate and expanded analysis should be done. Some comments questioned mortality estimates based on comparison with other projects due to inaccurate data for the other projects. A number of comments addressed specific aspects of the avian studies, including comments that a 2-year study period is needed; the study did not include nocturnal use or migratory pathways; area residents were not surveyed; use of radar to determine spatial and temporal distribution; aerial observations for active raptor nests are insufficient; DEIS fails to analyze weather conditions that could affect mortality; and there should have been an assessment of rodent populations. This issue includes comments relating to accountability for the studies and whether the studies should be redone.	1-1, 5-10, 5-15, 12-1, 12-3, 12-18, 15-5, 15-7, 15-10, 25-3, 26-2, 27-13, 27-15, 27-34, 27-68, 29-22, 30-5, 30-21, 30-24, 33-5, 36-10, 36-12, 38-47, 38-49, 38-102, 41-6, 41-10, 41-22, 41-32, 42-7, 43-5, 43-28, 43-60, 43-66, T5-2, T13-4, T27-3
2	**Determination of net impacts and associated mitigation** Comments that DEIS has inadequate presentation of net impacts and specific mitigation; project impacts can be substantially mitigated by employing measures discussed in the document, but confusion as to degree of efficacy which undermines conclusions in DEIS; revise analysis to clearly describe the net effect on the environment and unequivocally address which mitigation measures will be implemented.	1-2, 1-3
3	**Resource agency guidelines for wind projects** Request that DEIS incorporate WDFW guidelines for wind power projects. Also comments relating to U.S. Fish and Wildlife Service (USFWS) recommendations for wind projects, such as statement that project does not meet 6 of 10 USFWS criteria; project violates at least three guidelines; should state Desert Claim's level of compliance with USFWS guidelines.	1-4, 27-14, 41-11, 42-8, 43-123
4	**Role of Technical Advisory Committee in mitigation and monitoring** Comments addressing the Technical Advisory Committee (TAC) identified as a possible mitigation measure, including support for TAC; request that the formation and role of TAC be a binding measure; requests that TAC be in place for life of the project, and to describe authority and budget source, and indicate if data gathered by TAC would be available to public on request; request for membership in TAC.	1-5, 27-42, 30-28, 38-51, T27-6

Table I-2
Issues Based on Draft EIS Comments (cont'd)

5	**Vegetation/habitat restoration and mitigation** Comments relating to restoration of habitat disturbed by project construction and/or measures to mitigate impacts through replacement habitat. Issue includes requests to include construction timing as mitigation to minimize impacts to soils/vegetation; conduct activities outside of project footprint during dry periods or on frozen ground if possible. Also includes comments that the DEIS should identify a standard for evaluation of site restoration success, specifications on seeding, temporary erosion control measures and a long-term protocol for establishing plant communities while excluding invasive species. Also includes comments relating to mitigation ratios for replacement habitat, based on existing vegetation types; location of mitigation site; enhancement on mitigation site. Also requests that the plan to acquire replacement habitat be explained in detail, and to consider use of the site for farming to replace area used by project roads and turbines.	1-6, 1-7, 1-8, 1-9, 5-7, 27-41, 43-4
6	**Mitigation for potential avian impacts** Comments relating to project design or siting features to mitigate avian mortality, including statements that met towers should be freestanding; reliability of bird flight diverters is questionable; recommendation to set turbines back from the windward edge of the ridgeline; and comment that the only mitigation is not to build turbines.	1-10, 1-11, 12-2, 27-44
7	**Post-construction adjustments in response to avian mortality** Comments that DEIS does not include contingency measures to address bald eagle mortality; should require conservation measures in App. C; concern that corrective action (e.g., removal of a turbine) in event of avian mortality may not be possible during operation; plan for post-construction adjustments was needed.	1-12, 5-9, 36-16, T27-5
8	**Additional upland bird species** Comment that sharp-tailed grouse and sage grouse should be discussed in the EIS.	1-13
9	**Big game impacts and mitigation** Support for management of big game and control of animal damage on project land; public hunting is WDFW's primary tool for minimizing damage by game animals; could include access control and weapon restrictions; measures to address game damage should be approved by TAC. Also comments that DEIS should provide more analysis of big game habitat, migration and displacement; impact estimates are not sufficient; address shadow flicker effects on deer and elk; include more mitigation measures. Comment that project studies using helicopters could have scattered elk and deer herds.	1-14, 11-3, 14-3, 15-9, 16-10, 17-10, 29-24, 30-22, 41-14
10	**Presence of fish species in project area waters** Comments that map inaccuracies exist and WDFW actually expects fish are present in Currier Creek and Reecer Creek and possibly their tributaries at times; comment that project must affect summer steelhead, but DEIS does not address presence or mitigation.	1-16, 29-25
11	**Impacts to wetlands, streams and riparian areas** Comments that wetland and watercourse impacts should be minimized; proposed access roads and foundations would affect native vegetation and wetlands; micro-siting should be used to reduce impacts; where impact cannot be avoided, turbine should be removed; discuss wildlife impacts near wetland and riparian areas; streambeds are critical areas, setbacks are required and filling/ relocating should not be permitted; show total wetland acreage for project area, as well as the percentage temporarily or permanently altered; comment expressing surprise that wetland impacts would be allowed.	1-17, 15-2, 29-21, 36-14, 38-46, 38-101
12	**Take of species protected under the Bald and Golden Eagle Protection Act** Comments that project could result in take of species protected under the Bald and Golden Eagle Protection Act (BGEPA) and/or the Migratory Bird Treaty Act (MBTA), including points that USFWS must authorize take level; DEIS does not say whether take	5-3, 5-11, 11-4, 16-9, 17-9, 27-33, 27-43, 29-23,

Table I-2
Issues Based on Draft EIS Comments (cont'd)

	application has been filed; DEIS should contain assurances against potential take. Includes questions why bald eagles were only species addressed and who would be the *enXco* official prosecutable under BGEPA if an eagle is killed.	36-15, 42-9, T5-4
13	**Mortality assessment for raptors, particularly bald eagles** Comments noting the potential for bald eagle and/or raptor mortality in general; wind farms should not be built in known eagle habitat; questions on reliability of comparative mortality statistics for other wind project sites; no discussion of raptor presence along ridgelines, other than in mitigation; reference to roosting areas and potential for multiple flights through the proposed site; displacement impacts; calving will continue to attract raptors and could threaten their safety. Also includes requests to strike statements that no bald eagle fatalities have been reported at wind farms in U.S.	5-14, 25-4, 26-4, 26-5, 27-32, 30-20, 38-48, 38-103, 41-5, 41-7, 43-62, 43-63, T12-3, T27-4, T29-3
14	**Impacts to non-endangered avian species** Comments addressing impact analysis and/or conclusions for non-endangered avian species, including concern for protection provided for non-endangered species present on the site; objection to characterization of estimated 220 bird kills per year as not significant; concern for known presence of great horned owl; and question whether the impact addresses the total or local avian population.	5-8, 12-4, 14-2, 17-7, 27-60, 38-50, 43-61
15	**Impact analysis methods and results for bats** Multiple comments relating to study methods and conclusions for bats, including request for thorough study of risk to bats; information from nocturnal studies; evidence of bat mortality at other wind facilities; estimates are not sufficient for determining significant adverse impacts would not be expected; no analysis of potential bat activity in relation to nearby forested area; assess bat populations using appropriate technology; reference to wind turbine project in Appalachians that caused a record number of bat kills.	5-12, 15-8, 33-6, 36-11, 38-52, 38-104, 42-10, 43-64
16	**Indirect avian impacts, particularly potential for viral outbreaks** Comments addressing possible indirect impacts of avian mortality, primarily questioning growth of mice or mosquito population and corresponding potential for viral outbreaks (e.g., hantavirus, West Nile virus).	15-6, 16-8, 17-8, 41-8, 43-65, T13-5
17	**Impacts to shrub-steppe vegetation and lithosols** Comments that primary vegetation in project area is shrub-steppe, which is in critical state of survival; loss of shrub-steppe could undermine habitat value; shrub-steppe habitat obligates bird species occupy this region during the breeding season; concern that lithosols would be disturbed; concern that project could impact plant communities used by raptors to hunt visible prey.	5-5, 5-6
18	**Vegetation and wildlife impacts in general** Comments expressing general concern over impacts of the project on existing vegetation, or impacts to wildlife without respect to specific wildlife types or guilds.	20-3, 29-20
19	**Impacts to threatened and endangered species** Comment questioning the acceptability of the DEIS conclusion of no significant impacts to threatened and endangered species.	29-26
20	**Monitoring of post-construction conditions** Comments addressing post-construction monitoring, including points that monitoring should be done by an impartial body; adequate monitoring and mitigation should be in place to document bird fatalities; project of this size could change overall ecology, so there should be monitoring of a test installation first; DEIS does not include follow-up studies of other wind farms to determine if they change the 'overall' ecology of a site.	30-25, 41-9, 41-25, 43-6
21	**Impact of turbine safety lights on avian mortality** Concern that lights on turbines could attract night migrating birds and should not be used since they are not required by the FAA.	36-13

Table I-2
Issues Based on Draft EIS Comments (cont'd)

22	**Adequacy of entries in Table 1-1** Comments that **Table 1-1** provides inaccurate comparisons between Desert Claim and White Horse, and fails to include the County's "zero net loss" policy on wetlands.	37-2, 38-8, 38-9, T26-2
23	**Classification of vegetation types** Comment that DEIS should include all uses of vegetative areas in **Section 3.4.1.1** or only include uses in the Land Use section.	38-45
ENR	**Energy and Natural Resources**	
1	**Impact of project on the supply and price of electricity** Comments that DEIS fails to evaluate potential impact on the broader energy picture, or disagreeing with **Section 3.5** conclusions about the project's effect on price and availability of electricity.	27-16, 27-35, 29-27, 38-11, 42-5
2	**Relative energy importance of the project and wind power in general** Comments addressing contribution of the project and/or wind power generally to energy supply, including statements that this and other proposed projects in the area would generate minuscule amount of power; include discussion of the relative importance of these wind projects to the whole energy picture; conservation could accomplish the same savings; there is no competent national energy policy; compare wind energy to hydroelectric power. Also objections to specific statements or comparisons in the DEIS addressing the amount of energy the project would produce.	12-19, 33-4, 36-17, 38-53, 38-105, 41-23, 48-3
3	**Scope of EIS energy analysis** Comment that discussion of other potential energy developments is outside EIS scope; project would not eliminate other energy facility proposals in local area or elsewhere.	38-54
4	**Quantification of resource use** Comment that DEIS should list quantities of resources to be removed or displaced.	43-69
5	**Energy loss through transmission** Statement that wind energy is best used in areas in close proximity to consumers, and concern regarding energy loss through long-distance transmission of power.	48-4
CR	**Cultural Resources**	
1	**Mitigation for cultural resource impacts** Comments that DEIS should provide specific mitigation that would be required; turbine or road sited in identified area of concern should be relocated; mitigation of retrieving scientific or cultural information from its location is unacceptable; would not be permissible to unearth artifacts; mitigation involving removal of artifact(s) would result in significant unavoidable adverse impacts.	29-29, 38-56, 38-57, 38-106, 43-72
2	**Nature and extent of cultural resource impacts** Comments specific to impacts, such as statements that DEIS is incomplete on cultural resource impacts; DEIS refers to possible transmission connection and actual impacts should be determined; six cultural sites are identified as potential impact areas.	12-16, 38-55, 43-71
3	**Impacts and consultation regarding traditional cultural properties** Comments that DEIS contains little information on cultural resources; suspects little consultation with Yakama Nation; need to include area(s) of the site pertaining to the Yakama Nation that would be affected and their value; need supplemental EIS per Section 106 of National Historic Preservation Act (NHPA); private property use is not identified, cannot be assumed.	12-17, 43-29, 43-70
LU	**Land and Shoreline Use**	

Table I-2
Issues Based on Draft EIS Comments (cont'd)

1	**Direct land use impacts/compatibility with existing uses** Comments addressing primarily the DEIS discussion of direct land use impacts and compatibility of the project with existing land uses. Comments reflect several common themes, including compatibility of the project with existing residential land use and lifestyle, particularly for residences within one-half mile; that the project represents an industrial use; and disagreement with the approach, accuracy and content of the analysis, including comments that the DEIS downplays impacts on residents, should provide evidence that impacts to existing activities are not expected, and that data on number of residences is inaccurate, inconsistent or incomplete. One comment stated that cumulative impact on all residences with a view was not adequately addressed in the DEIS.	15-15, 25-2, 25-5, 27-18, 27-61, 27-70, 29-5, 29-30, 38-58, 38-64, 38-107, 38-108, 38-110, 42-11, 43-74, 43-76, 43-78, 43-84, 43-91, 44-2, 44-5, 46-1, 47-12, T22-5
2	**Indirect land use impacts** Comments appearing to relate primarily to the DEIS discussion of indirect land use impacts, such as potential future effect on residential development near the project and/or continued agricultural use. Includes comments relating to compatibility with residential development and growth of Ellensburg. One comment stated the zoning change for project could indirectly result in increased bird mortality and destruction of shrub-steppe habitat.	5-13, 29-6, 36-8, 43-81, T22-7
3	**Possible relocation of existing area residents** Comments relating to the DEIS statement that area residents may choose to relocate if the project conflicted with their lifestyles, including general objection to or questioning of that statement or a similar statement that wind production is compatible with rural resources. Includes comment that for relocation option to be viable, property value analysis and mitigation would be necessary to give residents financial ability to relocate.	11-8, 12-28, 27-36, 30-26, 38-60, 43-83, 44-7, T4-8
4	**Compensatory mitigation for land use impacts** Comments that insufficient mitigation is proposed to protect rights of landowners; mitigation should include property purchase or other form of compensation.	11-9, 15-16, 27-47, 38-109, 43-80
5	**Setbacks from residences and property lines** Comments relating to land use aspects of turbine setbacks addressed in the EIS, such as objection to proposed setbacks from residences and/or property lines; setbacks relative to residences adjacent to central portion of the site; concern over potential limitations on use of land on adjacent properties within setback limits; statement that land use will be changed if setbacks do not address all potential impacts.	16-12, 17-6, 20-1, 25-6, 27-45, 38-63, 43-7, 43-30, 43-79, T22-6, T24-4
6	**Project consistency with Kittitas County Comprehensive Plan** Comments offering opinions on whether the project would be consistent with one or more provisions of the County comprehensive plan, including specific comments that every turbine would need to be located within industrial-zoned land; project would allow industrialization of scenic valley landscape; comment that if all three proposed wind farms are built, over 10,000 acres of land would be used for turbine development; disagreement that project would be consistent with the plan. Includes comments that project is not consistent with or does not discuss specific policies in the plan; project would violate "zero net loss" policy on wetlands; DEIS fails to consider the definition of rural lands and the type of activities compatible with this use classification.	27-19, 29-31, 30-7, 32-5, 33-2, 38-65, 38-67, 42-14, 47-3, 47-10
7	**Consistency of project with Growth Management Act** Comment that DEIS discussion of consistency with GMA is flawed by inaccurate conclusion that proposal would not involve significant amounts of buildings, structures, or impermeable surfaces, as development of 120 structures is considered significant.	38-68

Table I-2
Issues Based on Draft EIS Comments (cont'd)

8	**Compatibility of agricultural and residential uses** Comments objecting to DEIS statements on potential for conflicts between existing agricultural and residential uses, including statements that DEIS does not show such conflicts exist; suggestion that residential users compete with agriculture is not accurate; statement that agricultural activities would continue in project area is unsubstantiated.	38-12, 38-61
9	**Proximity of project site to transmission lines** Comment that DEIS statement indicates a means of transmission connection has been determined, which is not the case, and proximity of transmission lines is irrelevant.	38-59
10	**Impacts of power collection lines** Comments that off-site overhead power collection lines would increase adverse impacts to non-participating landowners; comment that one power collection line would adversely affect a specific property.	38-66, 50-4
HS	**Health and Safety**	
1	**Fire hazards** Comments relating primarily to the discussion of fire hazards in DEIS **Section 3.8.** Comments within this category generally addressed one or more of three primary topics, including the existing level of fire hazard in the project area, the fire hazards associated with construction and/or operation of the proposed project, and the possible mitigation measures related to fire hazards. Specific comments typically noted that the proposed project site is in an extreme high fire hazard area, expressed concern that the project itself could cause fires or expressed dissatisfaction with the DEIS coverage of fire hazards, or included statements that proposed fire mitigation measures were insufficient and/or that a fire fighting plan was needed.	4-1, 10-1, 11-6, 12-5, 12-29, 22-2, 23-1, 24-3, 27-21, 27-22, 29-33, 29-35, 38-72, 42-16, 43-24, 43-25, 43-92, 43-96, 43-105, 43-110, T14-2, T29-2, T30-1
2	**Impacts of mechanical hazards from machinery/structure failures** Comments primarily addressing possible mechanical hazards (other than fire) associated with wind turbines. Includes general statements, such as that turbines present health and safety hazards or impacts will drive property owners away, and comments more specific to technical analysis of blade throw and tower collapse provided in the DEIS.	12-11, 15-13, 27-48, 29-32, 43-8, 43-93, 43-94
3	**Ice throw impact analysis and mitigation** Comments similar to those in HS-2, but specifically related to the DEIS ice throw analysis and mitigation discussion, including statements that ice throw probability is not remote; comment that Bowers Field icing information could be used; question regarding period of record for icing conditions; comment that mitigation language in DEIS is inadequate; and several comments relating to potential use of ice sensors.	12-13, 27-50, 38-71, 43-104, T23-2
4	**Hazard mitigation through prescribed setbacks** Comments primarily addressing specific distances considered as setbacks to mitigate for mechanical hazards, such as general objections to distances contained in DEIS; suggestion that greatest setback distance determined for any hazard should be applied for all potential impacts; and various suggestions for specific setback distances ranging from 435 feet to 2,500 feet.	12-12, 12-14, 12-26, 15-14, 27-20, 38-17, 38-78, 41-35, 42-15, 42-17, 43-13, 43-95; 43-103, 43-108, 51-6, T4-6
5	**Potential interference with telecommunications** Comments that study should be required to address emergency responder communication and study of impact on TV and radio reception and mitigation needs to be conducted.	4-2, 11-5, 32-3, 43-99

Table I-2
Issues Based on Draft EIS Comments (cont'd)

6	**Electrical hazards, including lightning** Comments pertaining to safety-related electric hazards, including general statements that DEIS does not address electrical hazards, health hazards of electromagnetic fields or lightning impacts and several comments addressing potential issue of stray voltage.	29-36, 38-79, 43-10, 43-89, 43-90, 43-97, 43-98, 43-106, 43-109, 43-127
7	**Shadow flicker impact analysis and conclusion** Comments addressing methods used in analysis of potential shadow flicker impacts and/or the results of that analysis. Includes comments that DEIS contains insufficient assessment of impacts; does not assess traffic-related impacts; shadow flicker causes health problems; no site-specific assessments; shadow flicker impacts are unacceptable, are not unavoidable; nuisance trespass would occur to existing residences; and graphs do not provide substantive information. Also comments on specific aspects of analysis, such as definition of "receptor" and whether all potential receptors have been included, and model assessment of shadow flicker relative to fog or cloud conditions.	12-9, 27-23, 29-37, 30-8, 30-10, 38-73, 38-75, 38-76, 43-31, 43-100, 44-13, 44-14, T25-1
8	**Mitigation for shadow flicker impacts** Comments focusing on mitigation of shadow flicker impacts, including comments that inadequate mitigation for shadow flicker impacts is identified; EIS places burden of impacts on affected residents but it should be on applicant; turbines should not be allowed or should be removed where shadow flicker occurs; suggesting that residents be confined to their homes when shadow flicker occurs is not practical; and that **Table 1-1** conflicts with Chapter 3 regarding mitigation for shadow flicker.	12-10, 27-52, 30-9, 30-29, 37-1, 38-13, 38-74, 38-80, 38-114, 43-12, 43-32, 43-101, 43-107, 43-126, T26-1
9	**Spill/accident remediation** Request to contract for environmental remediation services, in the event of an incident.	4-3
10	**Liability for damage from hazards** Recommendations that applicant assume liability for any impacts as a result of project-related fires, as a condition for approval, or for project-related electricity damage.	22-3, 23-2, 43-11
11	**Need for engineering review** Comment that engineering review of design and construction standards be part of DEIS.	27-49
12	**Potential hazards from viral exposure** Comments addressing possible project relationship to viral hazards in reference to **Section 3.8**, including statements that DEIS does not analyze potential increased human exposure to hantavirus; disagreement with conclusion about hantavirus risk; no analysis provided for potential increased exposure to West Nile Virus.	38-77, 41-12, 41-13
13	**Description of existing hazard conditions** Comments about DEIS information on existing hazards in project area, including statements that paragraphs on residential and household electrical hazards should be removed and existing land uses listed in **Section 3.8.1.3** should include rural residential.	38-69, 38-70
NOI	**Noise**	
1	**Noise impact analysis methods, results and/or conclusions** Multiple comments relating to some aspect of the DEIS noise analysis. Includes general objections to/concerns over potential noise impacts and comments that the DEIS contains insufficient assessment of impacts; no statement that residents will experience increased noise; concern regarding potential for inaccurate noise calculations; suggested additional study; noise from wind farms is not comparable to existing rural noise sources. Also comments about specific noise components in the analysis, such as equipment running simultaneously, sound effect of turbine braking system, blasting and	12-21, 20-2, 27-24, 28-2, 38-30, 38-83, 38-84, 38-86, 38-111, 42-19, 43-33, 43-34, 43-111, 43-113, 43-115, 43-117,

Table I-2
Issues Based on Draft EIS Comments (cont'd)

	tonal noise; comments taking exception to conclusions about noise impact levels; comments addressing specific inputs to model analysis, including measuring noise at receptor's level (not based on a 5,200-acre site), using more than 4-8 mph wind speeds, using wind data from previous 2 years and that DEIS selected only 4 areas for noise modeling.	44-11, 44-12, 50-5, T11-4, T22-2
2	**Setbacks for noise mitigation** Multiple comments relating to what should be considered adequate setbacks to mitigate project noise impacts, including general statements that setbacks from properties should be increased and DEIS should look at other wind projects to assure adequate setback, and comments mentioning specific figures such as 2,000 feet or 2,500 feet, or basing the setback to ensure a maximum sound level of 35 decibels or 40 decibels at residences.	27-25, 29-38, 38-85, 41-36, 42-18, 43-14, 43-112, 43-114, 51-7, T22-4
3	**Other (than setbacks) mitigation for noise impacts** Comments involving noise mitigation other than setbacks, such as statements that DEIS does not include contingency measures if noise impacts are greater than projected; request that project be decommissioned if unbearable noise occurs; include soundproofing or buying out impacted owners; TAC should log noise complaints and resolve issues, including potential purchase of properties impacted.	27-53, 27-54, 30-12, 30-30, 43-35
4	**Noise standards appropriate to project/project area** Comments pertaining to the regulatory standards used in the noise impact analysis, including statements that industrial/agricultural noise standards should not apply or should be reduced, and to adopt noise standards based on actual use.	30-11, 38-81
5	**Impacts of low-frequency sound** Comments that DEIS should address low-frequency sound, which can only be mitigated by placing turbines well away from homes; cumulative effect increases with number of turbines; reference to article on effects on residents near turbines in the UK.	30-13, 40-1, 41-15, 41-27, 41-34, 43-15, 43-36
6	**Affected environment description** Comment that project area uses listed in **Section 3.9.1.3** should include residential.	38-82
ALG	**Aesthetics/Light and Glare**	
1	**General nature and magnitude of visual impacts from the project** Comments expressing concern over the visual impacts of the project or noting the magnitude of those impacts, including statements that view impacts would affect residents and visitors; do not want to see turbines; wind farms should not be located near Highway 97; painting turbines gray will not help; local views would be destroyed; quality of life (as interpreted visually) would be affected; large changes to rural landscape are unacceptable; world-class scenic views would be adversely impacted. Several comments specifically reference contribution of turbine lighting to visual impacts, mentioning impacts of flashing red lights; light pollution in Ellensburg and the valley; lighting impacts on stargazing and residents at higher elevations. One stated that change in visual character would be in direct opposition to Kittitas County's objectives.	12-6, 12-7, 12-8, 12-20, 14-1, 14-5, 21-3, 21-5, 30-16, 33-7, 38-88, 38-112, 41-17, 43-16, 43-17, 44-18, T1-1, T3-3, T19-3, T22-2
2	**Adequacy of the visual impact analysis and displays presented in the DEIS** Multiple comments relating to the visual impact methods and information materials documented in the DEIS. Many are comments critical of the photos and visual simulations, including statements to the effect that the photos and simulations are not accurate and/or are distorted, views selected were not appropriate and do not show turbines in front of the Cascades or views from affected residences. This category includes comments critical of the graphics and similar aspects of **Section 3.10**, including specific figures and tables, use of subjective scales in the analysis, the number of residents impacted, and presentation of conclusions about impact levels.	24-1, 26-3, 27-26, 27-69, 29-39, 30-15, 36-7, 38-87, 41-16, 41-18, 41-33, 43-118, 44-9, 47-5, 47-6, 51-9, T5-3, T17-2

Table I-2
Issues Based on Draft EIS Comments (cont'd)

3	**Blade glint and glare impacts** Comments that blade glint, glare impacts to road safety should be addressed; glare from multiple angles and surrounding turbines cannot be minimized; objection to impacts.	27-27, 29-40, 30-18, 42-20
4	**Mitigation for aesthetic impacts** Comments that DEIS does not provide adequate mitigation for visual effects or light and glare impacts; recommend moving turbines 20 miles away; inadequate guidance on mitigation; use of curtains and trees as mitigation is inadequate; use of screening vegetation. Several comments addressed compensation. One comment questioned whether it was possible to mitigate the visual impacts of the project.	27-55, 30-17, 30-31, 41-28, 43-37, 44-10, 47-8, 50-1, T11-3
5	**Source of shadow flicker** Comment on DEIS statement that shadow flicker can arise within or near houses.	38-89
RC	**Recreation**	
1	**Recreation impacts and mitigation** Comments relating to direct or indirect recreation impacts and/or mitigation, including comments disagreeing with assertion that project would not impact recreation; expressing concern regarding hunting rights; noting impact on snowmobiling, biking and other activities or impacts to non-participating landowners; or stating DEIS should reflect research done with realtors to reveal greater level of recreational benefit.	16-7, 17-4, 27-28, 27-56, 29-41
2	**Tourist interest in the project** Comment questioning a DEIS statement about the level of tourist interest in the project.	29-42
3	**Traffic disruption during construction** Comment noting that DEIS identifies traffic impacts to residents and visitors, and stating that traffic plan needs to address resident access as a priority.	38-90
GT	**Ground Transportation**	
1	**Baseline transportation conditions** Comments with additional information or clarifications to DEIS content on existing road network, including statements about highway classifications for I-90 and US 97, legal size and load limits and permits, an over-height restriction on eastbound I-90 at Exit 62, and upcoming WSDOT projects that might affect project-related transportation.	2-1, 2-2, 2-4, 2-7, 2-8
2	**Potential use of SR 970** Comment that if SR 970 is used for transportation of project components, this must be included in EIS with additional supporting analysis.	2-3
3	**Project-related transportation plans** Requests for WSDOT review of construction and tourism management plans as they pertain to WSDOT facilities, and a comment that tourism plan should be required prior to construction and be designed to minimize impacts to the environment and community.	2-5, 2-6, 38-92
4	**Emergency access route** Request that applicant construct a west-east road from Smithson Road to allow for improved fire control, emergency, and maintenance and operations access.	3-8
5	**Project tourist facilities** Comment that applicant should build, operate tourist kiosk along SR 97 or Smithson Rd.	3-9
6	**Road maintenance conditions** Comment that roads be maintained in current condition throughout construction process.	38-93
7	**Mitigation of construction dust impacts** Comment that DEIS makes no mention of mitigation of dust impacts from construction.	43-18

Table I-2
Issues Based on Draft EIS Comments (cont'd)

AT	**Air Transportation**	
1	**Potential impacts on VFR traffic pattern** Comments primarily addressing the potential project conflict with the Visual Flight Rule (VFR) traffic pattern identified in the DEIS, including specific statements that impacts to VFR airspace would be excessive; comment requesting clarification of reason for dramatic alteration of the CAT A&B airspaces; use of Bowers Field by 185 flight students, which results in 44,000 airport operations.	3-1, 43-19
2	**Mitigation options for VFR traffic pattern issue** Multiple comments primarily addressing mitigation measures for VFR traffic pattern conflict discussed in the EIS, including requests to confirm minimum possible change with FAA, clarify that reduction in airspace would be temporary, and include a condition for contingent removal of turbines. Also includes statements about the acceptability of the measures, such as impact on progress by Airport Advisory Committee and County to address airport planning concerns; modification of traffic patterns is not acceptable; project should not take priority over Bowers Field; remove 27 turbines or lower their heights; mitigation for air transport issues is unresolved.	3-2, 6-4, 12-25, 27-29, 27-57, 27-63, 29-43, 38-94, 42-21, 43-20, 43-21, 43-38, 43-119, T4-4, T22-1
3	**Potential impact on IFR operations** Comments about instrument flight operations, including that DEIS fails to address IFR operations with supporting documentation; analyze approved and proposed IFR operations; perform an Obstacle Evaluation; account for circle-to-land maneuvering; applications for new approaches have been submitted, are being designed by FAA.	3-3, 3-5, 6-5, 6-7, 6-8
4	**Status of air traffic review for Wild Horse project** Comment that DEIS incorrectly indicates FAA approval of the Wild Horse project, which is used throughout the DEIS to substantiate non-significant impact.	3-4, 6-6
5	**Resolution of air transportation issues** Comment that issues have not come to a reasonable determination, while additional research and discussions with FAA could resolve issues.	3-6
6	**Turbine lighting plan** Request for clarification on intent of shielding; concerns over lighting impacts.	3-7, 38-95, 43-22
7	**Additional air transportation issues** Comments relating primarily to aspects of air operations other than VFR traffic pattern and IFR procedures, including concern regarding impact on operational capability of the airport; inaccuracies regarding operation of the four runways; aircraft operating for other purposes than arriving, departing, operating in traffic pattern or executing instrument approaches; agricultural aircraft, helicopters or the CWU flight program; training and practice areas, minimum safe altitudes and margins of safety; small landing strip close to turbines; small plane activity.	6-2, 6-3, 6-9, 12-23, 12-24, 43-39, 44-15, 48-7, T4-3
PSU	**Public Services and Utilities**	
1	**Water supply for fire fighting** Request to provide a water supply for fire fighting beyond fire district boundaries.	4-4
2	**Fire protection service and coordination** Comments related to fire protection service to the project in operation, including several requests regarding fire service coordination, training, service agreements and plans for fire risk reduction; requests for information on fire fighting plans; comments regarding use of aircraft for fire fighting; and question on cost responsibility for fighting fires.	4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 11-7, 29-34, 43-9, 43-23, T13-1, T23-4
3	**Fire station location** Comments noting DEIS error on location of Fairview Fire Station.	22-1, 38-96, T14-1

Table I-2
Issues Based on Draft EIS Comments (cont'd)

4	**Project impacts to water supplies** Concern over impact to water supply from wells and lack of consideration for irrigation.	29-44
5	**Law enforcement services** Concern over increased calls to police as result of trespass by curious visitors.	41-20
PHE	**Population, Housing and Employment**	
1	**Project effects on tourism** Comments relating to **Section 3.15** discussion of project influence on tourism, involving expanded literature review and evidence of positive or negative effects on tourism.	27-30, 42-12
2	**Significance of population, housing and employment impacts** Statement that conclusion on population, housing and employment impacts in **Section 1.9.15** conflicts with those described for aesthetics, light and glare in **Section 1.9.10**.	27-64
3	**Housing impacts during construction** Comment that meeting the housing demands of construction workers would be difficult.	29-45
4	**Consideration of economic impacts** Comment that DEIS appears slanted, as only some economic impacts are considered.	38-113
FIS	**Fiscal Conditions**	
1	**Tax revenue benefits of the project** Comments relating to influence of the project on local government tax revenues and/or rates, including comments that DEIS sufficiently captures potential economic benefits, and additional information on new construction tax base and reduction in tax rates.	8-1, 9-4, T2-1, T23-3
2	**Time scope of fiscal analysis** Comments relating to the time scope of the fiscal analysis in the DEIS, including statements to include a full 30-year depreciated tax base analysis, and that accelerated depreciation leads reader to assume that tax revenue would be greater than in actuality.	27-31, 30-19, 41-21, 51-11
3	**Overall adequacy of the fiscal impact analysis** Comments relating to aspects of the fiscal analysis other than the time scope, primarily adverse impacts to local tax base and/or economy, such as fiscal impact of no action alternative; benefits of a wind plant vs. a fossil fuel plant; revenue loss from foregone home construction; need to consider property value increases and decreases; impacts to tax base/economic health if residential growth in project area is slowed or stopped.	9-5, 29-9, 31-1, 38-98, 43-82, T14-3, T20-2
4	**Project impact on utility rates** Comments to include estimates of increased utility rates to County residents; that savings in property tax rates would be lost by these increases; skepticism project would generate enough revenue to offset costs or that County would derive income from project tax base.	41-24, 48-2
	OTHER ISSUES	
NS	**Non-SEPA Issues**	
1	**Impact of proposed project on area property values** Comments addressing relationship of the project to values of property near the project area, primarily comments that property values would be adversely affected and/or that property values should be considered in the EIS. This category includes statements such as concern over housing resale value; DEIS contains insufficient discussion; potential domino effect could result in lower home sales, rodeo attendance and business revenues; should monitor impacts on property values; project will impact values of residential, agricultural and recreational lands; examine impact to property value for every home in	7-2, 12-27, 15-11, 16-11, 17-5, 18-4, 20-4, 24-2, 26-1, 27-71, 28-1, 30-2, 32-4, 36-9, 38-33, 38-62, 38-97, 39-3, 43-

Table I-2
Issues Based on Draft EIS Comments (cont'd)

	Northwest Valley areas 1A and 1E. Includes comments that DEIS should address compensation for loss in property values, and statement that groups who promote agenda of wind developers performed property value studies cited in the literature summary.	86, 47-7, 50-2, 51-10, T3-5, T4-7, T5-1, T16-1, T19-2, T22-8, T23-5, T24-5, T30-2
2	**Impact on the quality of life** Comments that the project would diminish the quality of life for the entire area.	21-4, T3-6
3	**Wind energy business practices and tax status** Comments that wind developers engage in unfair business practices; should be more affordable for individuals to engage in green energy; lawsuits against wind developers for take of species protected under the MBTA and for unfair business practices.	30-23, 34-1, 36-2
4	**Cost-benefit analysis** Comment that DEIS is inadequate on cost-benefit analysis and cumulative impact costs.	47-9
5	**Potential for legal action** Comments addressing possibility for lawsuits against County or applicant related to the project, with reference to aircraft accidents, land values and compensation fund.	35-2, 48-8
6	**Stress on residents and associated impacts** Comment that DEIS does not mention the unending stress already placed on non-participant residents by the proposal and the potential impacts, medical or otherwise.	30-27
S/O	**Support/Opposition**	
1	**Renewable energy** Comment expressing support for renewable energy systems in general.	5-1
2	**No Action Alternative** Comments expressing support for the No Action Alternative and/or requesting the County select this alternative.	5-16, 17-12, 36-19
3	**Wind energy** Comments referencing the benefits of wind energy, stating need for wind energy, or expressing support for wind energy over other energy sources.	9-6, T25-2, T30-4
4	**Alternative 1** Comments expressing support for Alternative 1, including statements that the Wild Horse wind farm in the Whiskey Dick area is more appropriate for this type of industrial development; this site has a greater area to accommodate project; Alternative 1 will not intrude on the lives of so many people; wind farm should be in a lightly populated area, such as east of Ellensburg.	13-1, 16-14, 27-38, 28-4, 43-57, 43-68, 43-73, 43-77, 43-87, 43-88, 43-102, 43-116, 43-124, T12-6
5	**Proposed Action/Desert Claim project/applicant** Comments expressing opposition to or support for the proposed Desert Claim project and/or to the DEIS as it relates to the project location, including statements that urge decision-makers to consider their decision as if the turbines were proposed near their homes; “we don’t want you here, you are not welcome”; do not allow project at this location; no reason for wind turbines to be located in populated areas such as the greater Ellensburg area.	16-15, 17-2, 17-11, 21-2, 23-3, 24-6, 27-73, 28-3, 32-1, 35-1, 39-5, 42-24, 46-2, T3-1, T4-1, T10-1, T13-6, T14-6, T15-1, T20-1, T21-1, T28-1

Table I-2
Issues Based on Draft EIS Comments (cont'd)

6	**Wind turbines in Kittitas County** Comments expressing opinions about the general acceptability of locating wind turbines in Kittitas County, including statements opposing wind turbines anywhere in the County, supporting wind turbines in the right place and suggesting all wind farms be located away from populated areas and out of view.	19-2, 52-1 (also letters 53 through 78), T6-1, T17-1, T24-7
V/B	**Value/Belief Statements**	
1	**Adequacy of federal and state wildlife protections** Comment expressing belief that federal and state legal provisions provide little protection for most avian species.	5-2
2	**Motivations relating to the project** Opinions about motives and behavior of the applicant and/or landowners participating in the project, including statements that project is all about money; applicant does not care about residents or environment; 8 landowners will benefit to the detriment of hundreds of others; non-participating landowners will incur all of the impacts of the project and receive none of the benefits; money promised to County is an unacceptable carrot, money motivation should not ride roughshod over obligations to protect the citizenry.	11-10, 27-37, 27-62, 27-65, 30-14, 33-8, 43-85, 44-17, T14-4, T19-1
3	**Opinions about the overall merits of the project** Multiple opinions about long-term effects of the project or its desirability, including statements that windmills will result in significant negative impact; wind farms will change the area forever; project threatens many residents have been in area for generations and worked hard to enjoy the lifestyle, ; assertion that project would not be detrimental to public health, peace, safety, or character is false; wind generation would be of no benefit to the County; impact and power generated are not worth the tax reduction; County would be better served with homes and ranchettes in the area; project would provide economic benefits.	11-11, 12-15, 16-13, 31-2, 36-18, 38-120, 48-9; 49-1, 52-2 (also letters 53 through 78), T23-1, T30-3
4	**Opinions about objectivity of the EIS and supporting studies** Comments expressing opinions about the objectivity of information in the EIS and/or the objectivity of the EIS preparers, without reference to points of substantive disagreement. Includes statements critical of wildlife consultant; that document is biased toward applicant, is constructed to support the project; studies and information in DEIS were provided by wind power advocates and taken at face value; apparent disinterest in comments during January 20 meeting; many comments are not based on reality, but a vision; comparisons change based on the intended result.	15-4, 16-1, 18-3, 30-6, 38-116, 45-2, 51-2
5	**Commentary on level of local support for or opposition to the project** Comments that the only long-time residents who support the project are those who would gain financially; majority oppose the wind farms; three groups are in favor.	18-1, 21-1, 33-1, T3-2
6	**Opinions on whose views and rights should have priority** Comments expressing opinions about how individual or group preferences or rights should be viewed in the decision, including statements that the feelings and judgments of residents who are impacted should have priority; wind turbines infringe on property rights of others nearby; 8 landowners should not be allowed to impact 350 others.	21-6, 39-2, 43-75, T3-7, T23-6
7	**Acceptability of impacts on non-participating landowners** Comments expressing opinion that no impacts from proposed project should cross property line of any non-participating landowner without permission; impact to neighboring, non-participating homeowners is enough to deny proposed project; if project could discourage residential use, this is reason not to site the proposed project.	41-13, 41-19, 41-26, 42-13

Table I-2
Issues Based on Draft EIS Comments (cont'd)

8	**Value of existing views** Comment that views in the Valley are one of the greatest resources of the County, are not renewable, and County Commissioners should protect views whatever the cost.	39-4
9	**Precedent for future wind energy development** Opinion that construction of one turbine in Valley will result in numerous wind projects.	47-11
10	**Kittitas County planning approach** Opinions relating to County planning efforts or how County might evaluate the project, including disbelief that Commissioners would harm so many and that position of County is to allow individual enterprise to dominate community interests.	27-46, 33-3
11	**Preference for nuclear power** Comment of disbelief that residents would be forced to pay increased electrical bills when capability exists to build nuclear plants, would welcome nuclear power.	32-2
12	**Need for electrical expertise** Comment that perhaps decision makers should be required to be electrical engineers, or should consult the experts on important decisions.	48-5

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State of Washington
Department of Fish and Wildlife
South Central Region – Ellensburg District Office, 201 North Pearl, Ellensburg, WA 98926
Phone: (509) 925-1013, Fax (509) 925-4702

January 30, 2004

Clay White, Planner
Kittitas County Community Development Services
411 North Ruby, Suite 2
Ellensburg, Washington 98926

Subject: Comments on Draft EIS, Desert Claim Wind Power Project

Dear Mr. White:

The Department of Fish and Wildlife has reviewed the Draft EIS for the Desert Claim Wind Power LLC Project. We also discussed the project with the applicant and the applicant's consultants during the past two years to provide review, comments and recommendations regarding the project and background studies. Our comments below relate to the DEIS assessment of fish and wildlife, their associated habitats and the project's potential affects on these resources.

General Comments and Concerns

We are generally satisfied with those sections of the DEIS and appendices that provide background information and those sections which review the project and the potential impacts. The background studies and information collected on fish, wildlife and their habitats, are generally consistent with our discussions with and recommendations to the proponents and their consultants. We have enclosed specific comments and clarifications regarding some of this information. These comments do not greatly alter the background information presented in the DEIS, but warrant revisions in the Final EIS. 1-1 PA-1

We are disappointed with the presentation of net impacts and specific mitigation in the DEIS. The Desert Claim project has the potential to adversely affect fish and wildlife and their habitats to a significant degree, but these impacts can be substantially avoided and mitigated by employing measures and strategies discussed in the document and appendices. Unfortunately, the DEIS is confusing as to the degree of mitigation and thus the net environmental impacts to be expected. In a number of places the DEIS identifies possible significant mitigation to avoid or reduce impacts but it does not identify which measures – if any – would actually be implemented (or else the presentation is confusing as to intent), nor alternatively, does the DEIS 1-2 PA-2 identify a predictable process for selecting and implementing "potential" mitigation measures where needed. The assessment of impacts, however, is generally presented as if all the mitigation measures were incorporated in the project. From our previous discussions with the proponent we would expect that the intent is to incorporate all the mitigation measures discussed in the DEIS into project. However, the DEIS presentation is not clear on this matter. The DEIS must unequivocally describe for reviewers and decision makers what mitigation measures will be included in the project and the net effect of the project on the environment. This shortcoming of the DEIS tends to undermine the analysis and conclusions of the document. 1-2 Cont. PA-2

We have a number of specific comments regarding the DEIS. These comments are provided on enclosed pages.

Conclusions and Recommendations

The DEIS needs to better clarify the analysis of impacts and mitigation. The document should be revised to clearly describe the mitigation elements of the project and the net environmental effect of the project when the mitigation is implemented.

The possible mitigation measures identified in the DEIS and its appendices are substantive and appropriate for the project. We recommend that these measures be unequivocally incorporated in the Final EIS as measures that would be implemented as part of the development and operation. 1-3 PA-2

Over the past year, WDFW worked with representatives of the wind power industry and proponents of renewable energy to craft state-wide guidelines for the protection of fish and wildlife resources when siting and operating wind power facilities. These guidelines are intended to support renewable wind power projects while concurrently preserving the public's fish and wildlife interests. We request that the DEIS incorporate these guidelines in the selection of mitigation measures for this project. I have attached a copy of these guidelines for your information. (A copy can also be seen at http://www.nationalwind.org/workinggroups/wildlife/washington_windpower_guide.pdf) 1-4 PA-3

Please keep us apprised of the status of this project and related Wind Development actions by your office. Thank you for the opportunity to review the DEIS. If you have questions or need additional information, please contact Brent Renfrow of my staff at (509) 925-1013.

Sincerely,

Ted A. Clausing

Ted A. Clausing
Regional Habitat Program Manager

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Enclosure: WDFW Comments and concerns related to project impacts and mitigation needs

Cc: David Steeb, Desert Claim Wind Power, Enexco
Brent Renfow, WDFW Ellensburg
David Mudd, WDFW Olympia

Washington Department of Fish and Wildlife Comments on Draft EIS for Desert Claim Wind Power Project

General

- **Technical Advisory Committee**: The formation of a Technical Advisory Committee to work with the proponent and the county on mitigation and monitoring is proposed as a possible mitigation measure. Such a technical committee would be a valuable asset to the project and we request that it be a requirement of the project. 1-5 PA-4

Shrub Steppe Plant Communities and Associated Wildlife – Impacts and Mitigation

- **Construction timing is an important mitigation measure:** Section 3.4.1.5 should include construction timing as a mitigation measure to avoid and minimize impacts to soils and vegetation. To the greatest extent possible, construction activities outside of the hardened footprint of the project (i.e. "temporary disturbance areas") should be done during the late spring, summer and fall when soil moisture is very low.

  For most of the project area, the time of year of construction will greatly influence the amount of long-term damage to soils and plants. The shrub steppe and grassland communities identified in the DEIS are very fragile when soils are wet. 1-6 PA-5 Even a single day of driving equipment on these sites when wet can result in substantial permanent damage. In contrast, during summer when soils are dry they can withstand traffic with minimal soil displacement and breakage of plant roots. Moreover, vegetation is more tolerant to damage during the dry period as the period of rapid growth has ended, many plants have completed flowering and setting of seed, and many are dormant.

  Working in winter on frozen ground is possible but because the project area varies greatly in elevation and is on generally south-facing slopes, predicting frozen ground conditions will be impractical for all but work of short duration.

- **Post-Construction Restoration of Temporary Disturbed Areas - Standards for site restoration:** The DEIS should identify a reference standard (or a process to establish one) for evaluation of site restoration success. The standard could be based on a reference site selected within the project area for each vegetation type, 1-7 PA-5 the typical vegetation description for each soil type in the draft NRCS soil survey, or other agreed-upon standard. Post-construction restoration of temporarily disturbed areas should be sufficient to achieve site stability and agreed-upon

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P.5

similarity to the reference standard. Selection of reference standards should be done in consultation with WDFW and the Technical Advisory Committee.

Site restoration and reseeding should be done at a time of year when germination and establishment can be successful. The DEIS should specify that seeding will be done at the next suitable planting window following disturbance, and that temporary erosion control measures will be implemented as appropriate. 1-7 Cont. PA-5

- **Clarification of Grassland Vegetation Type**: The term "grassland" as used in the DEIS is a descriptive term for shrub steppe sites where the shrub canopy has been temporarily removed by fire or other temporal disturbance. The project area does not include "true grasslands" or CRP "managed grasslands". 1-8 PA-5

- **Proposed Acquisition of Habitat Mitigation Site and Clarification of proposed mitigation ratios**: The proposed habitat mitigation site should be strategically located with respect to other shrub steppe habitat in the landscape of the Kittitas Valley and be selected to achieve the mitigation goals. Enhancement of the site should be considered (e.g. grazing management plan, weed control, selective revegetation efforts, etc.) in consultation with the TAC.

  WDFW would apply the mitigation ratios presented in Section 3.4.1.5 such that "grassland" sites on this project would have the same ratio as shrub steppe. As a point of clarification, the term "grassland" as used in this DEIS is a descriptive term for shrub steppe sites where the shrub canopy has been temporarily removed. Over time the shrub canopy will recover naturally. Technically these sites are shrub steppe (refer to Daubenmire, Steppe Vegetation of Washington, 1970) and the mitigation ratio associated with shrub steppe should be applied. In the context of the mitigation ratios negotiated with the wind power industry, a lower ratio was established for true grasslands (such as the Palouse) and CRP grass plantings because of the relative difference in restoration success and length of time to maturity. The grassland ratios should not be applied to the Desert Claim project site. 1-9 PA-5

Wildlife - Direct Impacts and Mitigation

- **Meteorological Towers – Guyed Towers verses Free Standing**: The project proposes the installation of four meteorological towers. These towers should be free standing towers which are demonstrably less likely to result in bird mortality.

  It is well documented that towers with guy wires kill birds at a significantly greater rate than free standing towers. The DEIS notes that the typical avian mortality associated with modern wind turbines at comparable sites is about 2 birds per tower per year. In sharp contrast, the guyed meteorological towers at the analogous Foote Creek Rim wind project in Wyoming had a mortality rate of about 8 birds per tower per year. Thus, if unprotected guyed meteorological 1-10 PA-6 towers were used on this project instead of free-standing towers, annual avian mortality would be expected to increase by about 14-21%. The use of bird flight diverters has been proposed but there is no information provided as to the effectiveness of bird flight diverters in reducing avian tower strikes. Bird flight diverters have been used at many places in North America to deter large waterfowl from striking transmission lines near waterways. We have not been able to find documentation of successful use of bird flight diverters on tower guy wires to prevent avian collisions during either daylight or during night-time migrations.

1-10 Cont. PA-6

The use of free-standing towers is a demonstrated mitigation technique for reducing avian mortality. Bird flight diverters should not be used in lieu of free-standing towers unless their effectiveness can be demonstrated or their use is part of an approved adaptive management effort coordinated with WDFW and other natural resource management agencies, and the Technical Advisory Committee.

- **Ridgeline Setback for Turbines**: The project will place turbines along the ridge line above Reecer Creek in Sections 4 and 9. The DEIS identifies setting turbines back from the windward edge of the ridgeline as a potential mitigation measure to reduce potential impacts to raptors which use the updraft areas along the edge of ridges. This mitigation strategy should be incorporated into the project. 1-11 PA-6

- **Bald Eagles – Potential for Turbine Mortality and Contingency Plans**: The DEIS does not include contingency measures for addressing the potential of bald eagle mortality at the project. The DEIS provides a rationale as to why the risk to bald eagles is low but also concedes that some risk remains. The DEIS points out the lack of bald eagle mortality at other wind project sites (where bald eagles are relatively uncommon) but we are not confident that this is a good predictor of bald eagle impacts in the Kittitas Valley where bald eagles are relatively common during the winter. The DEIS Appendix C, Exhibit 1 (page C1-20) includes conservation measures for managing risk to Bald Eagles. These measures should also be incorporated as project requirements. 1-12 PA-7

- **Sharp-tailed and Sage Grouse Should Be Discussed in Section S.14 and Section 4.4.3.1.** Sharp-tailed grouse historically occurred in Kittitas County. Sage grouse occur in the county, though the population is a fraction of historic levels. The three proposals for wind generation facilities are sited in habitat that is suitable for one or the other of these species. Population recovery and reestablishing these two species in the state is an agency priority that may be affected by the cumulative effects of wind energy projects. 1-13 PA-8

- **Management of Big Game Animals, Hunting and Control of Animal Damage on the Project, Including Lands Acquired for Habitat Mitigation:** In our scoping comments and meetings with the proponents we noted that WDFW is liable for damages caused by dear and elk. Public hunting is the primary tool 1-14 PA-9 available to us to minimize damage caused by game animals. If hunting is precluded, there is potential for deer and elk to use project lands as a refuge from which to foray out to adjacent agricultural lands and cause damage to crops and irrigated pasture. The cost of big game damage can be a substantial burden. We requested that the project proponent not preclude public hunting as a means of dispersing animals or reducing herd size. The DEIS Section 3.11.2.2 currently reads that hunting on both private and public lands in the project will be precluded by contract or agreement with the proponent.

Hunting can be arranged that would likely be compatible with the project objectives. For example, access control can ensure hunters are conscientious in their use of project lands, and choice of weapons (e.g. muzzle loader fire arms or archery equipment) can minimize risk to project facilities. WDFW requests Desert Claim allow public hunting to control big game numbers on the project, including mitigation lands, or otherwise control the big game population and use of those lands so as to prevent animal damage. The measures used to address big game damage concerns should be approved by the Technical Advisory Committee.

1-14
Cont.
PA-9

Stream and Wetland Impacts from Facilities

- The application notes a number of road and utility crossings of watercourses. All of these crossings will require construction techniques to prevent erosion and maintain water quality. Some of these watercourses support fish and crossings must be designed to maintain fish passage and instream habitat. An Hydraulic Project Approval (Chapter 77.55 RCW, WAC 220-110) from WDFW will be required for this work.

1-15
WR-1

- The DEIS reports that fish are not expected to be present in the project area based upon map information provided by WDFW. Regrettably the maps do not have sufficient accuracy and resolution for purposes of this project. (WDFW is working on correcting these deficiencies.) From prior field work we expect fish to be present in Currier and Reecer Creeks in the project area. Fish may also be present at times in their tributaries.

  Interestingly, it is possible for juvenile steelhead (listed as Threatened under the federal Endangered Species Act) to be present in streams in the project area because of the diversion of unscreened water from First Creek where steelhead spawning has been documented. Water diverted from First Creek conveys fish via a network of ditches and streams down Green Canyon to Dry, Reecer and Currier creeks. Thus it is physically possible for juvenile steelhead (which look like rainbow trout) to be entrained in the ditch in the Swauk subbasin and be transferred to the Reecer Creek subbasin.

1-16
PA-10

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P.8

- The DEIS notes some unavoidable permanent impacts to wetlands from facilities. Impacts to wetlands and watercourses should be minimized to the greatest extent practicable. Special consideration should be given to minimizing permanent impacts to wetlands associated with natural watercourses as these typically have the greatest functional value for fish, wildlife and water quality. Micro-siting of facilities should be used to further reduce these permanent impacts wherever possible. 1-17 PA-11

2
P.1

Washington State Department of Transportation
Douglas B. MacDonald
Secretary of Transportation

South Central Region
2809 Rudkin Road, Union Gap
P.O. Box 12560
Yakima, WA 98909-2560

509-577-1600
TTY: 1-800-833-6388
www.wsdot.wa.gov

January 29, 2004

Community Development Services
Kittitas County
411 N. Ruby, Suite 2
Ellensburg, Washington 98926-6300

Attention: Clay White, Planner II

Subject: Z-2003-01; enXco, Inc. – Desert Claim Wind Power, LLC
Wind Project – Reecer Creek Area
I-90, Exit 106 (US 97/West Ellensburg interchange) vicinity
US 97, MP 133.90-142.08 (I-90 to Smithson Road) greater vicinity
MP 134.16 (Dolarway Road/Cascade Way Extension) intersection
MP 142.08 (Smithson Road) intersection

We have reviewed the proposed project and have the following comments.

1. The project sites are not adjacent to any WSDOT-maintained roads, but U.S. Highway 97 and Interstate 90 will be used for access and delivery. I-90 is a rural interstate with a posted speed limit of 70 miles per hour.

   US 97 is an Urban - Principal Arterial in the vicinity of the I-90 ramps and the Dolarway Road/Cascade Way Extension intersection, and is a fully-controlled limited access facility. North of the intersection area, US 97 is a Rural – Principal Arterial. Access to US 97 from the sites is proposed via existing public road intersections. 2-1 GT-1

2. All loads transported on WSDOT rights-of-way must be within the legal size and load limits, or have a valid oversize and/or overweight permit. 2-2 GT-1

3. The applicant indicates the eastbound transport route would be from I-90 to US 97 via Exit 106. Presumably, the State Highway 970 from Cle Elum (I-90 Exit 85) to the junction of US 97, which would be a shorter route, will not be used as a transport route. If this is not the case, we request that it be included in the EIS and additional analysis be done. 2-3 GT-2

4. The proponent indicates that the transport of the turbine components may use either truck or rail. The proponent is advised that there is an overheight restriction on eastbound I-90 at Exit 62. All loads over the legal height (14'0") are required to exit at the eastbound ramp and reenter the interstate via the eastbound on ramp. 2-4 GT-1

5. The applicant proposes mitigating their construction traffic impacts by developing a Construction Traffic Management Plan. WSDOT will review and comment on this plan as it pertains to our highways. 2-5 GT-3

6. The applicant indicates that a number of turbine viewing sites could be developed. A Tourism Management Plan would be developed to identify how tourists viewing turbine sites would be accommodated. WSDOT will review and comment on this proposed plan if it affects our facilities. 2-6 GT-3

7. WSDOT has a number of projects that may impact the transport and/or operations of the proposed project:
   a) US 97: State Highway 10 to State Highway 970 (milepost 137.36 to 149.69). Pavement restoration project. Project awarded. Scheduled to begin in early spring of 2004, and be completed by summer 2004.
   b) US 97: Lower Green Canyon Road vicinity to Smithson Road vicinity (milepost 137.80 to 142.30). Guardrail update project. Scheduled ad date October 2004.
   c) I-90: Homestead Valley to Tinkham Road (milepost 37.00 to 45.00). Pavement replacement project. Scheduled ad date: April 2004. 2-7 GT-1
   d) I-90: Gold Creek to Easton Hill (milepost 55.51 to 67.32). Pavement restoration project. Scheduled ad date: February 2004.
   e) I-90: Yakima River bridge (milepost 78.81 to 78.85). Deck repair project. Scheduled ad date: January 2006.
   f) SR 970: Cle Elum to Teanaway River (milepost 0.00 to 5.85). Pavement restoration project. Scheduled ad date: April 2004.

8. In Section 3.12.2.1 "Construction Impacts" (page 3-238), the sentence reading, "The first route would require a left turn from Cascade Way Extension onto SR 97." Actually, this left turn is all US 97. At the intersection, the west and north legs are US 97, the east leg is Cascade Way Extension, and the south leg is Dolarway Road. 2-8 GT-1

Thank you for the opportunity to review and comment on this proposed project. If you have any questions regarding our comments, please contact Rick Holmstrom at (509) 577-1633.

Sincerely,

Salah Al-Tamimi, P.E.
Regional Planning Engineer

SA: rh/jjg
cc: File #8, US 97
Rick Gifford, Traffic Engineer
Terry Kukes, South Central Area 1 Maintenance Supervisor
John Schloss, North Central Region

KITTITAS COUNTY
DEPARTMENT OF PUBLIC WORKS
Paul D. Bennett, P.E., Director

30 January 2004

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KITTITAS COUNTY
CDS

Mr. Clay White
Kittitas County SEPA Responsible Official
411 N.Ruby Street Suite 1
Ellensburg, Washington
98926

RE: Comments for Desert Claim Wind Power

Dear Mr. White:

Thank you for this opportunity to submit DEIS comments on the Desert Claim Wind Power Project submitted by Desert Claim Wind Power L.L.C., a wholly owned subsidiary of enXco Inc. The intent of this letter is to address areas of the DEIS identify areas that need further review on behalf of the Kittitas County Department of Public Works and Bowers Field.

The DEIS has identified many of the areas that need to be explored. As the Kittitas County Public Works Director I would like to point out a few additional areas that need to be explored in theDEIS:

Air Transportation impact

The impacts to the VFR airspace seems to be excessive and seriously compromises the ability of the airport to operate in a safe and efficient manner. Please comment or clarify why the airspaces for CAT A&B have been so dramatically altered without any commentary. The impacts seem excessive and unbalanced. To restrict air traffic to the proposed airspace places an undue burden on the community from both a safety and noise imposition. 3-1 AT-1

The DEIS provides no justification for this impact. If there truly is an impact on 27 towers then have the DEIS confirm with the FAA as to what the minimum change in VFR airspace needs to be. If the airspace limitations could be significantly minimized (CAT D airspace moved south to the current CAT C northern boundary) then both the airport and the Wind Project could co-exist with a minimum of impact until such time that the CAT D traffic increases. The DEIS should specifically state that any reduction in airspace would be temporary and that at the end of the permitted time (30 years) that the towers are removed and the airspace is restored. A condition should be placed that if CAT D VFR traffic increases such that more than 50% of the traffic is diverted to the south then the offending towers shall be removed and the airspace reopened. 3-2 AT-2

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FAX (509) 962-7663

The DEIS is lacking on specifically addressing IFR operations. The "not be affected" statement is not supported by documentation. Specifically analyze approved IFR operations as well as IFR operations currently applied for and under review by the FAA. Address the impact and propose mitigation. 3-3 AT-3 Since we currently do not have a Wild Horse application before the county I am unable to verify that the FAA has approved that project and therefore the "No affect" for this project should apply is not acceptable. Please include all approvals or denials for this project and provide the details that would justify the claims of non-significance. 3-4 AT-4

The draft EIS discards the future instrument approaches to Ellensburg as hypothetical. The application for the approaches were submitted well before the Desert Claim application and should be evaluated as if they were approved and as if they were disapproved. 3-5 AT-3

I do not oppose the construction of the wind farms but feel all the issues have not been addressed to come to a reasonable determination. I think the DEIS is very close and with a limited amount of research and discussion with the FAA we can resolve these issues. 3-6 AT-5

Tower lighting issues still need to be resolved. If the lights are to be shielded, what do you hope to accomplish. The lighting needs to provide for safe aircraft operations and minimize the impact on the public. How would different shielding or light orientation minimize the impacts? 3-7 AT-6

Ground Transportation

A road to allow for fire control and emergency operations should be constructed to Uniform or International fire code standards subject to County, DNR, property owners and applicant approval. This construction of this road would greatly minimize the risk due to fire or other emergencies instead of requiring an 11-mile detour. This road would support immediate access for fire control during construction and subsequent maintenance and operations functions. This emergency access should be oriented west to east and connect Smithson Road and Wilson Creek Road at the intersection of Charlton road. 3-8 GT-4

A tourist Kiosk should be located along the SR97 corridor or along Smithson Road where the leased property abuts Smithson Road. The DEIS should identify the initial size and then require an increase based upon increased usage. O&M responsibilitieas are that of the applicant. 3-9 GT-5

Thank you for the opportunity to comment.

Sincerely,

Paul D. Bennett, P.E.
Director of Public Works

Kittitas County
Community Development Services

411 N. Ruby St., Suite 2, Ellensburg, WA 98926
Phone (509) 962-7506 • Fax (509) 962-7682

4
P.1

FROM THE CASCADES ... TO THE COLUMBIA
KITTITAS COUNTY

Date: January 29, 2004

To: Kittitas County

From; Derald Gaidos, Fire Marshal

RE: Comments on Desert Claim Wind Power Project

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KITTITAS COUNTY
CDS

After reviewing the information provided I have the following comments and requirements:

Planning Phase:

- All of the proposed project scenarios lie in a extreme high fire hazard area as shown by the number of fires in the area in past years. Two state mobilized fires have been on the south end of the proposed area within the past eight years. These are the only two state mobilized fire every to happen in Kittitas County. 4-1 HS-1
- FCC style communications study or appropriate study to ensure emergency responders communications shall not be derogated by the wind generators thus eliminating or reducing all communications on site by any emergency responders. 4-2 HS-5
- To have an environmental clean-up company under contract to provide the needed services to protect the environment up and beyond the small incidents. This is to include planning, implementing and storing of all material consider to be harmful. 4-3 HS-9
- Water supply for fire fighting at locations up and beyond the contracted fire districts shall be provided as part of the mitigation plan in an attempt to keep the fire in a manageable size incident. This can be mobile, above ground, underground or enhanced natural water supplies. 4-4 PSU-1

Construction Phase:

- Addressing of sites will be important to the ability of Emergency Services to provide services. All sites shall conform and be addressed according to Kittitas County Public Works Criteria prior to work starting on any stage of the project once approval is given. 4-5 PSU-2
- The sites may be outside of established Fire Districts and Hospital Districts thus not requiring emergency responses to sites. The proponents shall establish and have signed agreements in place to provide for emergency services, fire & EMS, with closest Fire/Hospital District or Department prior to work starting on any phase of the project once approval is given even if the sites are within fire district boundaries as to not impact taxpayers. Agreements will provide for Emergency Services for the workers and protect the adjourning property owners. 4-6 PSU-2
- All workers shall be given a fire prevention introduction prior to starting work on site that is approved by the Kittitas County Fire Marshal and Fire Chief of contracted Fire Department to reduce the chance of accidental fire starts and inform workers of severe dangers of wildfires. To include but not limited to: 4-7 PSU-2
    - Designated smoking areas.
    - Communications for emergency calls.

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Phone (509) 962-7506 • Fax (509) 962-7682

- Fire Extinguisher use.
- Hand tool use.
- Required fire extinguisher and hand tools per vehicle and or piece of equipment. 4-7 Cont. PSU-2
- Muffler and or spark arrestor requirement of every vehicle on site.
- Required shut downs due to industrial fire precautions.
- Hot work limitations and fire prevention procedures.

Operational Phase

- The proponent and or operators of this facility shall establish and have signed agreements in place to provide for emergency services, fire & EMS, with closest Fire/Hospital District or Department prior to work starting on operational phase of the project. Before power is generated agreements must be signed with appropriate agencies. Agreements will provide for Emergency Services for the workers and protect the adjourning property owners. This agreement must be in place for the term of the project and is to be looked at regular intervals (no more than three years) to assess incidents and prevention measures. 4-8 PSU-2
- Before operation of this project a long term plan for fire risk reduction must be approved with Kittitas County Fire Marshal and effected fire districts for all aspects of operations. 4-9 PSU-2
- Once a year the proponent and or operators of this facility shall provide emergency contact information to the appropriate agencies. 4-10 PSU-2

If any questions arise, please call.

Derald Gaidos
Fire Marshal
509-962-7000
derald@co.kittitas.wa.us

January,28 2004

Kittitas Audubon Society • P.O. Box 1443 • Ellensburg, WA 98926

To, Clay White
Kittitas County Planning Dept.
411 N Ruby Suite 2
Ellensburg, Wa. 98926

Dear Mr. White:

Kittitas Audubon Society [KAS], a chapter of the National Audubon Society, is an organization of 150+ members spread throughout all of Kittitas County.

The mission of Kittitas Audubon Society [KAS] is to develop an appreciation of nature through education and conservation, with a focus on birds.

Kittitas Audubon Society (KAS) supports renewable energy systems that are well planned and carefully installed. 5-1 SO-1

The relatively sudden emergence of wind power as a significant source of energy finds the public and those responsible for siting wind farms with little objective research information about potential impacts on wildlife. Moreover federal and state protections for non-game wildlife are focused on endangered species. This provides little protection for the vast majority of avian species that is of concern to KAS in the proposed wind farm site. 5-2 VB-1

Further, once a wind facility is installed, there appears to be no legal recourse to force changes to reduce mortality levels. Such is the situation at Altamont, CA where it is reported that as many as 50 Golden Eagles are reportedly killed annually without a single federal citation yet issued regarding what surely is a Take under provisions of the Bald and Golden Eagle Protection Act [16U.S.C. 668-668d]. KAS would like assurances through the DEIS that a similar situation will not occur in Kittitas County. 5-3 PA-12

To this end, KAS is writing to express concerns about deficiencies in the DEIS for the Desert Claim Wind Power Project

3.4.3.3 Impacts of the Alternatives
No Action Alternative
The paragraph of this section or any section that surmises other electric power generation will be required if this project is not built should be stricken from the document. Speculation on meeting the energy needs of the region should the DCWPP not be built is beyond the scope of 5-4 ALT-1

this DEIS. At the very least, if this paragraph remains, a statement should be made that national and regional energy conservation policies could eliminate the 'need' for the DCWPP. 5-4 Cont. ALT-1

3.4.1.1 Affected Environment

DEIS states the primary vegetation is Shrub-Steppe [53.4%]. This vegetation is in critical state of survival and major loss of it in this project will not be of a benefit to this habitat.
Historically the shrub-steppe environment that makes up the major habitat type on the DCWPP proposed site is considered to have little value. The historical 89.2% of the Columbia Basin Ecoregion occupied by this habitat type is now 32.1 % of the same region (O'Connor, G., Wieda, K., *Northwest Arid Lands, an Introduction to the Columbia Basin Shrub-Steppe,* Battelle Press, 2001, p.28). The DEIS references 1996 data which lists 55.7% of the Kittitas Valley shrub-steppe as intact though not pristine. 5-5 PA-17

This reduction of habitat has left many isolated and fringe areas that are written off as having little value to the larger landscape. Several shrub-steppe obligate bird species were found to occupy this region during the breeding season suggesting that the fringe habitat is of value to them.

The most fragile of the shrub-steppe zones, the lithosols, generally occur near the top of the ridges and, therefore, will suffer destruction with the installation of the DCWPP. Little is known about the value of the lithosols, how they form or even their purpose in the greater scheme of things. This lack of knowledge also means that little is known about how to 're-grow' them. Since the lithosols often occupy the same ridgelines along which raptors soar the offset from the tops of ridges could also protect the lithosols. In addition, the plant communities in the lithosols tend to be the lowest growing of the shrub-steppe species. Raptors are prone to hunt in low growth areas where prey is the most visible. 5-6 PA-17

The DEIS specifies the intent to restore native habitat in areas disturbed by construction of the DCWPP. Shrub-steppe vegetation is very slow growing and allows invasive species such as cheat grass to easily become dominant in disturbed areas (O'Connor, G., Wieda, K., *Northwest Arid Lands, an Introduction to the Columbia Basin Shrub-Steppe,* Battelle Press, 2001, p. 27). The DEIS should specify the long-term protocol using methods such as supplementary water to help establish these plant communities and exclude the invasive species. 5-7 PA-5

Wildlife [Bird Kill]

DEIS states there is possibility of 220 Avian bird kill per year and that this loss is of no significance. KAS differs with this view as KAS feels any loss of Avian is a major significance. KAS feels this is true when the cumulative kill from all three Wind Farms will reach into the 720 per year range. 5-8 PA-14

The DEIS also fails to specify what action will be taken in the event a turbine proves to have an unacceptable impact on wildlife. Some corrective action should be taken – be it 5-9 PA-7 the temporary shut down or removal of the problematic turbine or specific counter measurers to direct birds away from the turbine. What constitutes an unacceptable impact should also be specified. 5-9 Cont. PA-7

Appendix C Exhibit 2
Baseline Avian Studies Report by WEST, Inc

Fig. 2 Bald Eagle Survey Routes Page 50
Fig. 3 Raptor Nests pg. 51
Fig. 8 Buteo flight & perch sites pg. 58
Fig. 9 Accipiter & Falcon flight & perches. pg. 59 5-10 PA-1
Fig.10 Other Raptors flights & perches pg. 60
Fig.12 Bald Eagle flight & perches pg. 62

All of these figures indicate the presence of Raptors, Eagles, Accipiters and Owls in the turbine blade sweep areas and most likely to have a greater kill rate than specified in the DEIS. KAS finds this data to be very disturbing and contrary to our Mission Statement. It is apparent that if the studies are correct, there shouldn't be any turbines sited in the study circles due to the potential Bald Eagle presence.

<u>Bald Eagles</u>
The DEIS specifies Bald Eagle cumulative fatalities are classified as small at perhaps 1 Bald Eagle every 2 – 3 years cumulative over all three proposed wind farms.

The Bald and Golden Eagle Protection Act [16U.S.C. 668-668d] makes unauthorized take of one Eagle a violation of the law. The USFW must authorize the Take level of Bald or Golden Eagles prior to issuing a permit. There is no mechanism for authorizing individual take 'after the fact'. The DEIS does not specify whether an Eagle take permit application has been filed. 5-11 PA-12

<u>Bats</u>
Wind turbines kill bats as well they dispatch birds. While there are fatalities associated with many of man's activities and structures, it would be unconscionable to add yet another one without a thorough study and understanding of a site's potential risk to this animal.

There is increasing concern about the emergence of bat kills associated with wind turbine installations. This concern has been heightened by release of information about bat mortality at a West Virginia 40-turbine wind farm installation where some 475-bat carcasses were recovered in a 7-month period from April 2003 to November 2003. When corrected for searcher efficiency and scavenger loss, the number could be several thousand. (*Windpower Monthly,* October 2003.) 5-12 PA-15

The DEIS specifies that no nocturnal studies of wildlife, including bats, were performed and that bat kill rates were estimated based on other wind farm kill data. No analysis was made of how the nearby-forested areas may impact the kill of bats normally associated with the forest habitat.

The latest avian casualty report by WEST for the Stateline wind farm shows a total of 142 bat fatalities from July 2001 through October 2003. The WEST report states that the majority of casualties are most likely migratory species rather than resident, and sites the preponderance of silver-haired and hoary bats among the casualties. Silver-haired and hoary bats are forest dwellers and migrate from north to south. The DCWPP site lies southeast of the beginning of a forested area that extends continually into the Wenatchee National Forest. Bat populations, including migratory, need to be assessed for the project site if we are to be even reasonably assured of no bad surprises.

5-12 Cont. PA-15

The lack of night time wildlife assessments is a reflection of the newness of this emerging technology, the difficulty and cost of doing the necessary research, and the unfortunate fact that people don't know much or think much about bats and aren't sufficiently tuned into them to provide needed protection. Radar technology (such as BIRDRAD, other modified marine radar or acoustical methods) does exist for nighttime bat studies including migratory species, but instruments detecting echolocation won't work if migrating bats, as suspected they do, turn off this sensory apparatus during migration flight when they aren't hunting for food.

3.7 Land and Shoreline Use
Sec's 3.7.1—3.7.1.1

ZONING
The change from Ag 20 and Forest and Range to Wind Energy Resource Overlay Zone will result in harm to the environment in the form of Bird kill and destruction of Shrub-Steppe habitat. Two of the most important issues of the KAS mission statement. If the zoning change is not allowed, the Wind Farms will not be built and the bird kill and habitat destruction will not happen.

5-13 LU-2

Summary
During the 20 December 2003 Christmas Bird Count (CBC) by KAS, 6 of the 11 Bald Eagles sighted were in northern portions of the count circle [Reecer Creek and Fairview areas]. This was during a foggy, cloudy, snow covered day for a period of approximately 7-hrs and substantiates the Exhibit 2 pg.62, fig.12 Bald Eagle flight survey. Similar breakdown of CBC data is available for the last 26 years from Dr. Phil Mattocks, Biology Department, Central Washington University.

5-14 PA-13

On 8 January, 2004 Kittitas Audubon members reported four Bald Eagles (1 adult, 3 immature) feeding on a deer carcass on US Hwy 97 0.1 mile south of the SR 970 interchange. This is very near the proposed KVWPP and DCWPP on the side away from the river where the DEIS claims the Bald Eagles roost. These birds were observed at this location for more than one day. It is unknown whether they roosted near the roadkill or returned to the normal riparian roosts and thus passed through the KVWPP and DCWPP proposed area multiple times. 5-14 Cont. PA-13

KAS is concerned that wind energy facilities can adversely impact wildlife, especially birds and bats. As more facilities with larger turbines are built, the cumulative effects of this rapidly growing industry may initiate or contribute to the decline of some wildlife populations. ~~The potential harm to these populations from an additional~~ source of mortality or adverse habitat impacts makes careful evaluation of proposed facilities essential. Due to local differences in wildlife concentration and movement patterns, habitats, area topography, facility design, and weather, each proposed development site is unique ~~and requires detailed, individual evaluation.~~ 5-15 PA-1

KAS urges that all possible and reasonable steps be taken based on scientifically competent wildlife studies to ensure that the site is safe for wildlife. KAS feels that the individual evaluations and wildlife studies that have been done for this Wind Power Project do not assure KAS that Eagle, Bird and Bat kill and habitat destruction will not be excessive. Therefore Kittitas Audubon Society recommends the [NO ACTION ALTERNATIVE] for this DEIS. 5-16 SO-2

Thank you for the opportunity to provide comments to the Dec. 2003 DCWWP DEIS.

Sincerely,

Keith Johnson

Keith Johnson
President
Kittitas Audubon Society

1/29/2004
Kittitas County Airport Advisory Committee
Shan Rowbotham Chairman
5461 Look Rd
Ellensburg, WA 98926

RECEIVED

JAN 29 2004

KITTITAS COUNTY
CDS

Kittitas County Community Development Services
411 N Ruby, Suite 2
Ellensburg, WA 98926

Dear Sir,

The Airport Advisory Committee reviewed the Draft EIS for the Desert Claim Wind Power Project at our January 13, 2004 meeting, and during subsequent study sessions. Our committee specifically evaluated the sections concerning air transportation. Our conclusion is that the sections of the Draft EIS regarding impacts on air transportation are incomplete, contain inaccuracies, inappropriate assumptions, and therefore unacceptable. The following are examples of incomplete or erroneous information contained in the EIS; 6-1 EIS-1

1. No consideration is given to aircraft operating in the Kittitas Valley for any other purpose than arriving or departing Ellensburg Airport, operating in the traffic pattern, or executing instrument approaches. Agricultural aircraft and helicopter traffic, operating at altitudes at or below the levels of the proposed towers, are ignored in the EIS. In addition, the Central Washington University Flight program operating at the Ellensburg Airport results in one of the busiest flight training environments in the Northwest. These aircraft use designated practice areas to practice maneuvers. Some of these maneuvers are required to be performed at altitudes below 1,000 feet above the ground. The proposed towers would decrease the area of existing practice areas, effect minimum safe altitudes, and decrease margins of safety in the event of engine failures. 6-2 AT-7

2. Operations on each of the four available runways are stated as a percent of total operations. The statement is made that "Over the year it appears that approximately 60% of all Bowers Field aircraft operations occur on Runway 29." After further discussion regarding the remaining three runways, it is stated; "runway 25 which provides a westerly orientation for takeoffs and landings, is the most frequently used of these three runways." The actual percentage of total operations conducted on Runway 25 is probably less than 2%, not 20-30% as estimated, and the percentage of operations conducted on Runway 7 is very likely 40% or greater, a huge disparity form the estimate of the EIS of 5 to 10%. Since the "supposed" lack of traffic using Runways 7 and 11, is continually used as evidence of minimal impact of the project, this error alone invalidates the EIS. 6-3 AT-7

3. The Draft EIS claims that the only aircraft affected would be Category D aircraft, operating under Visual Flight Rules. One of the possible alternatives proposed to mitigate this issue, is to change the direction of aircraft operating in the traffic pattern from standard left traffic, to right traffic. The Airport Advisory Committee and Kittitas County in the last 5 years have worked to; adopt an Airport Overlay Zone, including evaluating noise levels, improve airport safety and security, plan future runway improvements, and air traffic impacts on residential properties. A major change in those dynamics would cause a subsequent major effort to modify all of the above. Specifically, changing to right traffic would limit pattern entry procedures and reduce safety in an environment where training is continuous. 6-4 AT-2

4. The Draft EIS claims that IFR operations to, from, and at the Ellensburg Airport would not be affected. That statement could only be supported if the FAA had performed an Obstacle Evaluation. As of January 15, 2004, the FAA had not received a request for the Desert Claim project. (Mr. Jim Lambert, ANM-520) Furthermore, Mr. Lambert stated that the Wild Horse wind power project did not receive FAA approval as proposed, due to interference with IFR traffic. Although the Wild Horse project is a separate project, it's supposed "acceptance" is used throughout the EIS to justify claims of non-significance of the Desert Claim project, both individually and cumulatively. 6-5 AT-3 6-6 AT-4

5. Consideration of existing instrument approaches at the Ellensburg Airport does not account for circle-to-land maneuvering to all runways. Contrary to the EIS, all aircraft are not expected or required to remain South or East of the airport, and would probably conflict with the project towers as proposed. Again, this is a determination that only the FAA may make. 6-7 AT-3

6. The Draft EIS calls future instrument approaches to Ellensburg "hypothetical", and hypothesizes that "any potential future procedure would likely involve an approach to Runway 7 from the west." Further, the conclusion is made that "the proposed wind turbines would not exceed the TERPS standards and there would not be a potential impact on protected airspace that might be associated with hypothetical future instrument approach procedures. There are instrument approaches being designed by the FAA at this time to each of the four runways at Ellensburg. It is not prudent to limit the options for access to the Ellensburg Airport, by allowing the placement of large obstacles in close proximity to approach corridors. 6-8 AT-3

In closing, the Advisory Committee has worked to preserve an irreplaceable piece of infrastructure through lower density zoning and trying to be a "good neighbor". It would be unfortunate to diminish any part of the operational capability of the airport for the sake of wind turbines whose location may not be compatible with operations on and around Bowers Field. 6-9 AT-7

Sincerely,

Shan Rowbotham

Shan Rowbotham
Chairman Airport Advisory Committee

Cc: Board of Kittitas County Commissioners
Kittitas County Director of Public Works

McCULLOUGH HILL FIKSO KRETSCHMER SMITH

A Professional Service Corporation

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P.1

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206-448-1818
206-727-2391 direct
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jack@mhfks.com

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JAN 30 2004

KITTITAS COUNTY
CDS

January 30, 2004

By Facsimile (509-962-7697)

Clay White
Kittitas County Community Development
Services Dept.
411 N. Ruby, Suite 2
Ellensburg, Washington 98926

Re: Desert Claim Wind Power LLC
Wind Resource Development Permit No. Z-2003-01

Dear Mr. White:

We are writing on behalf of Development Services of America, Inc. ("DSA"), the owner of a large parcel of property that adjoins the proposed location of the Desert Claim Wind Power project (the "Project"). DSA's property is located south of the Project, near the intersection of Smithson and Howard Roads.

We have reviewed the Draft Environmental Impact Statement (DEIS) issued on December 15, 2003, and we believe it adequately addresses the probable significant environmental impacts of the Project. We remain concerned, however, about potential impacts on nearby property values. 7-1 EIS-1

The Huckell/Weinman Study commissioned by the County indicates that established wind farms in other areas do not tend to have negative impacts on area property values. This study is encouraging, but we urge Kittitas County to closely monitor this issue, and to impose appropriate permit conditions necessary to mitigate visual impacts on neighboring properties. 7-2 NS-1

Thank you for your attention to these comments, and please continue to keep us apprised of all permit-related activities.

Very truly yours,

Courtney E. Flora

cc. Development Services of America, Inc.

G:\DEVSERV\669.002\CORR\YakimaWind02.doc

At the Crossroads of Washington State

PHOENIXGROUP
ECONOMIC DEVELOPMENT

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

January 30, 2004

Mr. Clay White
Kittitas County Community Development Services
411 North Ruby, Ste 2
Ellensburg, WA 98926

Dear Clay:

The attached spreadsheets provide additional information for the draft environmental impact statement that was prepared for the Desert Claim Wind Power Project proposed by Enxco related to the tax impacts. As shown, some new tax revenue is generated and taxes are lowered for all taxpayers in the county.

The spreadsheets were prepared based on information obtained through the Kittitas County Assessor's office. The Economic Development Group of Kittitas County developed the spreadsheet. As noted in the DEIS, I-747 limited tax revenue in a district to a 1% increase per year but exempted new construction from this limitation. Therefore new construction revenue only produces new tax revenue. Based on capital investment information reported in the DEIS, this project will generate an estimated $189,048 of new tax revenue in year 1. 8-1 FIS-1

The construction of this $100 million project would result in a new tax rate that is lower for all taxing districts. The sheet labeled example shows the savings expected in three Tax Code Areas. As you can see substantial savings occur in the Tax Code Areas where the project is located but savings do occur in other districts. Lower property taxes would benefit all taxpayers in the community.

Sincerely,

Debbie Strand

Debbie Strand, CEcD
Executive Director

PO Box 598 Ellensburg, WA 98926-0598 (509) 962-7244 Fax (509) 962-7141 ebdainc@kvalley.com

Desert Claim Wind Power

Approximate value of project	$100,000,000	20% real property and 80% personal property
Net Revenue	$1,642,574	

20% of project in Tax Code Area 19
80% of project in Tax Code Area 22

District	Levy rate/1000	Assessed value	Project value in district	New assessed value	2003 Revenue	2003 Rev +1%	New construction	New construction revenue	New tax limit	New rate*
County CE	$1.3406	$2,529,668,941	$100,000,000	$2,629,668,941	$3,391,274	$3,425,187	$20,000,000	$26,812	$3,451,999	$1.3127
State School	$2.8847	$2,510,795,792	$100,000,000	$2,610,795,792	$7,242,883	$7,315,322	$20,000,000	$57,694	$7,373,016	$2.8240
Road #1	$1.6310	$1,639,798,093	$100,000,000	$1,739,798,093	$2,674,507	$2,701,253	$20,000,000	$32,620	$2,733,873	$1.5714
Hospital #1	$0.0029	$1,649,685,591	$100,000,000	$1,749,685,591	$4,784	$4,832	$20,000,000	$58	$4,890	$0.0028
School 401 - Ellensburg	$2.4368	$1,126,298,453	$100,000,000	$1,226,298,453	$2,744,564	$2,772,010	$20,000,000	$48,736	$2,820,746	$2.3002
Fire #2 (22 only)	$1.4455	$623,017,007	$80,000,000	$703,017,007	$900,571	$909,577	$16,000,000	$23,128	$932,705	$1.3267
					$16,958,593	$17,128,179		$189,048		

* New tax limit/(New assessed value/1000)

Bonds	Levy rate/1000	Assessed value	Project value in district	Yrly payment	New assessed value	New rate*	Yrly payment
Hospital #1	$0.4420	$1,632,096,771	$100,000,000	$721,287.00	$1,732,096,771	$0.4164	$721,287
School 401 - Ellensburg	$1.6562	$1,126,298,453	$80,000,000	$1,865,375.50	$1,276,298,453	$1.4616	$1,865,376

* Yearly payment/(New assessed value/1000)

Estimated Taxes				Area 19 Levy Rates			Area 22 Levy Rates		
District	Levy rate/1000	Project value in district	Taxes	Old levy rate	New levy rate	Change	Old levy rate	New levy rate	Change
County CE	$1.3127	$150,000,000	$196,908.85	$1.3406	$1.3127	$0.0279	$1.3406	$1.3127	$0.0279
State School	$2.8240	$150,000,000	$423,607.37	$2.8847	$2.8240	$0.0607	$2.8847	$2.8240	$0.0607
Road #1	$1.5714	$150,000,000	$235,706.29	$1.6310	$1.5714	$0.0596	$1.6310	$1.5714	$0.0596
Hospital #1	$0.0028	$150,000,000	$419.21	$0.0029	$0.0028	$0.0001	$0.0029	$0.0028	$0.0001
School 401 - Ellensburg	$2.3002	$150,000,000	$345,031.71	$2.4368	$2.3002	$0.1366	$2.4368	$2.3002	$0.1366
Fire #2	$1.3267	$120,000,000	$159,206.07				$1.4455	$1.3267	$0.1188
Hospital #1	$0.4164	$150,000,000	$62,463.63	$0.4420	$0.4164	$0.0256	$0.4420	$0.4164	$0.0256
School 401 - Ellensburg	$1.4616	$150,000,000	$219,232.68	$1.6562	$1.4616	$0.1946	$1.6562	$1.4616	$0.1946
Total Taxes			$1,642,573.81	$10.3942	$9.8891	$0.5051	$11.8397	$11.2158	$0.6239

Assumptions

80% of project in Tax Code Area 22 and 20% of project in Tax Code Area 19
Using levy rates for 2003
All districts taking maximum 1% increase
TAV (Timber Assessed Value) not included
Bond Payments for 2004 will be same as 2003
20% of project real property and 80% personal property
New construction is real property only
Entire value of project added into new assessed valuation

EXAMPLE

The following shows examples of savings in the three districts if the Desert Claim Project is built. Note that the project is located only in Tax Code Area 19 and 22. You'll further note that the rates are lowered substantially in the districts where is project is located, however there will be a savings in Tax Code District 12 which is outside the project area.

$100,000 House in Tax Code Area 19 - Ellensburg School District

	Old levy Rate	Tax at old rate	New levy Rate	Tax at new rate	Savings
County CE	$1.3406	$134.06	$1.2932	$129.32	$4.74
State School	$2.8847	$288.47	$2.7818	$278.18	$10.29
Road #1	$1.6310	$163.10	$1.5366	$153.66	$9.44
Hospital #1	$0.0029	$0.29	$0.0027	$0.27	$0.02
School 401 - Ellensburg	$2.4368	$243.68	$2.2292	$222.92	$20.76
(Bonds)					
Hospital #1	$0.4420	$44.20	$0.4047	$40.47	$3.73
School 401 - Ellensburg	$1.6562	$165.62	$1.4616	$146.16	$19.46
Totals	**$10.3942**	**$1,039.42**	**$9.7098**	**$970.98**	**$68.44**

$100,000 House in Tax Code Area 22 - Ellensburg School District

	Old levy Rate	Tax at old rate	New levy Rate	Tax at new rate	Savings
County CE	$1.3406	$134.06	$1.2932	$129.32	$4.74
State School	$2.8847	$288.47	$2.7818	$278.18	$10.29
Road #1	$1.6310	$163.10	$1.5366	$153.66	$9.44
Hospital #1	$0.0029	$0.29	$0.0027	$0.27	$0.02
School 401 - Ellensburg	$2.4368	$243.68	$2.2292	$222.92	$20.76
Fire #2	$1.4455	$144.55	$1.2709	$127.09	$17.46
(Bonds)					
Hospital #1	$0.4420	$44.20	$0.4047	$40.47	$3.73
School 401 - Ellensburg	$1.6562	$165.62	$1.4616	$146.16	$19.46
Totals	**$11.8397**	**$1,183.97**	**$10.9807**	**$1,098.07**	**$85.90**

$100,000 House in Tax Code Area 12 - Thorp School District

	Old levy Rate	Tax at old rate	New levy Rate	Tax at new rate	Savings
County CE	$1.3406	$134.06	$1.2932	$129.32	$4.74
State School	$2.8847	$288.47	$2.7818	$278.18	$10.29
Road #1	$1.6310	$163.10	$1.5366	$153.66	$9.44
Hospital #1	$0.0029	$0.29	$0.0027	$0.27	$0.02
School 400 - Thorp	$2.7537	$275.37	$2.7537	$275.37	$0.00
Fire #1	$0.8444	$84.44	$0.8444	$84.44	$0.00
(Bonds)					
Hospital #1	$0.4420	$44.20	$0.4047	$40.47	$3.73
Fire #1	$0.1934	$19.34	$0.1934	$19.34	$0.00
School 400 - Thorp	$1.2113	$121.13	$1.2113	$121.13	$0.00
Totals	**$11.3040**	**$1,130.40**	**$11.0218**	**$1,102.18**	**$28.22**

9
P.1

Renewable Northwest Project

917 SW Oak
Suite 303
Portland, OR 97205

Phone
503.223.4544
Fax
503.223.4554
www.RNP.org

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

Renewable Northwest Project

January 30, 2004

Clay White, Planner II
Kittitas County Community Development Services
411 N. Ruby, Suite 2
Ellensburg, WA 98926

Re: Comments on Desert Claim Wind Power Project DEIS

Dear Mr. White,

The Renewable Northwest Project (RNP) appreciates the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the proposed 180 MW Desert Claim Wind Power Project.

RNP is a unique combination of renewable energy companies, environmental organizations and consumer groups. RNP is an advocate for clean air and global climate change solutions through the implementation of solar, wind and geothermal resources in the Northwest.

Overall, we believe the DEIS examines the potential impacts of the proposed project and the mitigation measures. We are pleased to find that the potential impacts identified can be appropriately mitigated. We commend Kittitas County for putting together a comprehensive document that addresses all concerns. 9-1 EIS-1

We have two general comments—one is on the no action alternative and the other is on the economic development benefits.

No action alternative

Rural residential development is identified as the most plausible no action alternative. We believe that the impact of housing development should be assessed and included in the DEIS. For example, the DEIS should assess the impact of housing development on the rural nature of the area. We believe that more housing development will degrade the existing rural nature of the area, whereas wind projects, on the other hand, will help maintain the current agriculture use of the area. 9-2 ALT-1

Another no action alternative that should be mentioned is the development of a fossil fuel plant for electricity generation. The development of fossil fuels to 9-3 ALT-1 meet the region's future load growth is a possible no action alternative and we think the DEIS should assess this no action alternative and the significant adverse impacts. As we mentioned in our scoping comments, the burning of fossil fuels has adversely impacted the environment, human health and economy. 9-3 Cont. ALT-1

In comparison to developing a new gas-fired plant, developing a 180 MW wind power project, operating at 33% capacity factor would avoid at least 227,000 tons of CO2 a year and 22 tons of acid rain precursors a year. In terms of global climate change impacts, this is the equivalent of planting over 75,900 acres of trees.

Economic development benefits

We are pleased to see that the DEIS captures the potential economic development benefits to Kittitas County. As the DEIS indicates, property taxes are estimated at $1.1 million for the first year, and the revenues would be used to fund school districts, state schools, and other county services. 9-4 FIS-1 The DEIS should also assess the impact of the no action alternative—housing development. In comparison to the development of a fossil fuel plant, a wind project would still bring significantly more economic benefits to a county because it has higher capital costs. 9-5 FIS-3

As the County moves forward on the proposed project, we hope that it will bear in mind the many benefits of a pollution-free new renewable resource, such as wind. 9-6 SO-3

Thank you for considering our comments.

Sincerely,

Sonja Ling
Policy Associate

Clay White

From:	Ed Garrett [garrett_ew@netos.com]
Sent:	Friday, January 23, 2004 3:41 PM
To:	mjohnston@kvnews.com; Clay White
Cc:	rmonaghan@icos.com
Subject:	enXco incident

Hi Mike,

In the DEIS for enXco, they still downplay the fire hazard issue. Chris Taylor still repeats the montra that no one has ever died because of a windfarm. 10-1 HS-1

Let's see how enXco can explain this and keep it out of the DEIS.

Best Regards,

Ed Garrett
ROKT

JAN 23 2004

****
>November 18, 2003
>
>by Paul Gipe
>
>Burn Fatality at Enxco's Altamont Site
>
>On September 19 at 7:30 pm Marty Evans died of burns received the previous
>day at a wind farm managed by Enxco says California's Division of
>Occupational Safety and Health (CalOSHA). Evans (34) was "performing a
>switching operation when an explosion occurred" at about 11:00 am on the
>18th. The explosion burned Evans over 80 percent of his body and started a
>grass fire. The East Contra Costa Fired Department responded. CalOSHA has
>opened an investigation of the accident and will exam Evans training,
>qualifications, and work assignment as well as interview his colleagues to
>determine the cause of the accident. No other details are available.
>
>Enxco says the accident occurred when Evans was switching a pad-mounted
>transformer. There are literally thousands of such transformers on
>California wind farms and switching them is a common activity.
>
>Enxco is a large diversified developer and operator of wind power plants.
>The company is part of SIIF, the unregulated subsidiary of French
>utility giant Electricite de France.
>
> -End-
>Paul Gipe
>208 S. Green St., #5
>Tehachapi CA 93561-1741 USA
>+661 822 9150
>+661 822 8452 fax
>pgipe@igc.org
>www.wind-works.org

Loran & Judy Allen
19480 Reecer Creek Rd.
Ellensburg, WA 98926

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JAN 3 0 2004
KITTITAS COUNTY
CDS

TO: Kittitas County Community Development Services
ATTN: Clay White

Enclosed are our comments concerning the Desert Claim Windpower Project Draft EIS.

Vol. 1 p.2-35 When constructing the turbine foundations, will Desert Claim be blasting with dynamite? Being extremely rocky in some areas, can heavy equipment such as a backhoe dig deep enough without blasting? What type of safety precautions are in place if blasting is necessary? 11-1 PD-1

What if our domestic water wells become contaminated or run dry due to construction of the wind farm? How will landowners be compensated? We did not see any information on these issues being addressed. 11-2 WR-2

Vol. 1 p.3-95 Impacts to Big Game from Construction and Operation More study needs to be done on Big Game habitat. This project will definitely have an impact on Big Game(such as deer and elk) in the area as they become displaced. There is very little information in the EIS about elk that live in and migrate through the area. We frequently see them from our place. Desert Claim claims once the project is completed, displaced deer will return. We disagree. What about the elk? If these animals are too pressured, they will leave the area for good. On p.3-96, comparing this wind farm to an oil well drilling operation in 1996 is not adequate. It is hard to believe that deer and elk would willingly return to an area with 393ft. turbines, whirling blades, and blinking lights. 11-3 PA-9

While on the subject of wildlife in the area, just last week we had 3 golden eagles perched in the cottonwood tree on our property. It is common to see these great birds this time of year. Do you really think they will come back once these giant windmills are installed? They come here because nothing bothers them out here. It is hard to imagine them feeling as secure once the wind turbines are up and running. We feel very privileged to view these wild animals in their natural environment out here throughout the year - that's part of the reason we chose to live here. Once the wildlife is disturbed or displaced by these wind farms, there is no guarantee they will ever return. 11-4 PA-12

In the EIS we haven't read any information concerning the impact of the wind turbines regarding our T.V. and radio reception. We do not have cable out here nor do we have a satellite dish. We rely on our antenna for T.V. and radio reception. We presently have good reception. What if the wind turbines affect our reception? How is Desert Claim going to resolve it? 11-5 HS-5

Loran & Judy Allen
19480 Reecer Creek Rd.
Ellensburg, WA 98926

Regarding the possibility of wildfires in our area, if a fire 11-6
breaks out in the wind farm area, aren't the rotating blades HS-1
just going to fan the flames harder and make a fire spread
faster and be harder to bring under control? Would planes or
helicopters be able(or be permitted)safely to swoop in with
fire retardant or water to douse the flames in a wind turbine
area? A couple of years ago there was a fire just a few miles
down the road from us during a hot, dry summer. It started
near Pheasant Lane road and spread extremely fast with the wind
blowing it toward Sun East. Without the hard work of the fire- 11-7
fighters along with aircraft assistance, it could have easily PSU-2
reached homes nearby. A few years before that, another fire
started near hwy 97 west of us and quickly headed in our direc-
tion. This was a large fire and difficult to put out due to
dry conditions. Without aircraft assistance, they would not
have been able to get it under control before it could have
reached our homes. We haven't seen any specific information
in the EIS on this issue.

Vol. 1 p.1-35 under Land and Shoreline Use, Desert Claim states
that residents in the proposed wind farm area might seek to
relocate if the wind farm conflicted with their lifestyles.
We find this statement offensive, with no regard for the time,
money, and labor that residents have invested in their homes 11-8
and property, not to mention the personal enjoyment landowners LU-3
have in choosing to live here. Such as, beautiful views, peace
and quiet, wildlife viewing, and recreational enjoyment. So
you are saying if we don't want our present lifestyles disrupted
by wind turbines just get out?! We don't think so.
If we are forced to live amongst, and have to drive by, these
towering monoliths on our way to and from work each day, the
very least Desert Claim can do is compensate the landowners in 11-9
the form of a yearly monetary compensation for having to put LU-4
up with them. Why not? The landowners that are allowing them
to be placed on their land will be compensated quite well, the
same should apply to the residents forced to live with them.
We urge all the County officials who are involved in reviewing
the EIS to seriously "read between the lines" concerning envi-
ronmental impacts that the EIS is trying to downplay. This 11-10
project will have a huge impact on our beautiful valley. VB-2
Unfortunately it's all about money. We're not fooled into be-
lieving that they really care that much about the environment
or the people who reside in the area. These giant windmills
will have a significant negative impact on the environment and 11-11
the people who live in this area. Wind farms will change the VB-3
area forever. Once it has begun, there will be no turning back.

Thank you for reading our comments.

Note:
We felt that the draft EIS
should have been mailed to all
landowners near the site, free 11-12 EIS-13
of charge. The disk is very time consuming
and inefficient to use in reviewing the documents.

sincerely,

Loran & Judy Allen

12
P.1

Clay White

From: lee bates [bateslee@eburg.com]
Sent: Saturday, January 17, 2004 3:15 PM
To: Clay White
Subject: Desert Claim DEIS Comments

Dwight Lee Bates

1509 Brick Road

Ellensburg WA

98926

(509) 925-5055

bateslee@elltel.net

JAN 1 7 2004

December 23, 2003

Clay White

Planner II

411 N. Ruby St.

Suite 2

Ellensburg WA 98926

Dear Mr. White,

This letter contains my comments on the Desert Claim DEIS.

12
P.2

Bird Kills

The summary of projected mortality of birds (pages 4-6, 4-7) shows the research for this DEIS is incomplete. Studying other studies and giving estimates does not substitute for doing an actual two year study of the turbine sites near Ellensburg. The species listed (pages 4-6, 4-7) offers a reason for a thorough study. 12-1 PA-1

Bird Kill Mitigation

No mitigation methods were given (pages 4-6, 4-7).

The real problem is the 20 RPM blades cause bird kills. The estimated number of kills in Altamont Pass, California is 44,000 birds in 20 years. The only mitigation is to not build turbines period. 12-2 PA-6

Study on Bird Kills

The mortality rates (pages 4-6, 4-7) are not good enough! A two year study is needed before even writing this Draft Environmental Impact Statement (DEIS). We should halt this process until the two year study is done. Pages 4-6 and 4-7 show a complete two year study needs to be done. 12-3 PA-1

Bird and Bat Kills

The estimated 740 kills of Passerine birds (page 4-6), 15 raptor kills per year (page 4-7) and the estimated 782 kills of bats (page 4-7) are unacceptable for the minor amount of 12-4 PA-14 electricity generated by these bird and bat killing turbines. 12-4 Cont. PA-14

Fire

No fire mitigations (page 4-12) are given. Fires fanned by the wind have occurred in the area in the past. I live down wind and do not want to lose my house like happened in the California fires. A Quick Response Plan by the Department of Natural Resources is needed. It goes without saying that a Fire Prevention and Suppression Plan is needed. Without this Plan which should have been submitted in the DEIS, this process should not proceed further! 12-5 HS-1

Page 2

Visual Impact of Turbines

The DEIS states (page 4-17) people would likely experience repetitive views of numbers of wind turbines through their local travels. People might perceive a substantial change to the overall character of the Kittitas Valley landscape with the development of multiple wind farms. This is true! The 410 foot high turbines (Figure 2-2 in the Sagebrush Power DEIS) are too high. They will impact the scenic view I have out my front windows. I retired here for the scenic views of the valley. I do not want to look out my windows and see these 410 foot monstrosities with flashing lights all hours of the day. 12-6 ALG-1

Highway 97 (page 4-14) a Scenic Byway is surrounded by these 410 foot monstrosities. These turbines should not be located anywhere near Highway 97. Wind farms are not scenic. Do not give me it is in the eye of the beholder crap! 12-7 ALG-1

They may interesting at first but this soon fades. I have seen wind farms at Stateline, Tehachapi and Palm Springs so I know what I am talking about. 12-7 Cont. ALG-1

The simulated views of turbines (pages 4-15, 4-16) are ugly. I do not want to see 410 foot monstrosities out in the country where I drive to relax! You people have no right to destroy a scenic valley I retired to for the scenery. The only reason you want to destroy the scenery with ugly turbines is your greed for the Federal Subsidies. Painting the turbines gray will not help. I do not want to see any turbines at all. 12-8 ALG-1

Shadow Flicker

The DEIS (page 4-13) states that some residents 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 12-9 HS-7

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 projects. This is not true! There will be definite shadow flicker problems.

People living near these monstrosities report health problems which should be studied at these turbine sites. People living near the Lincoln Township Wisconsin Wind Farm stated in a survey (

available upon request or call Dale Massey, Lincoln Township Clerk on 920-837-7298 for a copy) that shadow flicker causes a strobe effect throughout their houses causing headaches and sick to stomach cases. Also this shadow flicker lowers property values. Where is the study in this DEIS on the effect these turbines have on lowering property values? Where is the shadow flicker mitigation in this DEIS? 12-9 Cont. HS-7 12-10 HS-8

Blade Throw

The DEIS states (4-12) that blade throw would have remote probabilities of occurrence. This is not true! Blades and ice could be thrown 1000 feet in a high wind. To ensure safety a 2000 foot set back from residents and roads is needed. No listed measures to reduce blade throw (page 4-12) are given. What report can the public see to ensure inspections take place on a regular basis? Why is not a maintenance plan included in this DEIS? No mitigation for blade throw is given. Why not? 12-11 HS-2 12-12 HS-4

Page 4

Ice Throw

The DEIS states (4-12) that ice throw would have remote probabilities of occurrence. This is not true! 12-13 HS-3

A mitigation measure (page 4-12) to locate these monstrosity turbines 2000 feet from residences should be added to ensure safety. Who monitors sensors to make sure the system shuts down in icing conditions? What about a set back from public roads (page 4-12) to ensure it is safe enough to prevent a 12-14 HS-4 passer by on the road from getting hurt. A 2000 foot set back is needed to ensure safety. A major injury law suit could shut down the project. 12-14 Cont. HS-4

Tax Savings

As stated in the DEIS, the tax savings for this project (page 4-26) is one percent per year due to the Initiative 747 cap. The impact on the environment and the small amount of power generated by these monstrosity turbines is not worth a one percent tax reduction promised in the DEIS (page 4-26). Does not the writer know the impact of these monstrosities in the Kittitas Valley for years to come? 12-15 VB-3

Impact on Historical Culture

The DEIS states (page 4-10) the direct and indirect effects of each project on cultural resources are not known with precision.

No information was given on the impact of this project on Historical Culture. Stating it is unlikely that the combined effects of the project would represent a significant cumulative impact on the cultural resources of the region (page 4-10) is ludicrous! There was plenty of time to study this. This DEIS is insufficient, incomplete and lacking data. It should be redone. The respect for 12-16 CR-2

the Yakama Tribe is lacking. The tribe's culture depends upon preserving Historical Sites. A Supplemental EIS needs to be done per Section 106 Regulations of the National Historic Preservation Act (NHPA). 12-17 CR-3

Wildlife

The mortality rates (pages 4-6, 4-7, 4-8) given for wildlife and birds are estimates. A complete two year survey needs to be done before we can reasonably evaluate this DEIS. The species (page 3.2-24 in the Sagebrush Power DEIS) are listed as potentially occurring in the project area. This is a good reason to do a two year survey of wildlife and birds. 12-18 PA-1

Power Generated

The level of generated power is not listed (Chapter 4). These monstrosity turbines generate only a minuscule amount of power. The beauty of a scenic valley is not worth destroying for so little power generated. Studies show that five tenths of one per cent of Washington power needs is all these monstrosity turbines will generate. We now sell our power to other states due to our dams high output. We do our part to generate national electrical power. Let other states do their share by building efficient dams in their 12-19 ENR-2

states as we have done. Wind farms are not the answer!

Lights

Statements were made in the DEIS (page 4-14) on light and glare. The DEIS (page 4-14) states the most significant visual impacts would be from the Northwest Valley Assessment Unit.

These turbines will cumulatively contribute to increased nighttime lighting in the Kittitas Valley (page 1-18 of the Sagebrush Power DEIS). 12-20 ALG-1

Page 6

These lights are likely have an adverse cumulative effect on views from residential properties in the Kittitas Valley (pages1-18, 2-20, 3.9-47) are quotes from the Sagebrush Power DEIS.

This is unacceptable! I retired here for the scenic view out my front windows. I do not want to see these horrible monstrosities with their flashing lights day and night. The low power output does not justify building these monstrosities anywhere. They are not cost effective.

12-20
Cont.
ALG-1

The mitigation measures (pages 1-28, 3.2-58 in the Sagebrush Power DEIS) for lighting demonstrate how horrible these lights will be. I hate the lights we now have on the obnoxious cell phone towers in Kittitas County. The turbine red and white flashing lights (20,000 candela, page 3.9-47 in the Sagebrush Power DEIS) are too intense and will ruin views.

Noise

No statement was given in the DEIS that the residents will experience elevated noise levels (page 4-13). The Lincoln Township Wisconsin Survey shows that residents can not stand the constant noise from the turbines and have resulting health problems. The noise level of 108 dBA (page 3.12-8 in the Sagebrush Power DEIS) for these monstrosity turbines will affect the local residents. The 50 dBA noise level (Table 3.12-5 in the Sagebrush Power DEIS) will affect the health of local residents as the Lincoln Township Survey shows. The Lincoln Township Wisconsin Survey showed 67% of people near the wind farm were awakened by wind turbine noises.

12-21
NOI-1

Page 7

Decommissioning

A Decommissioning Plan (Chapter 4) is not shown. This DEIS is incomplete! How can the writers of this DEIS expect us to trust them when they make promises? The Decommissioning

12-22
PD-3

Plan should be in the DEIS. This project should stop and the DEIS should be redone. To give an incomplete DEIS is an insult. Where is the information on a bond Desert Claim should post so we can tear down the turbines when they result in being eyesores, inefficient and a waste of taxpayer money? I think Desert Claim will be long gone having sold the wind farm when we tear them down. 12-22 Cont. PD-3

Aircraft Safety

I disagree with the DEIS statement (page 4-21) that the turbines would not present conflicts or adverse impacts on air transportation resulting from these projects. I am a Private Pilot who flies in the Kittitas valley and these monstrosity turbines are in the way. They are too close to the Flying Rock Ranch grass air strip near Reecer creek which I land on. 12-23 AT-7 Midstate Aviation at Bowers field trains CWU students to fly in the valley. The monstrosity turbines are dangerous and unsafe for these students. The very fact that the Federal Aviation Agency requires lights (page 3.10-16 of Sagebrush Power DEIS) proves these monstrosity turbines are a hazard to flight. 12-24 AT-7 The DEIS (page 1-59) states: "Consequently a change to a right - hand VFR traffic pattern for runways 7 and 11 would likely cause a negligible shift in aircraft operating patterns and an imperceptible change in noise experienced with the community." This is not a normal departure and causes a great inconvenience. It puts more noise in the community.

Page 8 12-25 AT-2

The wind farm's estimated amount of traffic using runways 7 and 11 is way under the actual. Runway 7 is the no-wind runway for Ellensburg. When winds are light this is the prevailing runway in use. I estimate that it accounts for approximately 40% of the traffic for Ellensburg, with the exception of the winter months when runways 7/25 are closed (and even then, if there is no snow on the runway, runway 7 is often still used by local traffic).
There are approximately 120 flight students from the CWU Flight Technology program who utilize the Bowers Field airport. I'm not sure what the estimates are for average number of operations per day, but with 19

airplanes, and with each student scheduled for 3 flights per week, I estimate the average number of operations to be in excess of 300 per week, with many of these operations entailing practice take offs and landings. I estimate the number of take offs and landings to be about 1000 per week by college students alone. Any aircraft that has left the traffic pattern needs to re-enter it in an orderly fashion. Midstate Aviation has instituted a procedure to allow for an orderly flow of traffic into the pattern. These procedures have been approved by the Spokane FAA. They include, in addition to the normally accepted 45 degree entry to the downwind leg, procedures for entering the pattern from the upwind side. The practice is to enter on a 45 to the upwind, then cross the airport on the crosswind leg to enter the downwind. In this manner aircraft can enter the pattern from the opposite side. If the proposed changes are made to accommodate the wind farm, 12-25 Cont. AT-2

the complexity for entering the pattern will increase thereby increasing the potential for midair collisions. Upwind entries could still be made, which would mean the obstruction clearance would still be insufficient if the proposed windmills are erected. Furthermore, the FAA is currently drafting a new advisory circular for pattern entries which would include a crossover from the upwind side (at a 90 degree angle to cross over the runway at midfield). Either way, if the proposed FAA procedure is implemented or the Midstate 45 to upwind is continued, the windmills will still be in the way.

I strongly object to the proposal to change the traffic patterns.

–

Setbacks

The DEIS (Chapter 4) did not address set backs.

Page 9

12-26 HS-4

Set backs should be 2000 feet from roads and residences due to shadow flicker, flashing lights, noise, ice throw and blade throw to ensure safety. This is especially true in our litigation society.

Property Values

The DEIS (Chapter 4) does not state there will be a reduction of property values due to these wind farms. Regardless of the untruths in the local Daily Record Newspaper that property values would not be affected, the results of the Lincoln Township Wisconsin Survey show that turbines within one mile 12-27 NS-1 lower property values by 26% and 74% of the people would not buy within a quarter mile of turbines. Real estate people in Kittitas County have stated that wind farms will affect property values. The DEIS (page 1-35) states : " Some nearby residential users might seek to relocate if they felt that wind facilities individually or collectively conflicted with elements of their lifestyles." This made and me other residents very mad. We were here first. How can you invade our beautiful valley and tell us to move? Who would want to live next door to these monstrosity turbines? Where is the impact on the Kittitas County property values stated in the DEIS? This is another reason why this DEIS is incomplete and needs to be redone. I awaited anxiously for this DEIS. I was grossly disappointed in the quality of this DEIS! Is this DEIS an example of the quality of the turbines they build?

12-27 Cont. NS-1

12-28 LU-3

Page 10

Dwight Lee Bates

1509 Brick Road

Ellensburg WA

98926

(509) 925-5055

batesIee@elltel.net

Page 11

12
P.13

Clay White

From: lee bates [bateslee@eburg.com]
Sent: Thursday, January 22, 2004 5:13 PM
To: Clay White
Subject: Desert Claim DEIS Comments

The Tues the 21st hearing on the Desert Claim DEIS made me afraid my house will burn down from wind farm created fires and Ellensburg will be covered in a cloud of dust from the upstream wind farms. What is the County going to do about these issues? 12-29 HS-1 12-30 AQ-1

JAN 2 2 2004

13
P.1

RECEIVED

JAN 2 2 2004

KITTITAS COUNTY
CDS

Mr. Max Golladay
Kittitas County Board of Commissioners
205 W. 5th Ave.
Ellensburg, WA 98926

22 January 2004

Dear Commissioner Golladay,

Please find enclosed a copy of a letter sent to Governor Gary Locke.

It is hoped that you feel as we do that the proposed wind farms of Zilka and Desert Claim are unsuited to the areas of Kittitas County in which they are planned. The Wild Horse wind farm in the Whiskey Dick area is more appropriate for this type of industrial development. There is much more area there to accommodate them and they will not intrude on the lives of so many people. 13-1 SO-4

Sincerely,

Jack Boyovich
18830 Reecer Creek Road
Ellensburg, WA

Mr. Bruce Coe
Kittitas County Board of Commissioners
205 W. 5th Ave.
Ellensburg, WA 98926

22 January 2004

Dear Commissioner Coe,

Please find enclosed a copy of a letter sent to Governor Gary Locke.

It is hoped that you feel as we do that the proposed wind farms of Zilka and Desert Claim are unsuited to the areas of Kittitas County in which they are planned. The Wild Horse wind farm in the Whiskey Dick area is more appropriate for this type of industrial development. There is much more area there to accommodate them and they will not intrude on the lives of so many people.

Sincerely,

Jack Boyovich
18830 Reecer Creek Road
Ellensburg, WA

Mr. Perry Huston
Kittitas County Board of Commissioners
205 W. 5^{th} Ave.
Ellensburg, WA 98926

22 January 2004

Dear Commissioner Huston,

Please find enclosed a copy of a letter sent to Governor Gary Locke.

It is hoped that you feel as we do that the proposed wind farms of Zilka and Desert Claim are unsuited to the areas of Kittitas County in which they are planned. The Wild Horse wind farm in the Whiskey Dick area is more appropriate for this type of industrial development. There is much more area there to accommodate them and they will not intrude on the lives of so many people.

Sincerely,

Jack Boyovich
18830 Reecer Creek Road
Ellensburg, WA

Governor Gary Locke
Office of the Governor
P.O. Box 40002
Olympia, WA 98504-0002

RECEIVED
JAN 2 2 2004
KITTITAS COUNTY
CDS

22 January, 2004

Dear Governor Locke,

The Zilka Company of Houston, TX and Desert Claim Wind Power, LLC are preparing to build two wind farms in Kittitas County with over 400 wind turbines. Each turbine will be over 400 feet tall with whirling blades and flashing strobe lights.

The effect these towering monstrosities will have on Kittitas County is disastrous. The views of the property owners in area will be destroyed. The constant thump, thump of the whirling blades will be an annoying and detrimental part of our everyday life. The strobe lights will invade our homes during hours of darkness. Those of us who would choose to not live with this invasion of our lives will be forced to take terrible losses if we try to sell our homes and properties due to the reduction in property values that the wind farms will bring. Some say that they believe the turbines to be "beautiful" or "works of art". Those are the people that will not have to live with them 24 hours a day, seven days a week, 365 days a year.

The DEIS submitted by the Washington State Energy Facility Site Evaluation Council (EFSEC) states that the combined raptor mortality rate for the wind power projects will be 14 to 15 fatalities per year. It has been found however, that in California's Altamont Pass area there have been over 22,000 fatalities in the past ten years. That is over 2,200 birds killed each year. The area where Zilkas' wind farm is planed abuts the Yakima River corridor between Cle Elum and Ellensburg. Highway 97 follows the river here and has been designated as a scenic by-way. These huge turbines will certainly detract from the beauty of the area and it will no longer be "scenic".

The Desert Claim wind farm is planned for area near Reecer Creek. It will have the same effect on wildlife as Zilkas'. Deer and elk will be displaced from their normal ranges and wintering grounds as stated in the DEIS.

Bald Eagles, Ospreys, Turkey Vultures, Red Tailed Hawks and other raptors inhabit the valley here as well as other species of wild birds.

Bald Eagles are an endangered species. The DEIS states that the cumulative impacts on Bald Eagle will be low but there will be risk of collision. Any Bald Eagle fatality will be felt by a recovering species. The DEIS also states that between 430 to 740 passerines will be killed each year. That is a large number of birds that will no longer be around to eat the mosquitoes and other harmful insects that inhabit the area. How many of the nestlings will perish due to the parent bird coming into contact with a whirling giant propeller?

Zilka also says that the excavation needed to construct the turbines will be done with back-hoes and bulldozers. The ground in this area is full of rock. Some of that will need to be removed by blasting. What effect will this have on the water wells in the area? Subterranean subsidence could change the flow of underground water possibly drying up or reducing the amount of water in our wells.

We have been to California's Altamont Pass and seen the wind farms there. Half the turbines have been abandoned and are sitting idle. They dominate the view to such an extent that your eye is drawn to them and nothing else. They are just plain ugly and a blot on the countryside. Washington State does not need the small amount of power generated by these turbines. The electricity produced will be sold out of state to the highest bidder. The only ones to profit will be the wind farm owners who will be paid to allow them to be placed on their land.

The attorney for Zilka has now threatened to go to EFSEC and to your office to request pre-empting Kittitas County zoning laws. It is outrageous that they would threaten the county this way unless it "cooperates". A pre-emption would allow Zilka to proceed with this abomination without the necessary re-zone of the Highway 97 area. The great majority of Kittitas County residents and visitors are opposed to these looming, intrusive monstrosities being placed here when there is a better location the eastern end of the county. We think it would be better suited in the Reygrass Wildhorse-Whiskey Dick area. We respectfully urge that you not pre-empt Kittitas County in this matter.

Sincerely,

Jack Boyovich
18830 Reecer Creek Road
Ellensburg, WA

1-22-04

Clay White Planner II
411 N. Ruby St.
Ellensburg WA 98926

JAN 23 2004

Re: Wind Farm

Yes I am concerned with our view. But I am more concerned about the impact it will have on our large bird population that also share are space. 14-1 ALG-1

We live at Reecer Creek & Hungry Junction. Since we have been here I have observed a very large number of birds. In the spring as many as 10-15 bald eagles can be in the skies at one time. In the fall the new flocks of geese learning to fly to the open fields for the first time, are in the thousands. 14-2 PA-14

The herds of Elk that migrate 14-3 PA-9

#2 Wind Farm

down the Reecer Ck area heading to the Clockum are also a concern. 14-3 Cont. PA-9

While in Calif. a couple years ago the San Jose newspaper had a very extensive write up on their wind farms. Main concerns: dead bird carcasses littering the ground. Maintenance - parts never available, having to barrow from other wind mill farms because parts where not available. The fact that when the wind reaches certain sustained speeds, they either have to shut down or they break the shearpin. I have not heard if this would apply. How many actual days of the year could they run? What about June when you can have sustaind winds up to 25-30 mi for a whole month. 14-4 PD-2

#3 Wind Farm

Yes I am concerned about the flashing Red lights at night that will stand out like Christmas tree lights across the Valley. 14-5 ALG-1

Why do we have to start with so many. Why not start small at Whisky Dick. Let the people see on a small scale if this is what they want in their Valley. 14-6 ALT-2

According to Discover Dec 2003, with the on coming of nuclear fussion in the near future, Hydro coal & wind could be come outdated. Will we have dead mills on our hands twenty years down the road? Will the wind farm people remove them if they are no longer used? 14-7 PD-3

Yes I am concerned.

Linda Brown
5711 Reecer Ck Rd PO Box 755
Ellensburg WA 98926

Clay White

From:	Emilia Burdyshaw [ecarmelagb@hotmail.com]
Sent:	Monday, January 26, 2004 1:38 PM
To:	Clay White
Cc:	garrett_ew@netos.com
Subject:	Comments on DEIS for DCWWP

JAN 2 6 2004

Comments on DEIS for DCWPP

The Desert Claim Wind Power Project DEIS tends to minimize the project's permanent affect on the current environment. It fails to adequately address the actual impact on the human, animal, and natural environment of the area. 15-1 EIS-1

The proposed access roads and tower foundation locations would disturb native vegetation and jeopardize wetlands. "Permanent roads placed within streams or riparian areas would result in relocation of the stream bank or riparian area."(pp. B-27) "Tower foundations placed within streams or riparian areas would result in permanent filling-in of the feature in the area."(pp. B-26) These streambeds are designated as Critical Areas by the County and setbacks are required to protect these areas; therefore filling-in or relocating these areas is not permitted. To say that farming practices have altered wetlands is not a justifiable excuse for destroying these areas. Conservation practices could easily be implemented that would restore any sensitive areas to their natural condition. 15-2 PA-11 Also, proposed access roads that would cross 15 streams could affect surface and ground water by spillage of toxic fluids from vehicle traffic and wind turbines resulting in contamination of well water and downstream fish. 15-3 WR-1

West, Inc. is the company hired by most wind farm developers to do bird studies since they tend to minimize fatalities from turbine blade collisions. As an example, this company underestimated fatalities when they did the bird studies for the Altamont Pass wind farm some 20 years ago. 15-4 VB-4 Because an adequate study was not done for the Desert Claim site, the estimates of bird fatalities are mainly speculative. Other wind farm locations were used rather than constantly monitoring this site for avian activity. "Using mortality estimates from existing wind plants with similar habitat and bird use…fatalities per year."(pp. 1-32) 15-5 PA-1 Threat of the spread of the hanta virus from deer mice, who are kept in check by raptors, is dismissed as being unwarranted although it is admitted that raptor mortality is expected to be higher at this site compared to other wind farms. 15-6 PA-16 It is also mentioned that West, Inc. does not know why raptor mortality rates are so high at the Stateline wind project to the east. I wonder if West, Inc. was also hired for the bird fatality studies for the Stateline project. 15-7 PA-1

The project's affect on other wildlife in the area is also speculative since either other wind farms were used for comparisons or no comparisons were made because information was lacking. "Due to the lack of knowledge, ... it is difficult to access …impacts of wind plants on …bats." "Fatalities of these species occur at existing wind plants …fatalities are unavoidable."(pp. 3-101) 15-8 PA-15 "There is limited information regarding wind plant effects on big game species." "The potential effects of wind plant development on mule deer are even less well known."(pp. 3-95) Since knowledge was lacking, speculation was mere guess work. 15-9 PA-9 Because other wind farm locations were used for bat fatalities, rather than an actual study of the area, the results have no merit. 15-8 Cont. PA-25 To suggest that elk or deer would continue to use the area after the wind farm is operational is ridiculous. These animals are highly sensitive to noise and movement and would definitely be permanently displaced. 15-9 Cont. PA-9

Because speculation is not a valid replacement for an accurate study, other studies which include constant monitoring of the site should be required. These studies should be mandatory before the project is approved not after 15-10 PA-1 it is operational as suggested. "Such a study would be intended to provide information useful for future wind power planning and permitting, but would not affect mitigation requirements for the Desert Claim project." (pp. 3-101) The Audubon Society's designation of a two-year study period should be implemented before the project is allowed to proceed. 15-10 Cont. PA-1

Studies that were done to determine the impacts on land values are not reliable since other wind farm locations were used that had no similarity with the Kittitas Valley. 15-11 NS-1 Maps of the project area showing property lines with the names of ownership and the location of other properties near the site should have also been included on the CD for this DEIS. It is not sufficient to say that this information is on file with the County. Although the degree of impact on certain properties is difficult to assess when this information is omitted, an adverse affect on the area's property is still evident. 15-12 EIS-3

The project will create intolerable conditions for property owners since it introduces safety hazards and nuisances that are not currently present. Threat from tower collapse, ice throw, blade throw, and aggravation from shadow-flicker and increased noise levels will drive property owners from the area. 15-13 HS-2

Little consideration was given for current residences that would be 1,000 feet from a turbine; and neighboring properties without structures were disregarded since setbacks from these property lines are only 250 feet. Setback distances of 435 feet for tower collapse and 540 feet for blade and ice throw are suggested as a safety precaution because impact would result in damage, injury, or death. It is further mentioned that "facilities not be built within a distance from each tower….setback 435 feet" and "human access should be restricted and…facilities not built within a distance….540 feet." (pp. 3-163) This would restrict access to neighboring properties without current residences and limit options for future residential building sites. The DEIS assessment of the effects of shadow-flicker and noise level volumes is incorrect since some factors were not considered. It is stated that shadow-flicker impacts "would be limited to the immediate vicinity (approximately 2,000 feet) of the wind turbines" and that residences "could experience a noticeable change in the ambient sound level relative to baseline noise conditions...near the Desert Claim project." (pp. 1-37) If shadow-flicker creates an impact within a 2,000 foot radius, then turbine setbacks from property should be 2,000 feet and not 1,000 or 250 feet as is proposed. Because the turbines are dispersed throughout the project area, many owners will experience a magnification of sound levels much greater than has been determined. Thus, setbacks from all properties should be greatly increased to remove this condition. 15-14 HS-4

By classifying the area's use as mainly agricultural land, an attempt is made to downplay the true impact of the project. It is mentioned that the main usage of the area is for agricultural purposes that would be compatible with the wind farm. However, Desert Claim knows that residential development has been planned for the immediate area and surrounding vicinity. Reference is made to the Sun East community "The community is (just over one-half mile from the project boundary…)…consists of approximately 170 lots.." (pp. 3-124), to the subdivision near Reecer Creek Road "recent subdivision …could include up to 209 units …" (pp. 3-124), to the fact that there are currently 38 residences on the project site, and that up to 400 residences could be constructed in the immediate area. It is also aware of this project's adverse affect on residential living. "Wind turbines would be significantly greater in scale than nearby rural residential uses, and some degree of incompatibility or conflict would exist." (pp. 3-130) Furthermore, it has been suggested that residents that saw the wind farm as incompatible could relocate. 15-15 LU-1

No adequate mitigation is proposed to protect the area or the rights of property owners. Because these owners would be forced off their property if this project is built, a proper form of mitigation would be to purchase non-participating property in the immediate and surrounding vicinity. It would be necessary to acquire these properties at replacement cost so that 15-16 LU-4

15
P.3

comparable property can be purchased elsewhere. Unfortunately, this would not compensate the wildlife nor protect the environment from being compromised. 15-16 Cont. LU-4

Emilia Burdyshaw
Ellensburg Land Owner

Current Address:
2806 SW Adams
Seattle, WA 98126

January 10,2004

JAN 2 0 2004

Clay White
Planner II,
411 N. Ruby Street,
Suite 2,
Ellensburg,Wa. 98926

Dear Mr. White:

I have read and reviewed the content of your Environmental Impact Statement, and I am appalled at the way it can be interpreted to meet your needs. In the opening statements of the summary it was stated that certain criteria had to be considered as essential before any positive recommendations could be issued. 16-2 VB-4

1. The project is essential or desirable to the public convenience.

I do not see where a project that will be obsolete within the next decade is essential. Hydrogen power is the wave of the future and should be where our money and developement skills are focused, not on 120 turbines 300+ feet high that will not produce anywhere the amount of power necessary to validate their existence. They will sit idle for at least 4 months out of the year, and will produce nothing during those months unless subsidary power is applied to make them run. In that case they will use more fossil fuels than produce " environmentally friendly" power. On top of that the months that they would sit idle would be in the winter, when the most power is needed. Addressing the other issue in that first statement I can guarantee you that those of us who will be living in the middle of your monstrous project do not consider your project desirable. You plan on making us live amid towers that whir night and day, with blinking white and red lights. They are taller than any other structure in the vicinity, and are supported on steel and concrete foundations up to 42 feet below ground. There is a transformer at the base of each tower that I know will hum also. There are plans to lay underground collection cables that crisscross the streams that we depend 16-2 EIS-4

on for the life of the land. They will crisscross 17 streams, many of them more than once and your statement calls it a temporary disruption? On top of all that, as if the towers alone aren't disruption enough,you plan on building overhead cables on poles connecting the turbines to the project substation and more to connect these to the regional transmission system. Your statement varies the amount of above ground cable from a few feet to several miles. Which will you accept, feet or many miles? 16-3 PD-4

Your project roads will be 15 - 20 feet wide and provide vehicle access to the base of each tower. They will cross and crisscross 15 streams, 8 of them twice, and their 16-4 WR-1 construction will overlapp 6 streams. You say that there will be no noticeable disruption and that it will all go away after the initial construction phase. Who are you kidding? Any disruption to the flow of the streams and the groundwater, will damage the fragile irrigation system that has been put in place by the people above the canal who have only natural; water flow to irrigate their land and water their livestock. As to what your " temporary " disruption will do to the water that runs to the Yakima river basin and how it will affect the water available in the canals for the rest of the valley remains to be seen. We've already lost a lot of our water rights to other projects and companies such as Trend West, and now with the proposed windfarms disrupting more of our precious water, we very well might revert back to desert and sagebrush. 16-4 Cont. WR-1

Statement 2 of your opening reads:

The project is not to be detrimental or injurious to public health, peace, or safety or to the character of surrounding neighbourhoods.

I and many others feel that the project is indeed detrimental and injurious to public health. If there was ever an instance where the effects that power lines and constant whirring and flashing lights have on peoples health could be measured, then your project definitely qualifies. As to what it will do to the peace of our neighbourhood, that should be self-evident. It will ruin our quiet and peaceful lifestyle forever. As far as safety, that remains to be seen. If we can avoid the blades that come loose, the ice they throw and the damage they do when they tumble then I suppose the only danger left is from the increased fire danger , vandalism, and soil and water contamination. I've personally been close to three fires in the 15 months that We've lived here and believe me when I say that it's been three too many. All of them came extremely close to destroying everything we've built and the fact that your project will increase that danger is totally unacceptable. The public is banned from your project area because of the danger of electrocution. What about those of us and our families that live right in the middle of your project. Do we now have to keep our animals in pens or chained up and our children indoors because of the associated dangers of your project? We've also been crime free in our neighbourhood and your rosy outlook for increased tourism, only makes me realize that now I'll have to lock my doors, keep my animals protected and my land secure from tossed trash and cigarettes. I trust my neighbours, I do not trust the general public who venture into a community and have no idea what they might be endangering. The little fire station on Reecer Creek Road can never handle the potential problems that your project will create. 16-5 EIS-4

Addressing part three of this statement, the county will suffer economic loss. Not at first because you promise oodles of money., You say the county will gain 16 million in income during the construction phase and 5.3 million annually thereafter. This includes the 4500 per turbine that you will be paying the landowners who have agreed to lease their land to you for your project. Only 3 of the 6 landowners live in the county. This town will never see any of their money. You say the county will receive 3.8 million in property tax for the first year alone. How much will they lose when residents move out, or abandon their land. If selling doesn't become an option, then as people age the 16-6 EIS-4 ranches will be abandoned because the new generation will not live here. You also admit that the towers depreciate and the taxes will lessen each year. What I read into your glowing financial report is that we the residents of Ellensburg and the surrounding area will never see any benefit from your project and the county will lose every year after initial construction. In the end all we'll ber left with is 120 ugly 300 foot towers that are obsolete and useless. 16-6 Cont. EIS-4

You say it will not affect recreational activities, and yet in the same paragraph you say that the public will be barred from the project area. You also state that hunting will in all likelyhood be abolished in the area. Is anyone aware how many people who live here enjoy hunting and fishing here? You are planning on taking away the right to hunt in our backyard. Many of us have done this for years and some of us moved here because these activities were close and easily accessable. 16-7 RC-1

You also state that the only birds that might be noticeably affected are the Passerines. (Starlings, Finches, Sparrows,etc.) You estimate 430 - 740 birds yearly, will die. These birds keep the insect population manageable. The hawks and crows that will be killed will allow the mice to multiply , creating a health hazard to humans and livestock. The crickets would become another plague if not kept under control. 16-8 PA-16

You also state that there are no documented cases of windmills killing Eagles. How many windmills have been built in the middle of a residential farming community. The eagles are here during calving season by the hundreds. You tell me that only 1 every 2 to three years will be killed? Even if your estimate is correct, which I highly doubt, it's one too many. Aren't Bald Eagles protected by the federal government? If you knowingly kill one is it not a crime punishable by fines and/or imprisonment? Who in your company is going to pay that price? 16-9 PA-12

You say that any migratory corridors disrupted will not matter, that the elk and deer will simply establish new ones. How can you even verify how many elk and deer are involved in your conclusion. The helicopters were buzzing the foothills all summer , scattering and confusing the herds. Did your ongoing study have anything to do with that? 16-10 PA-9

You state that housing impacts will be minimal. That may be true, but there will be many people who love it here who will try to sell their homes and farms and get out of this town. Whether they will be able to do so will be highly questionable, because I don't know anyone who would spend any amount of money to live in the middle of a windfarm. Would any of you? 16-11 NS-1

You also state that a 1000 foot sufficient. Where do you get the right to use my property in your setback requirements? Shouldn't you have to go from my property line? I never gave you permission to include my property in your setback , and I resent that you would take that kind of liberty. 16-12 LU-5

The other issues of course are the conflicts with the airport, and the destroyed view properties along the foothills. What right do you , as a private company, have to take away what we cherish and love about our surroundings? Many of the residents have been here for generations. They work hard to make a living and are here because they love the farming and ranching lifestyle. You and your company threaten to destroy all 16-3 VB-3

of that for those of us who live here. Go to your alternate sites in the desert, where the only residents you will disturb are the snakes and groundhogs. Go where you won't destroy the water, our lifeblood. Go somewhere else where there is no population to disturb and no neighbourhood to destroy. The noise and visual impact on our valley and the surrounding hills is unacceptable. We don't want you here and the money you promise to the county is a carrot that we can't and won't accept. 16-14 SO-4
We urge those of you that will make the final decision to not be enticed by the promises of big profits. They won't materialize and we'll be all left with an eyesore that although heralded as beneficial, will in the end hurt us all. 16-15 SO-5

Lee + Chris Burchett
12611 Reecer Creek Rd.
Ellensburg, Wa. 98926
509-962-6009

JAN 2 0 2004

January 20, 2004

Dear sirs:

I have read and reviewed the content of your Environmental Impact statement. I may not have understood it all but one thing became crystal clear. Many of your determinations could be evaluated to suit any need. It is filled with statements such as: "cumulatively insignificant"" open to mitigation" having" minimal effect" " not measurable" and "temporary disruptions". Those of us who live in your project area do not deem any disruption as minimal and we resent the suggestion that the destruction of our way of life is cumulatively insignificant. 17-1 EIS-1

You, the Board of County Commissioners, will make the final permit decision for the Project. I ask that you adhere to your own criteria requirements and based on those you will surely deny Desert Claims application. 17-2 SO-5

In your criteria you state that your decision will be based on three criteria:
1. The Project is essential or desirable to the public convenience
2. The Project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding area.
3. The Project will not be unreasonably detrimental to the economic welfare of the county and will not create excessive public cost for public facilities and services.

I fail to see how the project is essential or desirable. Wind power is not necessarily environmentally friendly and is undependable at best. I would hope someone has noticed that the wind hasn't blown here for months. From what I understand this is normal from November through February and the wind is mainly present here in the valley in spring and summer. To me that means that the turbines would sit idle for at least 4 months of the year unless operated by subsidiary power. How can that be environmentally friendly or beneficial if other power may be needed to operate them? 17-3 EIS-4 Addressing the other issue in your first statement, I can guarantee you that those of us who live in the middle of your monstrous project do not consider it desirable. You plan on making us live amid towers that whir night and day, have blinking white and red lights and obscure our view of the foothills and the valley.

Whether or not the project is injurious or detrimental to the public health remains to be seen. The jury's still out on what the long term effects to the populous will be of the increased power transmitted by your turbines to the surrounding power grid. As the editorial in the Daily Record stated we're facing some of that from the Bonniville Power Administration's plans to update their transmission lines anyway, but we don't need more of an increase from yours. You, of course, know that because that was one of the reasons you chose our county for your proposal. If there was ever an instance where measurable effects on peoples health that power lines and constant whirring and flashing lights have, then your project qualifies. As to what will happen to safety, I can only imagine. Your statement again claims that the potential of ice throw, blades coming loose, towers collapsing and vandalism is all minimal and will have no significant impact. That's easy to say, but we've been relatively crime-free in the upper valley and your rosy outlook of increased traffic and tourism makes me realize that now I'll have to lock my doors, keep my animals protected, and watch that my land is secure from tossed cigarettes and trash, not to mention looking over my shoulder whenever I venture outside so that I 'm not injured by one of your towers. You have banned the public from your project area due to the dangers of electrocution. I say that is a definite safety hazard. The increased fire danger is also described as cumulatively insignificant. As far as I'm concerned, any increase in fire potential is too much. In the past year alone we've personally come close to at least three fires. They spread fast and are extremely hard to control. If your presence increases that hazard, then you are significantly disruptive and injurious to the surrounding area. As to the peace and character of the surrounding area that should be self-evident. The towers are taller than anything else in the vicinity and will predominate the landscape. There is a transformer at the base of each tower. There are plans to lay underground collection cables that crisscross the streams that we depend on for water to our land. They will crisscross 17 streams, many of them more than once and your evaluation calls it a " temporary disruption"? If the towers aren't bad enough you plan on building overhead cables on poles connecting the turbines to the project substation and more to connect these to the regional transmission lines. Your statement varies from the lenth of aboveground lines from feet to miles. That's a considerable variance. Your project roads will be 15 - 20 feet wide and provide vehicle access to the base of each tower. They will cross and crisscross 15 streams, 8 of them twice and their construction will overlap 6 streams. You say there will be no noticeable disruption and that it will all go away after the initial construction phase. Who are you kidding? Those of us who live here know how variable and precious the groundwater is. It lies just below the surface in many areas and goes deep in others. Any disruption to the flow of that groundwater or the streams will damage the fragile irrigation system that has been put in place by most of the farmers and ranchers and especially to those of us who depend on the natural flow for our land irrigation and stock water. The Yakima River water adjudication decisions aren't even all in place yet and you're already proposing to disrupt them. The whole valley also depends on wells for drinking water . What your project will do to the surrounding wells is never really addressed except to say that blasting and shaking will have insignificant impact on wells which supply drinking water. What if the impact is significant? Who will pay for drilling new wells and supplying us with water? Your whole DEIS was done in as little as 6 months after application in January 2003. How can you make such wide sweeping determinations without even evaluating the projects impact through all four seasons?

17-3 Cont. EIS-4

Addressing part three of your criteria, the county will suffer economic loss in the long run. It won't be noticeable at first because you promise oodles of money. You say the county will gain16 million in income during the construction phase and 3.8 million of that will go to labor. You also promise 1 million a year after that, depreciated over the life of the project. You do not however have a figure to track that depreciation. Of that yearly income 540,000 will go to the landowners who have leased their land to you.

Apparently you forget that at least three of those landowners do not live anywhere near Kittitas County and their share of your projected profits will never see the Kittitas County coffers. The increased costs of fire and police protection will eat up some of these profits also. We'll have to build a new Fire Station to secure the project area from fires. We the taxpayer will probably have to pay for it. You will also lose some of your revenue as local ranchers try to sell and leave the county. What you will be left with is a desert valley covered with windmills. They will of course become obsolete in far less than 30 years. I would estimate they become obsolete within the next decade. The Army is already converting to hydrogen, the energy source of the immediate future. Use of Hydrogen will dominate the energy scene and the windmills will have to be dismantled and removed. That of course depends on whether the money has been set aside for that purpose, and the company doesn't go bankrupt. If not, they will just mar the landscape forever, or you and I the taxpayer will have to finance their removal. In the end the county will see little money from the project, but will have expenditures for generations to come. 17-3 Cont. EIS-4
What I read into your glowing financial report is that we, the residents of Ellensburg and the surrounding area will never see any benefits from your project. In the end all we'll be left with is 120 ugly 300 foot towers that are obsolete and useless.

You also say that your project will not affect recreational activities, and yet in the same paragraph you say that the public will be barred from the project area. You also state that hunting will be abolished in the area. Is anyone aware of how many hunters live here? You are planning on taking away a major form of recreation . For many of us this is a big concern. I am also fairly sure that it will have an impact on snowmobiling , biking, and other outdoor activities in the area. 17-4 RC-1

You state that housing impacts will be minimal. I'm not sure that's true. There will be many people who love it here but will try to sell their homes and farms to get out of this town. Whether they will be able to do so will be highly questionable, because I don't know anyone who would spend any amount of money to live in the middle of a windfarm. Would any of you? As to land values? For tax purposes they probably won't change, but for resale, I predict a huge drop. People will lower their asking prices immensely just to get out. 17-5 NS-1

You also seem sure that a 1000 foot setback from the nearest residence is sufficient. My house is 400 feet from my property line. Where did you get the right to use my property as part of your setback? Shouldn't you have to start at my property line? You have effectively eliminated our plans to subdivide our 33 acres and give some to our children so they could build a summer home or retirement home here. I never gave you permission to include my property in your setback, and I resent that you would take that kind of liberty! 17-6 LU-5

Your DEIS also states that the impact on local wildlife and birds is cumulatively insignificant. You estimate 430 - 740 Passerines will be killed annually. That's a quarter of a million birds in your projected 30 years. I don't think of that as insignificant. 17-7 PA-14

These birds keep the rodent and insect population manageable. This combined with the hawks and crows that will be killed will allow the mice to multiply uncontrollably creating a health hazard to humans and livestock. You say there are no documented cases of Bald Eagles being killed by windmills. 17-8 PA-16 How many windfarms in the country are built in the middle of a residential and agricultural zone? I find that if even 1 is killed then federal laws for protection have been violated and someone should pay by fines and imprisonment. Who in your company will pay that price? 17-9 PA-12
You state that any migratory corridors for elk and deer will only be temporarily disrupted and that the animals will establish new ones. How can you even verify how many animals will be affected and where they will go? The helicopters were buzzing the foothills all summer scattering and confusing the herds. Did your ongoing and rushed study have anything to do with that? 17-10 PA-9

In the end it all comes down to this. We don't want you here. You are not a welcome addition to our neighbourhood. What right do you, a private company, have to take away what I cherish and love about my surroundings? Many of the residents who live here have been here for generations. They work hard to make a living and are here because they love it here. You and your company threaten to destroy all that. The money you promise to the county is a carrot that we're not willing to accept. I think you definitely need to be " open to mitigation". The lives and properties you destroy will cost you . I hope you've planned for that. 17-11 SO-5
We urge those of you that will make the final decision , to not be enticed by promises of big profits. I predict they will not materialize, and we'll all be left wih an eyesore that although heralded as beneficial by some, will in the end be obsolete and hurt us all. I advocate that the No Action Alternative be selected as your final decision. 17-12 SO-2

Lee + Chris Burtchett

Lee & Chris Burtchett
12611 Reecer Creek Road
Ellensburg, Wash 98926

(509) 962- 6009

January 25, 2004

Clay White:

This is just a short update to the meeting that I attended January 20. I ran out of time to completely read the letter that I left with you that night. I just want to readdress certain issues.

The article in the paper the next morning mentioned some things that I feel were very wrong. It is true that some of us who now live in the county are new, but we're not the only ones who object to the proposed windfarm. The paper led us to believe that long time residents are for the proposal and that couldn't be further from the truth. The only long time property owners who are for the project are those who stand to gain financially from the windtowers. 18-1 VB-5

The other thing that I think definetely needs to be considered is the fact that the study was hastily done and was not site specific. Many conclusions were made by evaluating other windfarms, in other counties and states, and it was done so quickly that no honest conclusions can possibly have been determined. 18-2 EIS-1 Mr Richard Weinman looked to me and others that he was totally bored and disinterested with the comments presented and had no intention of reevaluating some of his firms conclusions. 18-3 VB-4

The comments by Roger Weaver regarding land values needs to be seriously considered. He was right when he said that land values in this county are based on residential, agricultural and recreational. All three of these factors will be impacted if you, the Planning Commission, allow this project to go forward. 18-4 NS-1

Please don't make hasty conclusions, just because Desert Claim needs to push this through to get the government subsidies by the end of the year. Your decision will impact this valley for generations to come. 18-5 EIS-6

Chris Burtchett
12611 Reecer Creek Rd.
Ellensburg Wa-98926

Clay White

From: Judy Corey [tdcdonks@hotmail.com]
Sent: Monday, January 19, 2004 1:09 PM
To: Clay White
Subject: Wind Farms

RECEIVED
JAN 19 2004
KITTITAS COUNTY
CDS

Hello, Mr.. White;

I feel that the proposed locations of wind farms in Kittitas County is all wrong, and that there hasn't been adequate study on the environmental impact. 19-1 EIS-1

Why should wind farms be located so near to populated areas, when there is all the scab land on the eastern side of the county ? Seems like that would be a much more sensible location. 19-2 SO-6

Also, it seems to me that the effects of many many flashing lights all night will definitely effect the wildlife, as well as people.

All in all, I hope all 3 proposed wind farms will be relocated out of view of the majority of residents in Kittitas County. There must be better sites.

Judy Corey
2963 Schnebly Rd.
Ellensburg
(509)968-3699

1-10-04

20
P.1

Shirley Dawson
Property owner
12440 Reecer Creek Rd.
Ellensburg, WA 98926
Home address
2411 Hwy Hwy
Ellensburg, WA 98926

JAN 20 2004

Clay White
Planner II

411 N. Ruby St.
Ellensburg, WA 98926

Re: Desert Claim Wind Power Project
120-turbine proposed for 5,237 acre area North of Ellensburg.

I am the adjoining property owner on the N.E. of this project.

I My concerns are proximity of windmill turbines or any part of the projects - proximity (distance) to adjoining property owners. 20-1 LU-5

II Noise from turbines. 20-2 NOI-1
III Wild life in this area being protected, nature. 20-3 PA-18
IIII. Property Values.

These people that are allowing (leasing) the property to this Company are being compensated well first for testing. Us ~~people~~ are not protected 20-4 NS-1

20-4
Cont.
NS-1

at all; or compensated!

I have been a property owner & my family has since early 1900's in this area.

Thank you
Shirley Dawson

Would ask this be included in hearing comments.

Arthur DePalma
6991 Manastash Rd
Ellensburg, WA 98926

JAN 2 0 2004

January 20, 2004

Points to consider

1. Three groups in favor of wind farms * citing clean, green energy, which will save the planet from the effects of fossil fuels. Except the amount of electricity produced by wind power is miniscule and relies on fossil fuels to keep the turbines running.
   a. The first group * the energy companies EnXco and Zilka state how they want to produce clean energy. Yet if they were not getting hundreds of millions of dollars in federal subsidies from our tax dollars, there would be no projects; for wind farms are not economically viable. Once subsidies are gone that's the end of the wind farm and the turbines are left to rust.
   a. Another group are the landowners in the project area, who have contracted with EnXco and Zilka to receive thousands of dollars for each turbine built on their land. This is the one "mitigating factor" that changes minds to proclaim the wonders of wind energy. If it weren't for the money to be made, neither the energy companies nor the landowners would have any interest in turbines in Kittitas Co. So it really is all about money and not energy. 21-1 VB-5
   a. The third group consists of those who think wind energy is great since it's using a free natural resource * the wind. They are unswayed by the facts that fossil fuels are burned to keep the turbines powered when there is no wind; or that wind power produces insignificant energy. They are also unconcerned by those who don't want to live by hundreds of wind towers, and negate their concerns. It's easy for those who think they are not affected by the proximity of the turbines to vocally support wind farms. This group might have some credibility if they themselves lived in the wind farm area surrounded by turbines.

Although I live far from this project I am strongly against wind farms here because this scheme is outrageously unfair to the nearby residents. I am also opposed because of this proposal to build hundreds of huge towers a mere 8 miles from the city of Ellensburg, and near the pristine area of Table Mountain and Lion Rock. The Zilka project is just several more miles away along a scenic highway.

Imagine that the tables are turned and that it is proposed to build hundreds of these giant wind towers 8 miles from Olympia along Puget Sound They could use this same environmental impact statement with just different maps. Imagine also that several hundred 400 ft towers will be surrounding your property and home. What would you be thinking? Would it be "great, it's a sacrifice I'm willing to make for an insignificant amount of green energy"? Then visualize the company making deals and "mitigating the impact" with a few of your neighbors * by paying them thousands of dollars to move towers on their land. Now they think wind turbines close to Olympia, Puget Sound, or surrounding your land is a great idea. How are you feeling? Do you think your property 21-2 SO-5 values will be affected? 21-2 Cont. SO-5

I would like to emphasize four points.

1. The visual effect will ruin views and lower property values (notwithstanding the cited so called studies). 21-3 ALG-1
2. Hundreds of these huge towers will severely impact the quality of life for not only neighbors, but for much of the entire area because these towers will be built on rising elevation higher than Ellensburg and the Kittitas Valley. 21-4 NS-2
1. The constant daytime strobe light flicker, and hundreds of red beacons at night will not only make living near them untenable but will be visible for miles causing light pollution for Ellensburg and much of the valley. 21-5 ALG-1
1. It is easy to ruin **other** people's quality of life for little return. These industrial towers should not be built near homes period. The feelings and judgments of residents who are impacted should have priority in this decision. I urge you to make your recommendation as you would if these huge towers were proposed to be built surrounding your homes and properties, and just several miles from the city of Olympia. 21-6 VB-6

Thank you.

Arthur DePalma, M.D.

JAN 20 2004

Clay White, Planner II
411 N. Ruby Street, Suite 2
Ellensburg, WA 98926

January 16, 2004

Comments on the DEIS for Kittitas Valley Wind Power Project by Desert Claim Wind Power , L.L.C.

Dear Mr. White

1. Fairview Fire Station
The DEIS states the Fairview Fire Station is located on Highway 97. Last time I drove past it it was at the corner of Fairview and Brickmill Roads. 22-1 PSU-3

2. Fire Potential
The DEIS addresses the available fire fighting resources, but did not address the potential of a wind driven fire. The site is on a windy area or it would not have been chosen. When the wind blows it dries the foliage out. The area is brown most of the year. While the "experts" say "there is no need to worry about fires , all the safe guards will be in place" they can happen. Airliners are not suppose to go down or trains collide, but they do. When a project is new the potential for a fire is less. In 10 to 20 years and if the project is not producing the desired revenue, there is only one place to cut costs, that is maintenance. When maintenance is cut back , the potential for fire is increased. If a bearing would get too hot and start spewing hot metal and burning oil from a tower 300 feet high, it would start an wind driven inferno that would be difficult to stop. Remember Southern California fires in 2003? Why pick a site where there is a large populated area , homes and farms downwind that would be in the path of a fire? It doesn't make good sense. There are other sites where there are not homes in the wind path. To have a wind driven fire would have a major environmental impact. 22-2 HS-1

3 ~~2~~. Liability Insurance
I questioned my insurance agent about the possible increase of insurance premiums because of the increased risks. They said there should not be as the wind company should be carrying liability insurance.
I presume the L.L.C. in the name Desert Claim Wind Power L.L.C. means Limited Liability Corporation. I presume this means if there is a disaster caused by the turbines or transmission lines , they are only liable to the value of the corporation. If enXco,Inc. is allowed to develop the wind project, an all inclusive liability insurance policy needs to be in force for the replacement value of buildings, farms, businesses, crops, livestock, power lines, infrastructures, injuries, loss of life, etc.. Any losses over the insurance carried should become the liability of the developer, enXco , Inc. and its owners. This could be included in the conditional use development agreement. To have a wind driven fire that is caused by the wind project, but the losses are not covered by liability insurance would create an environmental impact. 22-3 HS-10

William Erickson
6980 Wilson Creek Rd.
Ellensburg ,WA 98926
Phone 509-925-1349

23
P.1

Clay White

From: Randy Fischer [randyjo@elltel.net]
Sent: Wednesday, January 21, 2004 8:43 PM
To: Clay White
Subject: Comments DEIS Desert Claim Project

JAN 2 1 2004

Comments concerning DIES for the Desert Claim Project

Respectfully submitted,

The DEIS for the Desert Claim Project does not completely address some important issues. One of them is wild fire.

23-1
HS-1

In the past two years the area proposed for wind farm construction has sustained damage from wild fires. Only with the aid of outside help and resources were the fires able to be contained. If wildfire can happen when the area in question is used solely for recreation and private home ownership what will the consequences be during and after construction of a large industrial facility? Construction will undoubtedly entail the use of explosives, welding equipment, and metal cutting spark producing saws. The area is not in a county fire district so who will pay the bill if Enexcos' crews or equipment accidentally start a fire? What about loss of personal property, or worse, loss of life? 23-2 HS-10

The most basic issue is that Zilkha and Enexco are trying to place this industrial facility in a place that impacts far too many people in negative and nonmitigable ways. There are better places to build this if it really has to happen.
I believe it is this counties responsibility to deny wind farms in the location studied and offer them areas farther east as suitable options for construction sites. 23-3 SO-5

I still, however, have not been convinced that this document has provided any public need for the insignificant amount of power that this facility is capable of producing. 23-4 EIS-7

Sincerely,

Randy Fischer
6440 Hanson Road
Ellensburg, Wa. 98926

24
P.1

Clay White

From: John & Barb Foster [bears@elltel.net]
Sent: Monday, January 26, 2004 3:35 PM
To: Clay White
Subject: Re: Desert Claim DEIS Statement

RECEIVED
JAN 2 6 2004
KITTITAS COUNTY
CDS

Dear Mr. White,

We are writing to express concerns about the Desert Claim DEIS. We do not believe the DEIS addresses the problem of the location of these wind towers which calls for placement in front of our beautiful Cascades. It does not provide a sufficient picture of the sheer ugliness of these mechanical monsters on our county's landscape. 24-1 ALG-2

There has been insufficient discussion of the devaluation of property assessments for homes in the area of the towers. There has been insufficient discussion of the harm to the public, including fires that may be caused by them, and of the harm to wildlife including birds. When the wind power company abandons the project, who will foot the bill for tower removal? Or will the towers be there forever? 24-2 NS-1 24-3 HS-1 24-4 PD-3

Problems caused by windfarms in other areas of the US and in other parts of the world are just now being realized. More time needs to be used to study these expensive providers of power. 24-5 EIS-6

We hope the county commissioners do not allow windfarms in this county because of their sheer ugliness to our landscape. The location of this project is of great concern to us. 24-6 SO-5

Sincerely,

John and Barbara Foster
2261 Killmore Rd
Ellensburg, WA 98926

Clay White

From: Ed Garrett [garrett_ew@netos.com]
Sent: Monday, January 19, 2004 11:29 AM
To: Clay White
Subject: enXco DEIS

JAN 19 2004

Hi Clay,

This is not my formal submission, just my thoughts to you.

I finished reviewing the enXco DEIS and I agree with you, that it is much more detailed and less one sided than the Zilkha DEIS. 25-1 EIS-1

I actually found very little to comment on other than, like Zilkha, they downplayed the impacts of neighboring landowners and basically saying they are looked upon as collateral damage if this project is allowed. 25-2 LU-1 The bird analysis by WEST, Inc again is not acceptable: not long enough, no night studies, migratory pathways not analyzed, 25-3 PA-1 and proposing that "no bald eagle has ever been killed at a wind facility within the United States" justifies placing this project in an area with known bald eagle presence. 25-4 PA-13

Section 3.7, Page 3-123 states that Kittitas County subdivision applications have been increasing since 1998.

Page 3-124 states, " rural residential uses predominate in the immediate area of the proposed site and to the south toward Ellensburg Urban Growth Area". Also, "majority of land within 1 mile of the proposed project area is privately owned and generally consists of rangeland and residences". The Sun East community alone has an estimated 83 residences. This is too many too close. I believe when David Lee testified last Tuesday at the EFSEC Public Meeting, he said he represented about 120 land owners at Sun East. 25-5 LU-1

Add this number to the 8 non-participating residences in the project area and 31 non-participating residences within 1000 feet of the project boundary area.

This shows major significant unavoidable impacts to neighbors just for the benefit of 8 landowners and their non-contiguous acreage.

The mitigations center again, around setbacks. 250 feet from neighboring property lines and public roads won't cut it. 1000 feet from residences is not adequate. 25-6 LU-5

Did you find anything else worth bringing up?

Best Regards,

Ed Garrett

Ed Garrett
19205 67th Ave SE
Snohomish, WA 98296

January 19, 2004

JAN 2 0 2004

Clay White
Planner II
Kittitas County Community Development Services
411 Ruby Street
Suite 2
Ellensburg, WA 98296

RE: Testimony on Issuance for Draft Environmental Impact Statement
Wind Resource Development Permit Z-2003-01

Dear Mr. White,

My name is Ed Garrett, I reside at 19205 67th Ave. SE, Snohomish, WA 98296 and I represent myself and my wife, Rosemary Monaghan.

In reviewing this DEIS I have the following comments.

First, I'd like to comment on the document, Property Value Effects of Wind Power Projects: A summary of the Literature, prepared by Huckell/Weinman Associates Inc. Groups who promote the agenda of wind developers performed the studies presented. On page 9, it states, "One scoping comment for Desert Claim specifically suggested that a certified real estate appraiser familiar with the local market conditions be engaged to identify the effects of wind turbines on property values". However, it goes on stating, "This request was not pursued" because it is not an environmental issue and because of the absence of data on actual sales before and after construction of a commercial wind farm.

I believe this to be a very pertinent part of the DEIS. The project area proposed includes 31 non-participating residences and landowners either in or as close 1000 feet of the boundary and many more non-resident landowners within 250 feet of their property lines.

26-1
NS-1

Second, I'd like to comment on the wildlife studies prepared by WEST, Inc. This was only a limited 1 year study performed by several 30 minute point count surveys and only during the daytime. The Kittitas County Audubon has already stated at previous public meetings that this is inadequate. I will defer any other comments on this issue to one of the Kittitas Audubon representatives.

26-2
PA-1

Third, visual photographic simulations are not adequate. Most of the simulations were taken at a significant distance from the project area to minimize its overall effects. I would like to see visual simulations from each of the 31 residences of non-participating landowners within and out to 1000 feet from the project boundary as well as from the Sun East community. 26-3 ALG-2

Lastly, I have grave concerns about building this industrial wind project with such close proximity to nesting bald eagles along the Yakima. The proposed project is among the hunting and roosting grounds of bald eagles and other important raptors. WEST Inc. attempts to minimize this issue by stating the mantra throughout this document that there have been no documented bald eagle fatalities at any operating wind facility within the United States. I find that statement to be very irresponsible as well as unsubstantiated. I would submit that bald eagles, just like the golden eagles at Altamont, CA are being killed occasionally but swept under the carpet because of the bad publicity it would bring as well as it being a federal crime violating the The Bald Eagle Protection Act. 26-4 PA-13

WEST, Inc., in their analysis they had frequent observations of bald eagles within the project area. On page C1-20 of Appendix C, they make the following statement, "due to the nearby vicinity of important roosting and foraging areas, bald eagles might **regularly move throughout the wind plant increasing their exposure**". Page C1-16 states 78% of the flying eagles observed were within the zone of risk.

They propose to mitigate this fact by:

1. Establish and enforce reasonable driving speed limits within the wind plant to minimize the potential for road killed wildlife or livestock that may attract foraging bald eagles.

2. Remove and dispose of all carcasses of livestock and other large wildlife from within the wind plant that may attract foraging bald eagles.

3. Ensure that livestock calving areas of **participating** landowners remain outside of the wind plant. What about all the **non-participating** landowners with livestock? 26-5 PA-13

I would add one other mitigation measure, how about you just don't build these giant industrial cuisine-arts- of-the-sky in known eagle habitat and where inhabited by innocent human beings.

Thank you for the opportunity to comment.

Ed Garrett

Ed Garrett & Rosemary Monaghan
19205 67th Ave SE
Snohomish, WA 98296
(425) 483-9770

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JAN 30 2004
KITTITAS COUNTY
CDS

January 29, 2004

Mr. Clay White
Kittitas County Planner II
411 N. Ruby Str.
Suite 2
Ellensburg, WA 98926

RE: Desert Claim Wind Power Project DEIS Review

Dear Mr. White,

The following are our comments after reviewing the DEIS prepared by Hunkell/Weinman Associates:

FACT SHEET, page i, Proposed Action states, "The proposed action consists of development of a 180-megawatt (MW) wind energy facility". It should read: The proposed action consists of development of a ***nameplate capacity*** of 180-megawatt (MW) wind energy facility. It should also be added that on average throughout a year, actual produced energy is 25 to 30 percent of nameplate capacity, or about 60 megawatts. This should be added to every reference to their 180 Megawatt wind energy facility throughout this document. 27-1 PD-5

FACT SHEET, page i, Proposed Action states, "The applicant's objective is to develop a commercially viable wind energy facility with a nameplate capacity of at least 180 MW that would deliver renewable energy to the Pacific Northwest." This statement is misleading. EnXco has not yet found a buyer for the energy so it cannot say this power will stay in the Pacific Northwest. Therefore, "to the Pacific Northwest" should be deleted. 27-2 PD-6

FACT SHEET, page ii, Operation and Maintenance states, "Electricity generated by the project would be sold to power marketing entities, such as Bonneville Power Association, local and regional utilities, such as Kittitas County PUD and Grant County PUD; and/or regional investor-owned utilities, such as Puget Sound Energy and Avista." Again, misleading, since they have no buyer for the power. They can't state for a fact the power will stay in the area. Everything after "marketing entities" should be struck out. 27-3 PD-6

FACT SHEET, page iii, Operation and Maintenance lists bullet points for O&M activities for on-sight personnel. A bullet point should be added addressing ongoing study and complaint resolution of non-participating residences within 1 mile of the project area and working with the local Kittitas Audubon in monitoring and reporting ALL wildlife (birds, bats, etc.) fatalities. 27-4 PD-2

FACT SHEET, page vi, Type/Timing of Subsequent Environmental Review states, "No subsequent environmental review would be required for the development addressed in the EIS and the January 2003 development activities application..." It should read "***Subsequent environmental review MAY be required......***" With a project this large and impacting so many neighboring landowners, any change enXco wants to make or "phase in" should have an open option to request additional environmental study and review. 27-5 EIS-8

Chapter 1, page 1-4, Summary, 1.3 Applicants Objective For Proposal states, "EnXco develops, builds, operates and manages wind energy projects throughout the United States". It should read, "EnXco, ***a French corporation,*** builds, operates, and manages ***several*** wind energy projects in the United States." Everything starting with the third sentence should be struck. Again, there is currently no buyer for their energy and the rest of this paragraph is speculative and misleading. There are currently no requirements at the state or federal level mandating purchasing of wind power. Currently, utilities can volunteer to offer wind power. Our State already produces 60% of our energy from hydropower, which is a renewable resource. Marketing projections and political positioning do not belong in this DEIS. The first two sentences say it all, they are a foreign held, private company and in the business to produce wind energy for a profit. 27-6 EIS-9

Chapter 1, page 1-5, 1.5.1 Proposed Action states, "...would deliver renewable energy to the Pacific Northwest" should be stricken. They have no buyer for their energy so they can't guarantee power will benefit the Pacific Northwest. 27-7 PD-6 This section should include the real production estimates (60 MW) along with their nameplate capacity. 27-8 PD-5

Chapter 1, page 1-6, 1.5.1.3 Operations and Maintenance. Same changes as suggested in **FACT SHEET, page ii, Operation and Maintenance.** 27-9 PD-6

Chapter 1, page 1-7, 1.5.4 No Action Alternative. Strike the entire second paragraph as speculative and not helpful to this DEIS. The first paragraph has all the facts needed for the no action alternative. 27-10 ALT-1

Chapter 1, pages 1-9, 1-10, 1.6 Summary Comparison of Environmental Impacts, Table 1-1, Air Quality, No Action Alternative. The second paragraph should be stricken. There is no proof that if the wind farm was not built that a fossil burning energy would have to be built to replace lost wind energy. The first paragraph has all the facts. 27-11 ALT-1

Chapter 1, page 1-11, 1.6 Summary Comparison of Environmental Impacts, Table 1-1, Ground Water, No Action Alternative. The first paragraph should be stricken as speculation and not fact. The second paragraph has all the facts. 27-12 ALT-1

Chapter 1, page 1-13, 1.6 Summary Comparison of Environmental Impacts, Table 1-1, Wildlife, Birds states conclusions from studies issued by WEST, Inc. Many of these studies are incomplete and should not be accepted. Conclusions are based on a limited 1 year, several 30 minute visual observations at random locations all in daylight. No confirmations were made with local landowners and the local Kittitas County Audubon. Most results are produced "statistically" and not from actual observations.

No night studies were made and no confirmation of migratory pathways were studied. Documentation from other wind facilities has stated significant raptor and bat fatalities and these documents were not acknowledged. No bat studies were performed in the project area. The proposed project area is in confirmed bald eagle hunting and roosting areas. Bald eagles are protected at the Federal level by the Bald Eagle Protection Act. Raptors are protected by State law. Arial observations by helicopter for active raptor nests is insufficient. Some species of raptors are cavity dwellers, which cannot be seen from the air.

27-13
PA-1

No reference was made about being in compliance with: Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines, issued by the US Fish and Wildlife Service, dated May 3, 2003.

27-14
PA-3

Conclusion: The studies by WEST, Inc. should be deleted and a new bird study be commissioned involving local landowners and the local Audubon Society. WEST, Inc. has positioned itself to serve most - if not all - wind developers in the US. It's studies all have the same conclusion and they are never held accountable when their studies are blatantly wrong, such as in Altamont, CA. This is an obvious conflict of interest issue.

27-15
PA-1

Chapter 1, page 1-15, 1.6 Summary Comparison of Environmental Impacts, Table 1-1, Energy and Natural Resources, Proposed Action, Desert Claim Wind Power Project states, "The project would have little or no impact on the supply and price of electricity available to local consumers." This statement is in error in two ways. First, since enXco has no buyers for the power, they cannot say it will impact local consumers. Secondly, the addition of wind power, as currently promoted through green tag programs increases the cost of power to consumers. Utilities charge a premium for wind power and pass that cost on to consumers.

27-16
ENR-1

Under the same heading, but under the, **No Action Alternative**, the second paragraph should be struck. It is conjecture that new supplies would have to be produced elsewhere. The first paragraph states the needed facts.

27-17
ALT-1

Chapter 1, page 1-17, 1.6, Summary Comparison of Environmental Impacts, Table 1-1, Land and Shoreline Use, Proposed Action: Desert Claim Wind Power Project, Land Use Patterns states in various paragraphs that project facilities are "not expected" to significantly impact existing activities, as well as changes to "land use patterns are not seen as significant". All these statements are conjecture and attempt to make the case that life will continue on as it has after the project is built. This is pure wind developer spin.

27-18
LU-1

The only statement of fact is the second paragraph. "Wind turbines would be significantly greater in scale than nearby rural residential uses, and 'some' degree of incompatibility or conflict would exist." That is the only factual comment in that column on that page. All the rest should be stricken as conjecture and not fact. 27-18 Cont. LU-1

Chapter 1, page 1-18, Summary Comparison of Environmental Impacts, Table 1-1, Proposed Action, Desert Claim Wind Power Project, Plans and Policies states, "The proposed project would be consistent with the land use and utilities policies of the Kittitas County Comprehensive Plan." To be able to make such statements, the Applicant must address three basic questions in order to obtain compliance for a Wind Resource Overlay Zone and become consistent with the KVCCP. Currently, they are not consistent.

1. The project is essential or desirable to the public convenience. It has not been determined essential or desirable thus far from the public scoping and public DEIS comment periods. In reviewing local newspapers, there appears to be building concensus that overall, the public is not in support of such a project.

2. The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood. It has been determined by the public, as well as sections in this DEIS, that the project will introduce potential injurious conditions (fire risk, ice throw risk, blade and tower failures, driving distractions, increased light and noise pollution, shadow flicker and blade glint effects) to the surrounding neighborhood. 27-19 LU-6 By placing giant 340 foot industrial towers as close to 250 feet from neighboring property lines and 1000 feet from neighboring non-participating residences will definitely change the character of the surrounding neighborhood. In the Applicant's Development Activities Application of January 28, 2003, Part D and E discuss the project area landowners and neighboring landowners. This defines the "immediate surrounding neighborhood" to be 8 landowners with non-contiguous parcels in favor of hosting giant wind turbines and 57 landowners owning parcels contiguous to the project area boundary who do not want to see the project developed. Also, the Applicant has not shown adequate proof with appropriate scientific backup to address the property devaluation issue of non-participants parcels and concern from local real estate agents.

3. The project will not be unreasonably detrimental to the economic welfare of the county and not create excessive public cost for public facilities and services. Recreation and rural development are the growing major economic force for land ownership in Kittitas County. The Applicant has not established how the project will truly affect the economy and recreation dollars spent in the area. The introduction of 120 industrial machines capable of causing fires from either lightening or mechanical failure would put a strain on current fire suppression capabilities. Does the local fire district even possess the equipment needed to suppress a nacelle fire 240 feet in the air, possibly on a windy day?

Noting these three conditions, the proposed project **<u>WOULD NOT</u>** be consistent, nor could it be through mitigation measures to the KVCCP. 27-19 Cont. LU-6

Chapter 1, page 1-18, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Mechanical Hazards, Proposed Action states that turbine tower collapse and blade failure (throws) are extremely remote, but then states it has occurred in the past. However, this DEIS fails to mention that the record on the 1.5 MW turbines is only now being written. This is newer and larger technology with no real operational history. Prudence would dictate that established safety setbacks should be on the liberal side (minimum of 545 feet) but realistically in the neighborhood of 700 to 900 feet from public roads and non-participating landowners property lines. 27-20 HS-4

Same page, under No Action Alternative. The last sentence, "The project area would retain a high fire hazard" should be stricken as it is conjecture. If the project is not built, current uses could expand, most likely as residential development which could alter the nature of the land and reduce the fire hazard. 27-21 HS-1

Chapter 1, page 1-19, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Mechanical Hazards, Proposed Action states "the presence of the project would likely have little long term effects on the level of fire hazard". It also states "wind turbine machinery is designed with fire safety in mind". As stated previously, there is basically no operational history on these newer larger machines and to make the statement that these machines perfectly safe is irresponsible. A review of literature has shown that these machines do sometimes fail and do sometimes start fires. It is inconceivable that this comes from enXco. They recently had such a failure that is described below:

Burn Fatality at Enxco's Altamont Wind Farm Site
by Paul Gipe
20 November 2003 27-22 HS-1

On September 19 at 7:30 pm Marty Evans died of burns received the previous day at a wind farm managed by Enxco says California's Division of Occupational Safety and Health (CalOSHA). Evans (34) was "performing a switching operation when an explosion occurred" at about 11:00 am on the 18th. The explosion burned Evans over 80 percent of his body and started a grass fire. The East Contra Costa Fired Department responded. CalOSHA has opened an investigation of the accident and will exam Evans training, qualifications, and work assignment as well as interview his colleagues to determine the cause of the accident. No other details are available.

Enxco says the accident occurred when Evans was switching a pad-mounted transformer. There are literally thousands of such transformers on California wind farms and switching them is a common activity.

Enxco is a large diversified developer and operator of wind power plants. The company is part of SIIF, the unregulated subsidiary of French utility giant Electricite de France. 27-22 Cont. HS-1

Why was this information of potential transformer failures not mentioned in this DEIS or reported by enXco?

Chapter 1, page 1-20, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Shadow Flicker, Proposed Action plainly states "The distance threshold for shadow flicker impacts is approximately 2,000 feet." And, "38 receptors (residences) in the project area could be exposed". This fact is being described as an unavoidable impact, especially for non-participating residences and neighboring land owners out to at least 2000 feet. This is unacceptable. Exposure statistics in this section are missing the whole point. No non-participating landowner should be subjected to this effect, PERIOD. The whole purpose of successful siting of commercial wind farms is to eliminate it's effects from innocent neighbors. If enXco cannot position turbines to accomplish this, they are proposing it in the wrong area. 27-23 HS-7

Chapter 1, page 1-21, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Noise, Proposed Action states "project noise impacts would be rated at either low or medium, and would not be significant." It also states "tonal noise from turbine operation is possible, but cannot be predicted." In a review of literature, one of the most under rated impacts is that of noise. There is ample information about noise logs and complaints of being close to wind turbines on the Internet. Computer modeling and dB weighting is not an exact science and the current analysis using WindPro software does not take into account the many variables of each turbine placement in its environment as well as the cumulative effects of carried sound. 27-24 NOI-1 Bottom line is the same as for shadow flicker. A 2000 foot noise buffer at a minimum. No non-participating residence and neighboring landowner should have to endure industrial noise. If enXco cannot position turbines to accomplish this, they are proposing it in the wrong area. 27-25 NOI-2

Chapter 1, page 1-21, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Aesthetics, Proposed Action reduces this issue to "Visual Assessment Units". Any sane person can figure out that 120 gigantic 340 foot towers with blinking lights and moving 200 foot blades in your western viewshed will adversely affect views. The DEIS contains pictures of 16 key views all of which contain clouds and other objects to detract from the turbine simulations. This DEIS should contain simulation photographs from each affected non-participating resident within 2000 feet. 27-26 ALG-2

Chapter 1, page 1-22, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Light and Glare, Proposed Action states "Blade glint or glare can be noticed over distances of 6 to 9 miles and could be an occasional occurrence." This impact can affect the public driving on public roads out to 9 miles if the information is correct. A significant impact for public safety on the roads and further distractions for drivers. Drivers on Interstate 10 and 90 and Highway 97 should not be exposed to this effect thus the potential to cause accidents. If enXco cannot position turbines to accomplish this, they are proposing it in the wrong area. 27-27 ALG-3

Chapter 1, page 1-23, Summary Comparison of Environmental Impacts, Table 1-1, Recreation, Proposed Action states "Indirect impacts would be limited to minor audible and visual intrusion into nearby recreational areas". For the eight landowners who have signed up with this project, only they should be impacted by its operation. The 57 neighboring landowners should not have to be impacted, even if estimated to be minor. Recreational use of land is a basic right of the landowner and should not be infringed upon, especially for a project with dubious benefit to the overall community. 27-28 RC-1

Chapter 1, page 1-25, Summary Comparison of Environmental Impacts, Table 1-1, Air Transportation, Proposed Action states that 27 turbines would "likely be considered hazards to air navigation and a potential adverse impact on air traffic operations in the traffic pattern". Since Bowers Field has been in operation since WWII, they should not have to alter established travel patterns to 'accommodate' the construction and profitability of the Applicant. Those 27 turbines identified as hazards should therefore not be allowed and eliminated from the application. 27-29 AT-2

Chapter 1, page 1-27, Summary Comparison of Environmental Impacts, Table 1-1, Population, Housing, Employment, Proposed Action states "current research has generally found that wind farms have either no effect on tourism or a positive effect". An expanded review of literature should be performed. There is ample evidence that industrial commercial wind installations in view shed areas will ultimately reduce tourism in the long run. Initially, after becoming operational, the general public and educational institutions (i.e., school field trips) will make a point to visit the area to be amazed at how big these machines are. But after that, the novelty goes away. Very few people travel to an area just to look at a wind farm. 27-30 PHE-1

Chapter 1, page 1-23, Summary Comparison of Environmental Impacts, Table 1-1, Fiscal Conditions, Proposed Action states "Potential property tax revenues from the project are estimated at a maximum of nearly $1.1.million for the first year of operation. Tax revenues in subsequent years would be based on depreciated value of the project and have not been estimated". The important point here is that a table of depreciated value should be produced to show the accelerated depreciation method and actual estimated tax revenue throughout the 20 to 30 year operational period of the project. This can easily be produced and should be requested. 27-31 FIS-2

Chapter 1, page 1-32, 1.7 Cumulative Impacts, 1.7.4.3 Wildlife. All references to the statement, "To date, no bald eagle fatalities have been reported from wind plants in the US" should be stricken from this document. For WEST, Inc. to repeat this mantra and for Huckell/Weinman Associates to accept it on face value is irresponsible. There is ample evidence that these wind turbines have killed thousands of raptors including golden and bald eagles, especially at Altamont, CA. And WEST, Inc. was involved in that avian study and has never been held accountable for their 'miscalculations'. 27-32 PA-13 The Desert Claim as well as the Kittitas Valley Wind Power Project areas are in bald eagle hunting grounds. The Kittitas Valley Audubon has confirmed that fact. There is a high potential that these 27-33 PA-12 two projects, if operational, will take a toll on our local eagle population. This is in violation of the federal Bald Eagle Protection Act. 27-33 Cont. PA-12

Same page under **Mammals**, it states, "based on experience at other wind plants, bat fatalities are likely to occur at all three Kittitas County projects". Yet, WEST, Inc. has done no formal bat studies to date at either project site. To suggest this impact will occur, but no study was done to investigate the overall impact, is irresponsible. Formal bat studies must be carried out as well as night studies on migratory birds for 2 years. 27-34 PA-1

Chapter 1, page 1-34, 1.7 Cumulative Impacts, 1.7.5 Energy and Natural Resources. After the sentence, "Assuming long-term operation of the three projects at a typical plant factor of 33%, the Kittitas Valley, Desert Claim and Wild Horse projects would produce approximately 180 average megawatts of electricity on a long term basis", should be eliminated. The rest of the paragraph is conjecture as none of the Applicants have a buyer for their proposed energy production. There is no guarantee that any of the power produced will stay in the local area or even in Washington State. Note that the Applicant admits that "although it (wind power) would represent a relatively small addition to the total regional electricity supply". The last sentence gives the impression that Puget Sound Energy will buy their power. The fact is PSE just has a RFP to look into renewable energy in all its form, wind power only being another form. 27-35 ENR-1

Chapter 1, page 1-35, 1.7 Cumulative Impacts, 1.7.7, Land and Shore Use states "it is possible that the proximate Desert Claim and Kittitas Valley proposals (together more than 12,000 acres) could cumulatively discourage residential uses to some degree in their general locations". It also states "some nearby residential users might seek to relocate if they felt that wind facilities, individually or collectively, conflict with elements of their lifestyle." 27-36 LU-3 This is absolutely preposterous! For the benefit of about 21 landowners, they feel they have the right to condemn 160 plus residences and landowners (on the project perimeter) and force them to abandon their property. How many other hundreds would be affected out to 1 mile of the project areas? This statement alone is proof that the wind developers do not care about being good corporate neighbors to citizens of Kittitas County. This is reason enough to not allow the wind resource rezone. 27-37 VB-2

Chapter 1, page 1-35 - 1-44, 1.7 Cumulative Impacts. The rest of this chapter basically amplifies all the impacts previously discussed. These cumulative impacts are mostly from the close proximity of the Desert Claim and Kittitas Valley projects. Wild Horse, on the other hand, would add little cumulative effect due to its isolated location and only one resident within 1-1/2 miles to the project area. One could argue this is a prime location in Kittitas County for this type of industrial development. 27-38 SO-4

Chapter 1, page 1-48, Mitigation Measures, 1.8.3.2 Ground Water does not address mitigation measures in regard to damage to non-participating landowner's wells that could be damaged by the blasting techniques to create the 30x30x35 foot holes needed for each turbine base. 27-39 WR-2 T here could be silting or other water quantity or quality issues. The long-term effect of 120 of these giant concrete cubes deep in the ground has not been 27-40 WR-3 evaluated in the long term (30 years). Concrete is known to leach minerals over time. What protections are in place for personal wells in the entire area for the next 30 years if water quality changes? 27-40 Cont. WR-3

Chapter 1, page 1-49, Mitigation Measures, 1.8.4.1 Vegetation, states "the project proponent would coordinate with the WDFW to mitigate for impacts to shrub steppe and grassland habitat. Mitigation is expected to consist of acquisition of replacement habitat at a 2:1 ratio for shrub steppe and 1:1 for grassland." What exactly does this mean? Once shrub steppe habitat is disturbed or destroyed, it is gone and cannot be returned by revegetation of native seed mixes. This mitigation measure and plan to acquire replacement habitat needs to be explained in detail. 27-41 PA-5

Chapter 1, page 1-50, Mitigation Measures, 1.8.4.3 Wildlife states, "A Technical Advisory Committee could be formed to implement and evaluate a mitigation and monitoring program and determine the need for further studies or mitigation measures once the project is operational." This statement is a very irresponsible way of saying the bird studies from WEST, Inc. say birds won't be killed, especially eagles, so it will be safe to build. And after becoming operational, and birds are proved to be killed (including a couple of eagles), they will form a committee to look at the problem. Reverse engineering at its finest. The Applicant is saying they could form a TAC, but will they? They mention that only a one year program be planned. The TAC should be in place for the lifetime of the project. They also don't describe or outline the authority the TAC will have on the wind farm operations. Will they have the authority to decommission turbines identified as excessive killers of birds or bats? Will they have the authority to shut the turbines down during migration seasons? How will those members of the TAC be compensated? Will they have an adequate budget to perform physical carcass counts on a regular basis (once or twice a week)? Will they be able to capture photographic evidence of bird and bat kills in a log PRIOR to disposing of casualties? Will that log be available to the public on request? 27-42 PA-4

And finally, if any golden or bald eagle becomes a casualty, who will be the accountable enXco official prosecutable under the federal Bald Eagle Protection Act? 27-43 PA-12

Same section, page 1-51, states, "guy wires on permanent met towers on-site could be equipped with Bird Flight Diverters to minimize the potential for avian collisions with guy wires." There should be no structures using guy wires. Permanent met towers should be constructed that are stable enough not to need guy wires. 27-44 PA-6

Chapter 1, page 1-52, 1.8.7 Land and Shoreline Use states, "Increasing turbine setbacks from the residences adjacent to the central portion of the site could reduce visual and proximity impacts to these residents. Other impacts discussed would not be significant and do not warrant mitigation." UNBELIEVABLE! 57 other residents living amongst and next to this industrial operation who will be subject to all the impacts previously discussed 'are not significant and do not warrant mitigation'. 27-45 LU-5 Hundreds of citizens WILL BE effected by SIGNIFICANT impacts, and enXco states: "Tough - if you don't like it you are free to move elsewhere." I cannot believe the Kittitas County 27-46 VB-10

Commissioners would walk over their own constituents to harm so many citizens for the benefit of 8 landowners. 27-46 Cont. VB-10

If this project is permitted, I would like to have described exactly what enXco will do to mitigate impacts to residences and landowners within a mile of this project area. The Applicant stated previously that some people will not be able to live around the project area and may have to move. EnXco should have to buy those properties within a mile of the project area at today's market value. PERIOD! 27-47 LU-4

Chapter 1, page 1-53, 1.8.8 Health and Safety, 1.8.8.1 Mechanical Hazards states, "Wind turbine generators....are equipped with multiple safety systems as standard equipment." As previously mentioned, there is no track record with which to compare whether this design is the most reliable or the safest. These larger designs have not been in operation long enough to state, with any reliability, their sound design. Once the turbine leaves the factory, the manufacturer basically declines any responsibility or liability and put it on the wind developer. Contractors assemble these giant structures wherever the wind developer wants to place them. Are the contractors assembling these structures to the manufacturer's specifications? Will the maintenance schedules follow manufacturers instructions? Is the wind developer cutting corners to save money? Are all safety features installed correctly? There are many ifs and variables which is why enXco states 'humans access should be restricted within a distance of at least 540 feet away from each tower. 27-48 HS-2

Chapter 1, page 1-53, 1.8.8 Health and Safety, 1.8.8.1 Mechanical Hazards, Tower Collapse states that "the selected wind turbine generator / tower combination would be subjected to engineering review to assure that the design and construction standards are appropriate for the Kittitas Valley site." The engineering review described should be included as part of the DEIS. 27-49 HS-11

Chapter 1, page 1-53, 1.8.8 Health and Safety, 1.8.8.1 Mechanical Hazards, Ice Throw states, "in light of the few days of icing conditions expected at the Kittitas County site, it MIGHT be practical to shut down selected turbines when the danger of icing exists. Icing sensor systems are available and COULD be installed on specified turbines". No evidence was presented to back up the statement that, "in light of the few days of icing conditions expected," is true. Records are available at Bowers Field to identify how many icing days have been experienced in any recent year. The Applicant does not say if icing sensors WILL be purchased and utilized, only might be used. 27-50 HS-3

Chapter 1, page 1-54, 1-55, 1.8.8 Health and Safety, 1.8.8.1 Mechanical Hazards, Fire Hazard states, "Location of transformers and electrical equipment below ground would harden them against tower collapse, blade throw and vandalism, thereby reducing the fire hazard." But, on the **Fact Sheet Page ii** states "a transformer mounted on a concrete pad near the base of each turbine would raise the voltage from 575 volts to 34.5 kilovolts." Which do they plan to do? This issue needs to be specifically addressed in 27-51 PD-8 light of the recent death and grass fire at an enXco wind farm in California when the pad mounted transformer unexpectedly exploded with a similar turbine design. 27-51 Cont. PD-8

Chapter 1, page 1-54, 1.8.8 Health and Safety, 1.8.8.3 Shadow Flicker states: "Because shadow flicker can only occur…it could (in principal) be prevented by shutting down specific turbines…. Implementing this measure, in practice, would likely be quite difficult, however. One operational measure that might be feasible….would be to develop a telephone hot line system. Receptor locations ….. could be provided with a specific number by which to connect to project staff …to request temporary turbine shutdown …. The viability of this option with respect to project operational costs and flexibility has not been evaluated." Other mitigating measures suggest that residents affected put up drapes or blinds on their windows. Again, this is unacceptable. No non-participating landowner should have to be exposed to this impact. The Applicant's comments above conclude that shutting down the facility at sunrise and sunset for 10 or 15 minutes is not an option and putting in a hotline number will affect (profits) operational costs. They previously stated shadow flicker can extend out to 2000 feet from a turbine, let alone 120 of them. This issue has not been researched enough and the mitigation measures are inadequate. Placing the problem that the Applicant created on the backs of hundreds of affected residents is about as irresponsible as another corporate polluter. 27-52 HS-8

Chapter 1, page 1-55, 1.8 Mitigation Measurers, 1.8.8 Health and Safety, 1.8.9 Noise states, "Several noise mitigation measures were included in the project design." With these design features, no significant noise impacts were identified." The Applicant offers no mitigation measures if their WindPro computer modeling simulation is wrong and their project subjects unbearable noise pollution into the surrounding area. The noise impacts seem to be the most problematic of wind farms placed in close proximity to human inhabitants. There is ample evidence on the internet from the UK, Spain, Germany and other European countries that have established operational wind facilities. 27-53 NOI-3 A mitigation measure would be that if their project creates unacceptable noise into the community, it will be decommissioned in a timely manner. The TAC group formed to monitor avian and mammal fatalities, should also keep a log of noise complaints from the surrounding community and work on resolutions up to and including purchasing of properties effected. 27-54 NOI-3

Chapter 1, page 1-56, 1.8 Mitigation Measurers, 1.8.8 Health and Safety, 1.8.10, Aesthetics, Light and Glare. None of the proposed mitigation measures will do anything to reduce the wind turbines towering effects in the valley. They cannot blend in a 400 foot structure with a blade the size of a Boeing 747 spinning with flashing lights into the landscape. Adding 119 more with random flashing lights and unsynchronized spinning blades would present the visual blight of industrialization to the valley. 27-55 ALG-4

Chapter 1, page 1-57, 1.8 Mitigation Measurers, 1.8.8 Health and Safety, 1.8.11, Recreation states, "The impact analysis did not identify significant adverse impacts on recreation resources and no mitigation measures are required or identified for 27-56 RC-1 consideration." This DEIS does not even mention those landowners who have purchased real estate not intending to build a home, but purchased for recreation. I myself, am an amateur astronomer. If I owned property on the fringe of this project, I would not be able to recreate in my own manner. The shear size of these machines would block massive areas of the sky. The blinking lights would introduce light pollution so deep space observations would be impossible. I am also a bird watcher. As in the previous example, my bird watching would be reduced to watching birds being chewed up by these cuisine arts of the sky. Hunkell/Weinman Associates should not accept the word of the Applicant, and do their own research with realtors in the area who know why people buy and recreate in the proposed area. 27-56 Cont. RC-1

Chapter 1, page 1-58, 1.8 Mitigation Measurers, 1.8.13 Air Transportation, 1.8.13.1 VFR Traffic Pattern states, "As of this writing, the Applicant has not completed an evaluation of the feasibility of these possible measures or their impact….and has not indicated a preferred course of action…" Modification of established air traffic patterns for the purpose of enXco to have 27 more turbines should not be an option. The proposed project is not worth, nor does it have a priority over, Bowers Field and its operation. 27-57 AT-2

Chapter 1, page 1-60, 1.8 Mitigation Measurers, 1.8.15 Population, Housing and Employment states, "no mitigation measures are necessary to offset impacts to employment, population or housing." Again, this DEIS did not go into great detail on the overall impacts to the county. Mitigation Measures should be in place if the EIS is found to be wrong. Many of the studies and information were selectively provided by pro-wind power sources. What if, after the project is built, real estate values and sales plummet? What if the annual Ellensburg Rodeo attendance drops 50 percent? What if business owners start seeing a drop off of business because travelers now bypass Ellensburg from Interstate 90? What if a wind turbine gets struck by lightening, starts a fire and spreads through the project area destroying houses and wildlife, decimating the area? What would enXco do? All these are examples of impacts that could happen and should be addressed. EnXco should have to be held accountable for any negative impacts they created, and deceived the County by withholding the facts. Perhaps this is why wind developers form LLCs (limited liability corporations). 27-58 EIS-10

Chapter 1, page 1-61, 1.9 Significant Unavoidable Adverse Impacts, 1.9.1 Earth Resources. No mention was made of the impact to the destruction of the coveted Ellensburg Blue agate in the excavation and moving of tons of ground. This earth resource is specific to this area west of Ellensburg. Many businesses make their livelihood in selling Ellensburg Blue gemstones. 27-59 ER-1

Chapter 1, page 1-62, 1.9 Significant Unavoidable Adverse Impacts, 1.9.4.3 Wildlife states "The project would result in unavoidable impacts to birds, primarily in the form of mortality caused by collision with turbine blades. Consequently, impacts to birds would not be considered significant." How many deaths of innocent birds and bats would it take to be considered significant??? Bald eagles inhabit the project area and the WEST, INC study confirms the eagle sitings in the area. How many eagles have to die to be 27-60 PA-14 considered significant??? This is the greatest example of 'minimizing' I have ever read. This whole issue needs to be re-examined by another, impartial, avian expert. The implication that avian mortality at this site will be similar to other sites is ludicrous. Every area, even if within the same state, has differences. 27-60 Cont. PA-14

Chapter 1, page 1-63, 1.9 Significant Unavoidable Adverse Impacts, 1.9.7 Land and Shore Use states: "The scale of the wind turbines would be significantly larger than other land uses; this contrast is unavoidable because of the nature of wind facilities. Effects on overall land use patterns in the project area would not be significant. Impacts to residences located proximate to the turbines could be reduced, but not avoided through increased setbacks." Another amazing statement! It is obvious that this project is incompatible with current land uses. They use the word 'proximate', and I would define that to mean within 1 mile of the project. The immediate impacts can be avoided by building it in a more isolated location away from innocent landowners. This is a poor site, and the authors of this DEIS failed to examine successfully sited projects such as the Stateline Project on the Columbia and the Klondike project in Wasco, Oregon. Even the proposed Wild Horse project can probably be compared as a successful site as it appears it will have little opposition and no impact to neighboring landowners. 27-61 LU-1

Chapter 1, page 1-63, 1.9 Significant Unavoidable Adverse Impacts, 1.9.10 Aesthetics, Light and Glare states, "Development of the project as proposed would result in significant unavoidable adverse impacts to the visual environment, especially for nearby rural residents in the northern half of the Northwest Valley." That says it all! Eight landowners will benefit to the detriment of hundreds of others for the benefit of unreliable, expensive and minimal electrical energy to be sent out of state so that a French company can profit. Amazing! 27-62 VB-2

Chapter 1, page 1-64, 1.9 Significant Unavoidable Adverse Impacts, 1.9.13 Air Transportation states, "Selection of the mitigation approach for the airspace conflict remains an unresolved issue." This is a crucial issue that must be resolved before a formal EIS be issued. It is irresponsible that Huckell/Weinman would let this remain unresolved in a DEIS. Forcing Bowers Field to change their policies on airspace should not be an option. The priority and purpose in the community of Bowers Field far exceeds what enXco needs to be profitable. 27-63 AT-2

Chapter 1, page 1-65, 1.9 Significant Unavoidable Adverse Impacts, 1.9.15 Population, Housing and Employment states, "The population, housing, and employment impacts of the Desert Claim Wind Power Project are not expected to be significant, and would not likely be viewed as adverse." This comment is totally counter 27-64 PHE-2 to **Chapter 1, page 1-63, 1.9 Significant Unavoidable Adverse Impacts, 1.9.10 Aesthetics, Light and Glare.** There WILL be impacts to many, and they WILL be adverse. This project does not justify destroying the Upper Valley so that eight landowners benefit financially as well as a French corporation. 27-65 VB-2

IN CONCLUSION:

This DEIS is better organized than what I have reviewed recently with the Kittitas Valley Project. It is, again, a document written to slant impacts to the developer. All industrial projects have a downside and Huckell/Weinman failed to realistically present that side. The document is littered with minimizing statements like, significantly insignificant, not expected to be significant, no significant adverse impacts, negligible significant adverse impacts, no high (i.e. significant) unavoidable adverse impacts, significant adverse indirect impacts are not anticipated, and adverse impacts are either not anticipated or would be insignificant. 27-66 EIS-1

Although this DEIS states obvious impacts, it does not go far enough to examine the long term effects. Mitigation measures are not long term and do not obligate the Applicant to pursue corrective actions after construction. 27-67 EIS-10

The wildlife studies by WEST, Inc are inadequate and fail to take into account night studies, bat studies and migratory flight paths. The issue of being responsible enough to adequately address the golden and bald eagle presence was minimized and basically ignored. WEST, Inc should stand by their studies and be held accountable along with the developer should their estimates be 'in error' or eagles are killed or injured. 27-68 PA-1

Visual simulations have been minimized and additional simulations should be done for each residence within 1000 feet in or around the project area. 27-69 ALG-2

Huckell and Weinman failed to address impacts to neighboring non-participating properties in a realistic manner. 27-70 LU-1 They also failed to make the connection with neighboring property owners and real estate values should the project be built. 27-71 NS-1

The true impacts from a project of this scope and size were minimized, and selected information from the Applicant was not scrutinized but taken on face value. Many of the comments are not based on reality, but on a vision.

On my own review of literature, there is ample evidence on wind farm operations worldwide which demonstrates the problems created by this specific industry. The bibliography for this DEIS fails to show that an attempt to due diligence was carried out. Selected studies, mostly from wind energy proponents, dominated the list of references. 27-72 EIS-1

I can not accept this DEIS as submitted. With all the impacts examined, it proves that this project is poorly sited and that the benefit does not justify the end result on the citizens of Kittitas County. 27-73 SO-5

Respectfully Submitted,

Ed Garrett
Rosemary Monaghan

Clay White

From: Gene Johnson [johnsong@cwu.EDU]
Sent: Thursday, January 29, 2004 11:53 AM
To: Clay White
Subject: Wind farms

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

Dear Mr. White,

While I was initially not planning to respond during the wind-farm comment period, I believe that the issue is too important to ignore. My property on Wilson Creek Road abuts the proposed wind-farm area. When I built my house on the property in 1996, I did so because of the peaceful and quiet atmosphere. My house and property are the single largest investment that I have ever made. I plan to live there until I retire, sell the house and property, and move to smaller housing. It it hard for me to comprehend that anybody would want to knowingly move next to such monstrosities as the proposed windmills. So who would I be able to sell my property to? And if I could sell it, what type of price could I expect to get? My investment would prove to be a poor one and the quality of my retired life could suffer. I also am concerned about noise and damage to the environment and animals. I do not believe that these issues have been thoroughly addressed in reports. 28-1 NS-1 28-2 NOI-1

I wish to go on record at this time that I am OPPOSED to a wind-farm next to my property. I know that there are not many people in my position (with abutting property), but I hope the the county will look after my interests as I have the most to loose. 28-3 SO-5

Sincerely,

Gene Johnson
11401 Wilson Creek Road

PS...There are so many places east of Ellensburg where wind-farms would not disturb a soul. How about a recommendation to move there? 28-4 SO-4

1 29 P.1

Mr. Clay White, Planner II
Kittitas County Community Development Services
411 N. Ruby St. Suite 2
Ellensburg, WA 98926

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT-DESERT CLAIM

Attached are my comments for the draft Environmental Impact Statement for Desert Claim Wind Power, LLC. Project by en*X*co.

Unfortunately this DEIS lacks quantitative and qualitative information as to the effects this project will have and the methods that will be utilized to ensure compliance. The constant usage of the term "non significant" is used randomly without any determination of this except by the proposing company en*X*co. Thus, this DEIS is merely a "Statement of Non Significance" document based on the ideology of the en*X*co company. 29-1 EIS-1

As stated the intent of the proposed project as detailed is in direct defiance of the Kittitas County's objectives. This fact alone regardless of operation, maintenance, etc. is a defining factor in the disqualification of the proposed project and submitted draft EIS. 29-2 EIS-4

This project rests not only on the adoption of this EIS but that Kittitas County will adopt a site-specific rezone for the site area and a change to Kittitas County Comprehensive Plan. I cannot imagine an EIS even being proposed without the required rezoning. For the company and the community to go through the review of this draft t EIS without the approval of this zoning seems senseless. 29-3 EIS-6

As reported in Cape Cod Times, October 2003, "the U.S. Bureau of Land Management, which controls more than 261 million acres of government land, recently announced it will conduct a two-year "programmatic" environmental impact statement in western states to assess common issues and concerns associated with wind farm development" (Attachment C.). I would think that the County along with the State would stall decisions until this review is completed. 29-4 EIS-6

RECEIVED
JAN 30 2004
KITTITAS COUNTY
CDS

Sincerely,

Jill Kuhn

Jill D. Kuhn (land and homeowner)
PO Box 926
Kittitas, WA 98936

NOTE: These comments will be postmarked by the January 31, 2004 5:00 pm deadline in addition to being e-mailed.

DRAFT EIS DESERT CLAIM WIND POWER, LLC..

The proposed project by en*Xco*: Desert Claim Wind Power, LLC. for a 120-turbine wind farm (180 megawatts) eight miles north of Ellensburg is totally misaligned with the zoning, objectives and basic character of the rural area. Even though the project is considered in a rural area the proximity to the City of Ellensburg, only eight miles away, is unjustified. It is not the mere turbines alone that would be disruptive but the construction of acres of roads, power collection cables, one or more substations, operations, and maintenance and storage buildings in addition to the storage repair areas. With the thirty year life span the project would definitely alter the entire town of Ellensburg and the Kittitas Valley for generations to come. They have been mention that the development of the wind farm will decrease growth of the area. There was a subdivision request just submitted for 400+ acres to be subdivided into 56 lots. Obviously even the prospect of the wind farm is neither stopping further growth nor the review and acceptance for such subdivisions by the county commissioners. 29-5 LU-1 29-6 LU-2

1.4 Kittitas County Objectives

Not only will there have to be rezoning of the property by the Kittitas County Commissioners but an amendment to the County Comprehensive Plan. The County criteria as stated in this section: "the project is essential or desirable to the public convinces.." This project is neither desirable by many nor vastly essential. This is proven by the fact that the electricity produced by this wind farm will not even be used within the county more or less the project area. The only Kittitas County residents that consider this "desirable" and for many of them even "essential" are those individuals already signed with en*X*co, Inc. for the lease of their lands. Thus, the residual profits from their leases are essential to then and to them only. 29-7 EIS-4

"The project is not detrimental or injurious to the public health, peace or safety or to the character to the surrounding neighborhood" The possible detrimental attributes of this proposed wind farm are not just those realized now but what is unfortunately unknown about the effect of wind farms on the physical health of residents. There have been claims made from active wind farms as to the noise, lights and electro magnetic reactions. Whether these are found to be accurate only time will tell. However, the legal responsibility for the county to accept such a project and the ramifications is tremendous. Of course the "peace" of the rural area will be disturbed. The mere mention above in the EIS of not only placement of the 120 turbines but the construction of access roads, control cables, power collection cables, the one or more substations, operation- 29-8 EIS-4 maintenance storage sheds and the storage repair areas is enough display that of course the "peace" of this rural area will be disturbed. The character of the immediate site surrounding, the town of Ellensburg and the whole valley will of course change. To presume otherwise is totally ridiculous. 29-8 Cont. EIS-4

The economic impact to the City of Ellensburg and Kittitas County is yet to be realized. I have not seen nor has this draft EIS documented the proposed incomes nor opposing costs. The mere usage of the existing roads without viable means of returning those costs to the city and or county would create a deficit. I would propose any deficit to the city and county would not be acceptable especially at this time. An exact recount of such cost per profit ratio should be studied. Also, if this project will limit otherwise sub dividable land and housing how will the loss of property taxes, etc. be off set by the proposed project? 29-9 FIS-3

1.5.1.3 **Operation and Maintenance**

Although Bonneville Power Administration, Puget Sound Power and Energy, Kittitas County PUD and Grants County PUD are mentioned as supposed buyers of the electricity there are no use agreements to guarantee such purchase. The economic feasibility of this project rests on these Purchase Agreements. Such agreements should be required as part of approval of this draft EIS. 29-10 PD-6

1.5.2 Alternative Site I Wild Horse Site

Yes, this could be a possible site. However Zilkha has already applied for a wind farm at this location. I sincerely doubt that with the proposed site acreage there would be adequate acreage for yet another farm by en*X*co Inc. So this is not a practical alternative. 29-11 ALT-3

1.5.3 Alternatives 2 Springwood Ranch

Springwood Ranch is mentioned as an alternative site. How can this site even be proposed when there has been no comprehensive, meteorological, on site review The Spring wood Ranch management has not even approved of such a "wind farm" site. Thus, no alternative is viably proposed. 29-12 ALT-4

1.5.3 **No Action Alternative**

This is by far the most comprehensible and reasonable statement throughout the entire EIS. Of course the proposed site will be subdivided. The County Commissioners are currently reviewing a subdivision request for a 400+ area to be subdivided into 54 lots. Of course none of us like the subdivision of rural land that eventually extinguishes the "rural character" of the area. However, this is a separate issue that needs to de 29-13 ALT-1 determined by the Planning Department in association with the County Planning Commission. Subdivision of this site will happen regardless. However with the increase number of residents the potential for physical harm, peace and safety of the area becomes even more in jeopardy. 29-13 Cont. ALT-1

1.6 **Summary Comparison of Environmental Impacts**

Table 1 showing the comparison of environmental impacts with the project and the two 78 proposed sites provides no information. The majority of the information provided is repetitious and since there have not even been site visits as recorded by this EIS at the Springwood Ranch I cannot see how this can even be regarded. 29-14 ALT-4

Earth: How can the impact of erosion be the same as it is now when there will be considerable construction during the development and construction of the project? Who will be the judge as to the impact of erosion? Due to the water table, steams and well systems, erosion, disturbance of this large amount of acreage, would of course have an impact. 29-15 ER-2 The location of turbines in already recognized "high land slide" areas should not even be permitted. 29-16 ER-3

Air Quality: The maximum construction especially of roads in the dry arid site will of course affect the quality of air. To what extend would be hard to predict. Hopefully this would be evaluated prior to jeopardizing the health of adjacent residents to construction areas. 29-17 AQ-2

Water Resources: As stated the proposed project would affect 15 streams in the construction of the towers and 18 streams would be crossed in collection of the power. Water is of extreme importance and of cautionary note especially in such an arid site. It is stated in the EIS that the constriction impacts would be "minor and temporary." Thus, enXco admits that there will be an impact. How temporary would this impact be? I would suspect that construction would happen during the spring and summer months when water tables can become increasingly low. 29-18 WR-1
It is admitted in this draft EIS that localized impacts to ground water quality are possible" but go on to say that this can be corrected by mitigation. The question is what specific mitigation? 29-19 WR-2

Vegetation: This project would occupy 78 acres of vegetation and 311 acres would be "temporarily disturbed." Unfortunately there is no such thing as "temporary disturbance" for vegetation. The vegetation is either disturbed or it isn't. The proposed construction could not be done without harming the vegetation. Yes, this vegetation may return but unfortunately it had been shown in many environmental cases that such "disturbance" disrupts more than the vegetation. The whole eco system that is supported by the vegetation and that it supports would be discomposed. The direct impact is to the animals of the region. 29-20 PA-18
16 acres of wetland would be temporarily disturbed by the projects construction and 9 acres of the en*X*co project would "permanently" be lost. Encroachment on designated 29-21 PA-11

"wertland" areas is extremely restricted if allowed at all. I cannot imagine that the State of Washington would allow the loss of 9 acres of "wetland." This could be yet another legal liability if approved by the county. 29-21 Cont. PA-11

Wildlife:

Birds: The information provide is based on conclusions drawn from studies issued by West, Inc. Many of these studies have been declared incomplete and thus should not be allowed as evidence. Also, these studies did not include information provided by actual residents of the area nor been the local Kittitas County Audubon Society. 29-22 PA-1 The site chosen is a warranted bald eagle roosting and hunting area. Since Bald Eagles are protected under United States Federal law (Bald Eagle Protection Act) I cannot I imagine disturbance of this site being acceptable. Even raptors in this area are protected by State law. How would Federal and State law be upheld when aviary harm is assured in the draft EIS, "3 to 4 raptor fatalities per year, 140-220 birds per year"? There can be no mitigation for the operation of 122 turbines that ensures bird kill as stated. But the EIS states that the "endangered species are not actually likely to use the area." Now that's ridiculous since it's already been proven that the species use this area (i.e. bald eagles, raptors). Why would these species all of a sudden not use the areas that they have used for centuries? Altamont Pass has documented the bird kill problem by wind turbines (refer to Attachment A. Washington Post Documents Bird Fatalities). 29-23 PA-12

Other Wildlife: The EIS states that "impact to small l mammals are expected to be low and non significant." What studies have been conducted for that statement to be concluded? With disturbance to the vegetation and topography loss of small mammals would prove to be significant especially to the higher species that feeds off that chain. This of course holds true for the mentioned amphibians and reptiles. The WDFW has determined that this area is winter range for the mule deer and Quilomene Elk spring migration is adjacent and many times within the project area's north boundary. The EIS sounds like the loss of these animals would not be important to the environment and the residents of the area. May we be reminded that this area and surrounding adjacent lands are recreational hunting areas. Any losses would not be taken lightly. 29-24 PA-9

Fish: Federally threatened summer steelhead is in not only the Yakima River but also Reecer Creek. How can the proposed project not affect the survival of this species? There is no information given on any neither migration nor procedures to ensure protection. 29-25 PA-10

Consistently throughout the review of the environmental site no wildlife, fish or vegetation would be significantly impacted. There are many endangered species listed. Yet there are no methods addressed for the protection of theses species. Should it e garnered that there will be "no significant affect" just because enXco, a wind farm developer, private company for profit, states so? **This is neither guaranteed nor acceptable.** 29-26 PA-19

Energy and Natural Resources: "The project would have little or no impact on the supply and price of electricity available to local customers." How can this statement be made? How can local customers be impacted when the company, en*X*co has no documented buyers for the produced power? But in fact if the power were to go to local Kittitas customers the cost would be higher because electrical companies charge a higher rate for power that is considered "green." The electric companies have to pay premium for wind power and that is then passed to the consumers. Local consumers would certainly not benefit. 29-27 ENR-1 Also, the 60-megawatt of power to be produced is certainly different than the 180 megawatts of power that was represented at the beginning summary of the project. This fact alone is very misleading and should be corrected through the EIS document. 29-28 PD-5

Cultural Resources: EIS goes on to say that development would be able to unveil "prehistoric and historic artifacts." This statement is preposterous. If any such artifacts were to be uncovered the project would be halted until certified archeologists and geologists would "clean" the site (University of Washington Archeological and Geological School of Studies). 29-29 CR-1

Land and Shoreline Use: Once again conjecture rules in this fictional tale. How can a project of this scope not impact existing activities and "changes to the land use patterns? To suggest such is ludicrous. Yet I do agree with the EIS statement that "Wind Turbines would be significantly greater in scale than nearby residential uses, and "some degree of incompatibility or conflict would exist." This is so very true. The one local wind turbine of 8 feet cannot compare with 120 turbines of 380 feet. Quite a startling difference and yes it would present incompatibility and conflict. 29-30 LU-1

Plans and Policies: The EIS states that the "proposed project would be consistent with the land use and utilities policies of the Kittitas Comprehensive Plan." As previously delineated this is not correct. In fact the project is indirect contradiction of the Kittitas Comprehensive Plan 29-31 LU-6

Health and Safety:

Mechanical Hazards: The EIS states that turbine tower collapse and blade throws are extremely remote. However, in the next statement admits that this has occurred previously. Since the designed turbines are new, of larger statue, there is no documentation for these exact turbines and potential hazards. Realistic setbacks would be hard to ensure with all of the existing lots and roads. 29-32 HS-2 Fire hazard seems not to be an issue. .However in such a high fire area site and with construction, operation and use of fuels this statement seems not justified. A review of the fires from previous years would give a good indication of the current fire danger. 29-33 HS-1 The fire danger would of course be increased. How will the local City of Ellensburg or the County handle such increased potential? How will the additional resources be paid for and what impact will that have on the residents need for fire protection? 29-34 PSU-2 Such a mechanical failure resulting in a burn fatality occurred at en*X*co's Altamont Wind Farm site (Attachment B). 29-35 HS-1

Electrical Hazards: Although the EIS mentions no potential electrical hazards a mechanical failure resulting in a burn fatality occurred at enXco's Altamont Wind Farm site (Attachment B). A failure as this is no reported in this EIS. Has review of en*X*co's health and safety records been reviewed? And not those by the company but county records specific to the site? Unfortunately the effects of Electromagnetic Fields are still being reviewed. As with Seattle City Light would en*X*co have testers that are used in residential areas to ensure no activity? In case the turbines due interfere with reception and communications what mitigation will be warranted? 29-36 Cont. HS-6

Shadow Flicker: The EIS states, "The distance threshold for shadow flicker impacts is approximately 2,000 feet." And, "38 receptors (residences) in the project area could be exposed". This fact is being described as an unavoidable impact, especially for non-participating residences and neighboring landowners out to at least 2000 feet. This is unacceptable. Residents who are not leasing their land to enXco should not be subject to this effect. If the project cannot be sited where it does not present such potential problems than the project should be site elsewhere. 29-37 HS-7

Noise: The EIS States "project noise impacts would be rated at either low or medium, and would not be significant." In addition it states, "tonal noise from turbine operation is possible, but cannot be predicted." In a review of literature, one of the most under rated impacts is that of noise. There is ample information about noise logs and complaints of being close to wind turbines on the Internet. Once again residents who have not leased their lands to en*X*co should not have to bear the effects of this project. Once the turbines are built and if the noise is over powering will the turbines be removed? Of course not! This has the potential of becoming an industrial wasteland. 29-38 NOI-1

Aesthetics: There is no way that 120, 340 foot towers with 200 foot blades will not impact the aesthetics of the area. Since the site is mostly level the wished throughout not only the site but even as far as Lions Rock overlook will be dramatically affected. The blinking lights on each tower would further impair this. Unfortunately the 16 views presented in the EIS are not accurate simulations due to the photograpic quality of the pictures (i.e. impaired distractions in the picture. I would like to see accurate simulations from residential house that are contiguous to the project. Once again it seems that the majority off affect residents will of course be those who are not being paid subsidies/leases from en*X*co. 29-39 ALG-2

Light and Glare: The EIS states that "blade glint or glare can be noticed over distances of 6 to 9 miles and could be an occasional occurrence." Since the city of Ellensburg is a mere 8 miles away this would not only impact the city butt outside of the city limits. How will this glare interact with road conditions? I cannot imagine what impact this would have on aviation. With the Yakima Firing Range using this vicinity for practices I do not believe that that there would be compliance with the Federal Aviation Administration. The distance for possible glare would impinge on not only local roads but Interstate 10 and Highway 97. Due to this glare problems siting of the turbines is not correct/adequare.. 29-40 ALG-3

Recreation: Contrary to the EIS statement I believe that recreation would be greatly I impacted. The possible noise, glare and the potential loss of wildlife for hunting would ensure this site to be defunct. Large numbers of people recreate in the Wenatchee National Forest, Lion Rock area. There are many recreational sites there that directly overlook the Recer Creek site proposed. Yearly there is a "Stargazers" gather of thousands of people at Lion Rock to view the stars with their telescopes. This site was selected because of the pristine viewing area. If the Desert Claim Wind Farm went in this major event would be halted. Viewing of the sky cannot occur when there are 120+ blinking lights in the night sky. Again contrary to the believe of wind farm developers, wind farms are not tourist attractions (refer to numerous articles through the Internet). If there is a draw it is for first time curiosity. After that the facility will lay dormant. Do you remember that this same adage was used for the building of nuclear power plants (refer to article, Three Mile Island, Beyond Tourist Reach). There have similar effects reported by Skye Windfarm Action Group (http://www.sw-ag.org/). 29-41 RC-1 29-42 RC-2

Air Transportation: If there are 27 turbines that would "likely be considered hazards to air navigation and a potential adverse impact on air traffic operations in the traffic pattern" why would they be allowed? 29-43 AT-2

Public Services and Utilities:

Water Supply, Storm Water and Sewage: Since the majority of all residents and recreational water is supplied by wells the potential for detrimental impact is a viable concern. Especially since the site would interact with several streams and waterways, most importantly Recer Creek and the Yakima River. Considerations as to irrigation are not even presented which it important to such an "agricultural" area. 29-44 PSU-4

Population, Housing and Employment: EnXco expects to hire 150 workers during the construction phase of the project. Housing still remains difficult for the mere college students at Central Washington University. Seeking an additional 150 rentals would be difficult especially during the summer, migrant season. 29-45 PHE-3

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

February 2, 2004

Mr. Clay White
Kittitas County Planner II
411 N. Ruby Street, Suite 2
Ellensburg, WA 98926

RE: Comments on Desert Claim Draft EIS

Dear Mr. White:

Please consider the following comments when determining the need for additional studies and before making any decision to allow EnXco's proposed "Desert Claim" Wind Power Project (Desert Claim) near Ellensburg, Washington.

The Desert Claim (Draft Environmental Impact Study)DEIS is certainly an improvement when compared to the Sagebrush Power Partners DEIS, which is the subject of cumulative impacts discussion in this DEIS. However both DEIS studies lack credibility with regard to the analysis of certain impacts that will be a result of both proposed projects. The Desert Claim DEIS does not adequately assess certain environmental impacts. However, despite that certain impacts are not adequately assessed, the DEIS still makes conclusions that there will be no resultant problems or that the problems are not significant enough to warrant appropriate mitigation measures for those impacts. This gives the DEIS an appearance of a biased public relations document. The most likely reason for this is because the community expects that an Environmental Impact Study (EIS) should be an objective scientific report, but the consultants and project proponents who supply much of the needed information regard the DEIS as simply a supporting document prepared as part of the procedure for gaining approval of the proposed project. 30-1 ESI-1

A completely objective EIS is never likely to result for the Desert Claim proposal because large investments, careers, political agendas, and business interests are at stake. The objectives and standards of those preparing and providing information for the EIS will therefore influence its contents and conclusions through the methods employed to collect, analyze, interpret, and present scientific data. Since the EIS is prepared at a later stage of the overall planning process, EnXco has obviously already committed a considerable financial investment to the proposed project. Unfortunately and because of this, the DEIS becomes just another bureaucratic obstacle on the way to achieving their goal of project approval, and they will want to provide information that will emphasize the advantages of their project and to de-emphasize the disadvantages and impacts.

The DEIS prepared by Hunkell/Weinman Associates for the Desert Claim proposal is much more complete and less biased than the DEIS prepared for the Sagebrush Power Partners proposal. However, it still contains data deficiencies and flawed analyses that bias the reader away from or greatly underestimate the magnitude of environmental impacts posed by the project. Proposed mitigation is also deficient in some cases. The DEIS appears to make a genuine attempt to address concerns from previous public comment. It appears the main problems with the DEIS originate from reliance on information provided by EnXco's consultants that have designed their studies to support the objectives of the applicant as opposed to the environment and the non-participant residents. 30-1 Cont. EIS-1

SPECIFIC DEIS COMMENTS:

To reduce the length of this letter and minimize redundancy, I have confined my comments primarily to the fact sheet and summary sections of the DEIS document. My comments apply to all applicable supporting sections that describe the same information.

One other thing I did not find in the DEIS was a discussion of impacts to property values of adjacent landowners if the Desert Claim project is approved and built. This is a controversial subject because no wind farm of the size proposed has yet been constructed in the midst of a highly scenic area with existing residences and recreational properties. Property value studies that were used by the Sagebrush Power Partners DEIS to claim no adverse impacts would occur were biased, inadequate in scope, and incomparable to Kittitas County. While it may be a subject the Applicant or the County wants to avoid, it is a significant environmental impact that should be addressed in the DEIS document. 30-2 NS-1

FACT SHEET, page i, Proposed Action: This section describes the proposed project as "The proposed action consists of development of a 180-megawatt (MW) wind energy facility". The applicant is overestimating the actual production of the proposed facility by using the nameplate capacity of 180-megawatts (MW). Since actual energy production is usually less than 30% of nameplate capacity, this should be explained and added to every reference to their 180 Megawatt wind energy facility throughout this 30-3 PD-5 document. The applicant is using this as a way to make the proposed facility seem more significant in it's energy producing ability than is actually the case. 30-3 Cont.

PD-5

Chapter 1, Section 1.5.4 - No Action Alternative: The second paragraph presents a discussion of various development scenarios that attempt to bias the reader that the area will be ruined by rampant residential development if the proposed wind facility is not built. The statement in the first paragraph that existing land uses will continue as they currently do is factual and sufficient. The entire second paragraph is biased, speculative and not material to the DEIS and should be stricken.

Chapter 1, Section 1.6 - Summary Comparison of Environmental Impacts, Table 1-1, Air Quality, No Action Alternative: The second paragraph attempts to bias the reader that if the wind farm is not built, a fossil-fuel burning energy would have to be built. This paragraph should be stricken because the first paragraph of the section is factual and sufficient. 30-4 ALT-1

Chapter 1, Section 1.6 - Summary Comparison of Environmental Impacts, Table 1-1, Ground Water, No Action Alternative: The first paragraph reference to 400 lots again attempts to bias the reader that residential development will occur. There is absolutely no certainty of this and the line should be stricken as speculation.

Chapter 1, Section 1.6 - Summary Comparison of Environmental Impacts, Table 1-1, Wildlife, Birds: The bird studies issued by WEST, Inc. are incomplete and should not be accepted. Conclusions are based on a very limited data set of short duration that is presented through statistical models that tend to confuse the average reader. No studies of nocturnal species or bats were made and no confirmation of migratory pathways were studied. Other wind facilities are having significant raptor and bat fatalities and these details were not acknowledged. The proposed project area is in confirmed bald eagle hunting and roosting areas. Bald eagles, golden eagles, and other raptors are protected by State and Federal law. The studies attempt to write off the issue as non-significant and offer no alternatives to document or address the problem of killing these species if it occurs after the project is built. 30-5 PA-1

The consultant WEST specializes in studies for the wind development industry, and is obviously prone to bias towards supporting their client's objectives. As a property owner in the area that would be affected by the proposed project, it is obvious to me the area is rich in birds and big game, yet WEST concludes impacts to these species will be minimal. I would be interested to know if they have ever concluded otherwise at a proposed wind farm site they were retained to study. 30-6 VB-4

Chapter 1, Summary Comparison of Environmental Impacts, Table 1-1, Proposed Action, Desert Claim Wind Power Project, Plans and Policies: "The proposed project would be consistent with the land use and utilities policies of the Kittitas County Comprehensive Plan." To make this claim the project must satisfy certain criteria, and this is not the case for the following reasons:

1. The project is essential or desirable to the public convenience. The project is certainly not essential and it has also not been determined unanimously desirable based on the public scoping and public DEIS comment periods.

2. The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood. The project will introduce numerous potential injurious conditions to the surrounding neighborhood that have been documented in the DEIS and public comment. The applicant attempts to evade responsibility for these conditions or downplay the impacts by ignoring certain facts, speculation, or biased interpretation of data. 30-7 LU-6

3. The project will not be unreasonably detrimental to the economic welfare of the county and not create excessive public cost for public facilities and services. Recreation and rural development are an important and growing major economic force for land ownership in Kittitas County. The Applicant has not established how the project will truly affect the economy and recreation use of the area.

Chapter 1, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Shadow Flicker, Proposed Action: "The distance threshold for shadow flicker impacts is approximately 2,000 feet." And, "38 receptors (residences) in the project area could be exposed". The DEIS shows significant shadow flicker impacts to existing properties and residences will occur. This equates to nuisance trespass and not acceptable. 30-8 HS-7 Mitigation must be required so that turbines are eliminated in areas in which impacts to residences are documented. 30-9 HS-8 There is also no information regarding potential traffic hazards caused by shadow flicker on public and private roads, or impacts to big game or domestic animals like horses, and proposed mitigation for such. 30-10 HS-7

Chapter 1, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Noise, Proposed Action: "project noise impacts would be rated at either low or medium, and would not be significant." It also states "tonal noise from turbine operation is possible, but cannot be predicted." Most of the property in the proposed project area is 30-11 NOI-4 range land or residential that has little or no ambient noise or background noise. Allowing industrial/agricultural noise standards to apply at the property line is not acceptable. According to descriptive noise comparisons this would be the equivalent of going from the quiet of a library to the noise of busy traffic at the receptor. 30-11 Cont. NOI-4 Mitigation should require soundproofing or buy-out option for properties impacted by intrusive noise from turbines. 30-12 NOI-3 There is also no information as to the impacts of turbine low frequency noise on big game herds or domestic animals such as horses, and proposed mitigation measures for any identified impacts. 30-13 NOI-5 This is one issue the developers know creates problems and attempt to downplay. No non-participant resident should be expected to allow degradation of their property for the benefit of EnXco and a few participating landowners. 30-14 VB-2

Chapter 1, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Aesthetics, Proposed Action: The Applicant's consultant has created a model to attempt to assess this issue with "Visual Assessment Units". The supporting Appendix G of the DEIS goes in to a lengthy discussion of various ways to model the area around the proposed project with respect to view. The photographs used to demonstrate what the landscape will look like after turbines are built are very misleading. The wide-angle lens used for these photos deliberately distorts the vertical exaggeration of the photographs. In most of photos the foreground and sky is entirely overemphasized, and the actual area on the photos where turbines are simulated is too small to even see them. I know where every one of the photos was shot and it does not look like that when you are standing there looking at the view. The cloudy sky used in many of the pictures also conveniently de-emphasizes the turbines, and the snow does a good job of hiding detail also. They will not be hard to see with the naked eye, in fact they will be so hard to ignore as to make this section of the DEIS unbelievably biased and evasive of the truth. This DEIS should contain simulation photographs from each affected non-participating resident's property within 2000 feet. 30-15 ALG-2

Regardless of the photo trickery utilized, it should be obvious to anyone that this area has world-class scenic views from almost anywhere you are. Trying to classify which views will be more impacted is meaningless. Construction of the project will forever change a beautiful landscape that has been the primary reason many people bought property here. The night time lighting will be hugely invasive to anyone residing within miles of the project, and unbearable to many who are living in one of the darkest areas around with world-class star-gazing opportunities. 30-16 ALG-1 Mitigation measures like trees and curtains are totally inadequate to compensate for the loss this project will cause to the non-participant's enjoyment of their properties. It will be truly 30-17 ALG-4 unfortunate if mitigation of this impact is not adequately required and affected residents are forced to pursue legal avenues for relief. 30-17 Cont. ALG-4

Chapter 1, Summary Comparison of Environmental Impacts, Table 1-1, Health and Safety, Light and Glare, Proposed Action: "Blade glint or glare can be noticed over distances of 6 to 9 miles and could be an occasional occurrence." This impact has the potential to cause accidents on nearby roads and has not been adequately assessed, nor has mitigation been proposed. I suppose the applicant assumes this is just another risk the public will have to accept for the purported benefits of this proposal. 30-18 ALG-3

Chapter 1, Summary Comparison of Environmental Impacts, Table 1-1, Fiscal Conditions, Proposed Action: "Potential property tax revenues from the project are estimated at a maximum of nearly $1.1.million for the first year of operation. Tax revenues in subsequent years would be based on depreciated value of the project and have not been estimated". A presentation of the actual estimated tax revenue throughout the 20 to 30 year operational period of the project should be presented. The project will enjoy accelerated depreciation subsidies, therefore the statement is biased leading the reader to assume that the tax revenue will be greater than it actually will be. 30-19 FIS-2

Chapter 1, Section 1.7 - Cumulative Impacts, 1.7.4.3 Wildlife: The statement, "To date, no bald eagle fatalities have been reported from wind plants in the US" is repeated in the document several times, is a bad attempt at bias, and should be stricken from this document. In Appendix C that presents plant and animal studies, the DEIS goes to great lengths to downplay the estimated bird "taking" that will undoubtedly be a side-effect of the project. It is obvious that the project as proposed will kill many birds and that no mitigation measures can prevent this other than locating the project in an area less favorable to birds. Statements are carefully worded to say that no fatalities have been ***observed***, but not necessarily that they have not ***occurred***. The DEIS also states that the estimated risk of bald eagle fatalities is extremely low, but possible. This is contradictory to the other DEIS assertion that average raptor fatalities will likely be higher at the site than at other wind project sites. It is ridiculous to imply that one can predict how many of which raptor species will be killed, and none should be anyway according to State and Federal law. The bald eagle is listed as a threatened species, and zero should be getting killed because someone wants to build wind turbines in their habitat. 30-20 PA-13

Models were used for predicting impacts for birds, bats, and wildlife. It has been said that all models are wrong, and this is true. Models can provide a best estimate for making an informed decision, if enough information is 30-21 PA-1 present – otherwise a model will be "garbage in-garbage out". Based on the information in this DEIS, it is apparent that impacts to birds and wildlife posed by the Desert Claim project will not be known until it is operating. The avian study was not long enough, relied on questionable observation methodologies, and completely ignored nocturnal species and bats. WEST, Inc. has done no formal bat studies to date at either project site. To suggest this impact will occur, but no study was done to investigate the overall impact, is irresponsible. Formal bat studies must be carried out as well as night studies on migratory birds for 2 years. 30-21 Cont. PA-1

The wildlife study basically concluded that elk and deer occupy the area proposed for development, and they might have to avoid the area in the future if they don't like the turbines or human interference. What a tragedy for our community to become the next test case. Better proposed mitigation measures are needed to respond to the avian and wildlife impacts that will undoubtedly occur. 30-22 PA-9

Interestingly, a lawsuit was filed just days ago in California that relates to this issue. The Center for Biological Diversity in Oakland charged a Florida company, FPL Group Inc., and a Danish wind power company, NEG Micon A/S, and other operators with violating the federal Migratory Bird Treaty Act, which makes it illegal to kill migratory birds without permits. The group's suit, filed in the U.S. District Court in San Francisco, alleges that the companies are breaking the unfair competition law under the California Business and Professions Code. It's illegal to violate state or federal laws in the course of a business' activities. The suit also alleges that the wind turbine operators are engaging in an unfair business practice by receiving government subsidies and tax credits that are intended to promote environmentally sound production of energy when in fact the activities are causing harm. 30-23 NS-3

It will be tragic to discover that Desert Claim is the first wind power development in the country that has documented bald eagle fatalities. There must be a better avian study performed before allowing the project to be approved. 30-24 PA-1 There also must be adequate monitoring requirements and mitigation measures in place to document the bird fatalities that will likely occur and to hold the developer and operator responsible for violations of the law. 30-25 PA-20

Chapter 1, Section 1.7 - Cumulative Impacts, 1.7.7, Land and Shore Use: "it is possible that the proximate Desert Claim and Kittitas Valley proposals (together more than 12,000 acres) could cumulatively discourage residential uses to some degree in their general locations", and "some nearby residential users might seek to relocate if they felt that wind facilities, 30-26 LU-3 individually or collectively, conflict with elements of their lifestyle." The bias in this is overwhelming and shows the developer cares nothing about anything that stands in the way of their objective. The developer should be made to mitigate by compensating those residents whose lives they will impact and disrupt to further their goals and profit. There has been no mention in the DEIS of the unending stress that has been placed on hundreds of non-participant residents and the potential impacts of such, medical or otherwise, because of the applicant's proposal.

3-26 Cont. LU-3

30-27 NS-6

Chapter 1, Mitigation Measures, 1.8.4.3 Wildlife: "A Technical Advisory Committee could be formed to implement and evaluate a mitigation and monitoring program and determine the need for further studies or mitigation measures once the project is operational." This is an inadequate proposed mitigation measure and is simply a way to allow approval of the project with insufficient study to conclude whether impacts will really occur. The Applicant would have no obligation to form a TAC, and would they if conditions warrant, or will this issue just be swept under the rug? The details of the mitigation must be such that there are requirements that are binding and constructive, not just window dressing.

30-28 PA-4

Chapter 1, Section 1.8.8 Health and Safety, 1.8.8.3 Shadow Flicker: "Because shadow flicker can only occur...it could (in principal) be prevented by shutting down specific turbines.... Implementing this measure, in practice, would likely be quite difficult, however. One operational measure that might be feasible....would be to develop a telephone hot line system. Receptor locations ..... could be provided with a specific number by which to connect to project staff ...to request temporary turbine shutdown .... The viability of this option with respect to project operational costs and flexibility has not been evaluated." Evaluate it. Do not put the burden of dealing with the projects projects onto non-participant residents. Why should those people be expected to be calling EnXco every time they are being impacted by things that have been so well modeled and addressed?

30-29 HS-8

Chapter 1, Section 1.8 Mitigation Measurers, 1.8.8 Health and Safety, 1.8.9 Noise "Several noise mitigation measures were included in the project design." With these design features, no significant noise impacts were identified." Mitigation must be required if the modeling results provided by the applicant are wrong. The impacts that might occur to certain residences and properties by the Applicant's proposal could be so severe that they can not be adequately mitigated. Soundproofing or buy-out options for affected properties should be required.

30-30 NOI-3

Chapter 1, Section 1.8 Mitigation Measurers, 1.8.8 Health and Safety, 1.8.10, Aesthetics, Light and Glare: and Chapter 1, Section

30-31 ALG-4

1.9 Significant Unavoidable Adverse Impacts, 1.9.10 Aesthetics, Light and Glare : "Development of the project as proposed would result in significant unavoidable adverse impacts to the visual environment, especially for nearby rural residents in the northern half of the Northwest Valley." The impacts that will occur to certain residences and properties by the Applicant's proposal will be so severe that can not be adequately mitigated by anything other than buy-out. Applicant should be required to evaluate and include this as a mitigation option for those that will undoubtedly be so affected if the project is constructed.

30-31
Cont.
ALG-4

CLOSING

It is apparent that additional work is needed to address the deficiencies in data and mitigation remedies presented in the DEIS. Regardless of the substance of the final EIS, there will be obvious and significant environmental impacts to surrounding properties if the Desert Claim project is approved and is built. Some of these impacts have the potential to directly impact residents and to change the character of the existing area to such a degree as to make residing there unbearable. Kittitas County has a responsibility to residents, property owners, and the environment to ensure that the magnitude of potential impacts are assessed in a complete and unbiased manner, to ensure that mitigation measures are required and enforced, and to require that there will be a system in place to report problems and obtain appropriate mitigation before the project is approved, constructed, or operated.

30-32
EIS-5

Thank you for reviewing my concerns and including them into the public comments for the Desert Claim - DEIS.

Sincerely,

Eric Larsen
20121 Reecer Creek Road
Ellensburg, WA 98926
(509) 962-6946
eb_smlars@msn.com

31
P.1

Clay White

From: Janet Lee [ponderosa53@hotmail.com]
Sent: Monday, January 19, 2004 3:24 PM
To: Clay White
Subject: No to Wind Turbines

JAN 19 2004

Dear Clay White:

I, have property in SunEast - Parcel # 19-18-13050-0403. I purchased this property because of the incredible view & my desire to live here. I currently own a piece of property in Graham, Washington & my intent is to sell that property & build a $300,000 home in Kittitas County. I have been made aware of these industrial machine wind turbines that are about to appear in my back yard. These people from Desert Claim WInd Power Project tell us what a great economic benefit it is to the valley. I am one party out of literally hundreds who are probably planning similar ideas of building & locating in the Ellensburg valley. Now, it is my understanding that $300,000 contributed to this county will traditionally turn over 10 times in this county before the money exits the county. So, that makes my $300,000 home a 3 million dollar revenue machine for Kittitas County. Now, take that times the hundreds of people who plan to move to this valley over the life of these turbines. Seems like a considerable loss in revenue. 31-1 FIS-3

People do not want to live close to or view these 410 foot eye sores. They are noise generating, they have extensive blinking lights & shadow flickering, & they will kill the birds of prey. We will have a huge rodent problem then. There is no doubt that our property values will go down dramatically. These turbines are a ploy to receive grant monies from the federal tax payers. As an end result this "green energy" will be costing us considerably more than we are paying now for energy. Rest assured that in the event that these towers are voted through, I will take my money to another county who is not doing this to their pristine landscape. 31-2 VB-3

Janet Morris

32
P.1

Clay White

From: Janet Lee [ponderosa53@hotmail.com]
Sent: Tuesday, January 27, 2004 8:05 PM
To: Clay White
Subject: Enxco Desert Claim DEIS

RECEIVED
JAN 27 2004
KITTITAS COUNTY
PLANNING DEPT.

Dear Clay - **We find that the DEIS is flawed & here are just a few reasons why.** After over a year of reading, interpreting & digesting the information concerning the wind machines & power, we take a definite stand against them. There is no reason for these wind machines to be in populated areas such as the Ellensburg greater vicinity. There are thousands of vacant non-populated acres where these wind farms belong, if at all. We find it absolutely unbelievable that we will be forced to pay an increase in our monthly electrical bill when we have the capability of building nuclear power plants. We would welcome a nuclear power plant on our 200 acres as opposed to 40 story buildings all over this valley with flashing lights. It will affect telephone, radio, television, cell phones & all other communication equipment. We already have a high powered transmission line crossing our property. When it rains or there is moisture in the air, it sounds like a roaring river from these power lines. With any decrease in the value of our property because of these wind monsters, whom do you suggest we sue? Will it be Kittitas County for allowing it, the Governor of Washington for oking the project or would you simply prefer to buy us out now? Then, we will invest my funds in an area that cares about it's scenery, it's lifestyle & an area that is not dedicated to negative growth.

32-1 SO-5

32-2 VB-11

32-3 HS-5

32-4 NS-1

Another subject that we feel is very important to this valley is to follow the Comprehensive Growth Plan that each county was required to participate in several years ago. So, with that in mind, we are assuming that every wind generating tower to be an industrial zoned. If this is Kittitas County's stand then we assume that it is ok for us to generate industrial parks on our property as well.

32-5 LU-6

David & Janet Lee

5821 Robbins Road

Clay White Planner II
411 N Ruby St
Ellensburg, WA 98926

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

January 30, 2004

R.E. the proposed enXco wind farm

Dear Mr. White,

About all that can be said concerning wind farms, including the one by enXco, has been said. Arguments pro and con have been well covered in the Daily Record and in testimony both written and oral before Kittitas County's government representatives. It is our observation from reading and having attended hearings, and having participated in preparing testimony for those hearings, that a substantial majority of people oppose allowing the wind farm projects. 33-1 VB-5

If Kittitas County decides to allow development of the proposed wind farms, a decision will have been made that includes these consequences:

I. It allows industrialization of broad sections of this Valley's scenic landscape – in the instance of the combination of the Zilkha and enXco projects something in excess of ten thousand acres of heretofore open country. It would be a precedent-setting action by the County, one with consequences difficult to comprehend or predict. A third project is in the wings and doubtless more are planned. The cumulative effects from such proliferation is something to bear in mind. 33-2 LU-6

What makes this issue especially dangerous is that in effect Kittitas County does not really look ahead, and PLAN much of anything. The County reacts (often grudgingly to judge from public comments made by County Commissioners), and jumps through the legal hoops required by State and Federal laws. But the position of the current Kittitas County government is to allow individual enterprise to dominate the broader interests of the community with the result that there has been no real effort to ascertain what those broader enduring interests and values are. Consequently very powerful and well-financed companies can and have overwhelmed a vulnerable Kittitas County with their demands – demands which fit rather well with a free-enterprise-at-the-expense-of-all-else philosophy. 33-3 VB-10

2. It should make clear to all citizens of Kittitas County that their home sites are not safe from any manner of scheme that makes money for a developer. The wind farm projects require the County to add a Development Overlay that encompasses thousands of acres in order to allow the industrialization of areas already occupied by homesites. 33-3 Cont. VB-10

   There are governmental actions required to be taken in the case of emergencies that threaten the health and safety of its citizens – actions that may abrogate established individual rights. Such is not the case here. There is no threat to our health and safety that would be satisfactorily or significantly addressed by allowing the enXco wind farm project to proceed. We don't argue that there isn't an energy crisis; indeed there is one, and it stems in major part from the unwillingness of Administrations past and present to plan for and to consistently fund basic research for energy conservation and for alternative energy sources. Ultimately the situation is almost certain to become one of crisis dimension where global warming, for example, threatens survival of the earth's life communities. But crises of such dimension require national and international attention and action. Since we have nothing resembling a competent national energy policy (the current Administration even refuses to divulge to Congress how it arrived at its proposed energy bill), it is absurd to argue that the enXco wind farm development will contribute in any significant way to addressing a looming energy crisis. 33-4 ENR-2

3. There will be an impact on wildlife. Because new wind turbine construction includes lessons learned from previous types of construction, the impact would be less severe than that from earlier models. Companies are cooperating with state agencies in attempts to reduce impacts. Both Zilkha and enXco have had WEST (a firm that does wildlife studies for wind farm project proposals) make wildlife studies for their project sites. That is certainly an improvement over the Altamont project(s) where apparently no such studies were made. However the WEST studies are of one year duration which detract from their value since the changes in, for example, bird populations can change significantly from one year to the next. Also, it isn't apparent that ornithologists are involved in the studies. Had they been there would likely have been an assessment of the rodent populations in the enXco site since such would be a predictor of the sites attraction for avian predators. There were no night time assessments made. 33-5 PA-1

A recently recognized problem is the incidence of bat kills. A 40-turbine installation in the Appalacians has caused a record number of bat kills – something over 400 in a year. Subsequent investigations reveal that the turbines were place in a migratory path for the bats. It isn't expected that anything like this would be found in the enXco project site area, but it points to the need for a more thorough study in order to avoid unexpected yet avoidable problems. 33-6 PA-15

4. The most obvious impact from these wind farm installations, and the one that most threatens our enjoyment with living in this part of the Kittitas Valley is scenic. We've lived four miles west of Ellensburg for more than fifty years. From our home we look out just beyond our property to a line of old cottonwood trees most of which we estimate to be 100 feet or more in height. It is very difficult perhaps impossible for people to judge the impact from a 150-turbine installation each unit reaching between 300 and 400 feet in height including the rotor sweep area. The installation of these turbines in an already populated area is unacceptable. The illogic siren song of "we need this green power" appears to dominate the senses of some to the extent that the beauty of their surroundings no longer (if it ever did) matters. To us it is a very significant part of our life as it surely is to the majority of people in the Valley. 33-7 ALG-1

   More and more we hear and read about the disenchantment of people in other places including foreign countries where wind turbine installations have ruined prized landscapes.

In conclusion: It is important for individuals to accept responsibility to contribute to the resolution of community problems. We do recognize that there is a crisis with respect to our production and use of energy. And, we are willing to play a part in solutions. But we must feel and know that our efforts are based on good research and will significantly contribute to the resolutions of whatever threat exists. Such is absolutely not the case here. The drive to install the wind farm(s) comes from the developers – not in order to solve a crisis (energy) but rather because it is financially good for them. Nothing wrong to want to make money, but such motivation must not be allowed to ride rough-shod over Kittitas County's obligations to protect its citizenry. Peoples' homes, which includes their viewscape, deserve protection. 33-8 VB-2

Hal Lindstrom

Gloria Lindstrom

RECEIVED 34
P.1

JAN 8 2004

KITTITAS COUNTY CDS

Clay White

From: Mitch [meffman@kvalley.com]

Sent: Thursday, January 08, 2004 10:15 PM

To: efsec@ep.cted.wa.gov; tengstrom@kvnews.com

Cc: opinion@yakima-herald.com; susanblack@seanet.com; tribune@inlandnet.com; Residents Opposed to Kittitas Turbines; Clay White

Subject: wind farm comments

After taking time for several months to read the progress and developing news related to wind farms and the Zilkha/enXco projects, I must ask some questions.

First, if Zilkha were truly interested in working with their "neighbors" (as they've called all of us) in Kittitas County, including the
commissioners, why would they publicly accuse the commissioners of changing criteria and rules for permit approval in the middle of their DEIS? I've seen this county do nothing short of bend over backward for them......but it mustn't be enough. Not to mention Zilkha didn't even have the decency to apply with the County, they ran to the state.

Second, if wind farm technology and it's "product" are such promising developments, why does California have annual energy supply problems (they have the most wind farms of any state in the U.S.)? I **know** wind farm technology produces less than 1% of our national energy needs.

Third, since there are no buyers yet, and the energy produced wouldn't be distributed locally, what benefit does my family derive from supporting the projects? Given that there are no subsidies/tax credits to enable me to erect my own turbine, thus allowing me to reduce the energy the PUD has to send to my home, I see no reason to support any company that aims to destroy the value of this area, ruin the viewshed, decimate the wildlife habitat, and worst of all, offer nothing more than money, with which government, even local ones, rarely spend prudently. As a matter of fact, following our tax money sure makes this seem like another "filter" through which the state, county, and local governments get more of our salaries. This is in <u>addition</u> to the tax money (from our salaries) that the Wind Farm Developers get already. If there's that much extra money floating around, it should be made more affordable for you and I to engage in our own "green" energy projects, thus reducing our dependence on fossil fuels, making each of us more energy self-reliant, and most importantly, using our rural resources more intelligently.

34-1
NS-3

mitch meffert
ellensburg, wa
962-5046

35
P.1

Clay White

From: Mitch [meffman@kvalley.com]
Sent: Monday, January 19, 2004 9:22 PM
To: irinaM@ep.cted.wa.gov
Cc: allenf@ep.cted.wa.gov; Clay White
Subject: wind farms

JAN 1 9 2004

I'm writing to express my opposition to the siting of Zilkha's wind farm proposal in the Hwy. 97/10 areas, and the enXco proposal in Reecer Creek area. While being placated with words, the opposition's not being heard in relation to the 95% of us landowners who DID NOT sell leases to either of these 2 companies. 35-1 SO-5 If both companies do not set aside a fund to compensate those of us who would choose to sell our homes/properties if these proposals are approved, I would be among the many who would logjam the county and state's court systems with lawsuits. Since we're not being heard, and we'd loose our investments if the farms were approved, suing is no worse a loss of money and time. Please don't let it come to that. Tell these companies to site where there are not thousands of people living. thank you 35-2 NS-5

mitch meffert
ellensburg, Wa

RECEIVED

FEB 0 2 2004

KITTITAS COUNTY
CDS

Janet Nelson
P.O. Box 203
Easton, Wa. 98925
January 29, 2004

Clay White
Kittitas County Planning Department
County Courthouse
Ellensburg, Wa. 98925 Re: Desert Claim Windfarm DEIS

Dear Clay,

I have some concerns about the Desert Claim Windfarm DEIS.

1) There is no discussion of the alternatives to windpower for providing ways to cut greenhouse emissions and reduce dependence on foreign oil. What about restructuring the power grid, conservation, solar power and the new Hydrogen power? 36-1 ALT-5
2) There is also no discussion of the fact that the reason these companies are building all these windfarms is the HUGE tax breaks and other incentives being provided by the state and federal governments. They are rushing to get as many done as fast as possible to get them in before these incentives RUN OUT. 36-2 NS-3 In addition there is no discussion of the true economics of windpower and how backup power will be required to be on line and operational during the time that the windfarms are not operating, producing more greenhouse gases all the while. 36-3 AQ-4
3) Why are there so many farms being planned for this area? Why was not one alone proposed so that the impact would be much less on the visual environment as well as the birds, sagebrush steppe, and people? 36-4 EIS-11
4) Why are these windfarms so huge? In England and many places in this country the windfarms being built have only 40-60 towers. MUCH less impact. One could have been built and the REAL impact evaluated to see if more of the towers could or should be built. 36-5 ALT-2 What about incentives for homeowner built alternative power? 36-6 ALT-5
5) There is no discussion, from what I could see, of the impact on homes located farther than 1000 feet from the towers but Not in Ellensburg. Obviously there have to be many. I saw no maps showing these homes. They will have views of the towers no doubt and be impacted. There are areas in Ellensburg (Radio Hill?) I would think that would have views of the towers. 36-7 ALG-2
6) The windfarm is only 6 miles away at one point. Ellensburg is a changing and expanding area in terms of home ownership, tourism and business. I am aware that retired people from Cle Elum are moving down out of the heavier snow to Ellensburg. New developments and assisted living complexes have sprung up and will attract more. These windfarms could have a negative impact on the cities growth. One of the main reasons people in general choose to live and recreate in Ellensburg is the rural, pastoral character of the area. I don't think "Rodeo City" should be turned into " Tower City". 36-8 LU-2

7) A recent letter to the editor of the local paper from a local realtor stated he felt a negative impact on property values would be a certainty. At a windfarm in Kewaunee Co. Wisconsin a survey done after construction showed 52% of the residents did not want to live within 2 miles of the turbines and the majority of those living closest felt that the turbines had adversely impacted their health and safety. The utility that owns the farm eventually purchased neighboring residential property to resolve noise and other complaints. (from Wind Energy Economics in West Virginia, Glen R Schleede Jan 20, 2003. Attached). There is a real potential for a negative impact on property values and the effect of turning potential homeowners away to another area of higher quality rural character to live in. I-90 is the way many people first see the area and the views are NOT going to be the unspoiled territorial views that have always existed if this or any windfarm is located near Ellensburg. The photos of the cumulative effect of both windfarms are dramatic. These projects will affect the entire valley. 36-9 NS-1

8) The potential for killing both endangered and migratory birds is understated.
A) **The number of birds counted is in question.** The bird survey, while done over a years time (when a 2-3 year study is recommended by various authorities) was done for 20-30 minutes at a time once a week. Many birds were in all likelihood missed. The total number of birds seen for ALL THREE proposed windfarms was only around 9000.
The Kittitas Audubon Society Christmas Bird Count done on ONE EXTREMELY FOGGY DAY in December of 2003 with 27 experienced birders participating found almost 17,000 birds! This count is done every year in the same area in a 15 mile diameter circle around Ellensburg and includes the Fairview and Reecer Creek areas which are in the two proposed windfarm areas. 6 of the 11 Bald Eagles found that day were in the Reecer Creek and Fairview areas! (copy attached)

B) **There was a failure to assess for migratory birds.** Referencing a letter from US Fish and Wildlife Service to Zilka Renewable Energy pertaining to Meyersdale Windpower Project dated Sept 5, 2003: (attached) "Because most neotropical migrants migrate at night, radar should be considered for use in determining the altitude of bird flights at proposed wind power project locations, as well as their spatial and temporal distribution... Acoustic and infrared radar devices can be used to determine dates of peak avian use, and the effect of different weather conditions on the bird activity". No night surveys were done. **The Ellensburg area is in the western neotropical migratory flyway** zone so there is real potential for migratory birds at night. 36-10 PA-1

C) **There was a failure to assess for weather conditions which would affect both bird and bat mortality.** Again referencing the USFW/Meyersdale letter: "Lights apparently draw birds into tower areas during times of fog, mist and low cloud ceiling, creating opportunities for collision. Therefore, we generally recommend avoiding siting of towers in areas with high incidence of these conditions, and weather records for proposed project sites should be evaluated to determine if and when low cloud conditions and fog occur." Also:"Bat mortality at turbine sites has occurred during late summer and early fall migration and during inclement weather (i.e. fog and low clouds). For example, we were recently advised that 230 dead bats of five species were found between Aug 18 and 20, 2003 at the Backbone Mountain wind turbine site in West Virginia." **Ellensburg is well known to be a midwinter fog bowl with fog sometimes lasting for weeks at a time. The Christmas bird count was done during dense fog.** 36-11 PA-15

D) **There was a failure to monitor for bats at all.** The USFWS recommended a 2 year pre construction monitoring using radar, acoustical studies and other appropriate sampling at Meyersdale.

E) **There was a failure to assess for the presence of prey.** Rodents and other small animals attract raptors to the area. This has been a major reason for raptor mortality at the Altamont Calif. Windfarm. 36-12 PA-1

F) **Lights which are NOT REQUIRED will be used at night.** On the Kittitas Valley DEIS I saw a letter from the FAA indicating that lights WERE NOT REQUIRED. Why are lights being used if not required? To quote FAA "based on this evaluation, marking and lighting are not necessary for aviation safety." ALSO currently white strobe lights are planned for the day and red at night. The Meyersdale/USFWS letter states:"unless otherwise requested by the FAA, only white strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute allowable by FAA. Solid RED or PULSATING RED incandescent lights should NOT be used, as they appear to attract night migrating birds at a much higher rate than white strobe lights." 36-13 PA-21

G) **Wetland and riparian areas will attract birds.** Again the Meyersdale letter recommends avoiding wetlands and riparian areas unless mortality risk is low (birds present rarely enter the rotor swept area.) Bats also use these areas emphasizing the need for bat surveys. There was no discussion of wildlife impact near these areas. 36-14 PA-11

H) **Of the 13-14 endangered birds found in the area only the Bald Eagle seems to be of concern** in any of these DEIS's . Why is that? Golden Eagle were also found, which require a take permit as well as the bald eagle. 36-15 PA-12

9) **There was no mention of a plan for flexibility to be built in to address problems.** There was no mention of a plan to address a finding of high risk to wildlife post construction: Such as: adjusting tower height where feasible, shutting down of turbines during peak migration periods, orienting blades parallel 36-16 PA-7

to flight path etc. When upgrading or retrofitting turbines, if studies indicate high mortality at specific turbine, relocating or retrofitting should be considered. 36-16 Cont. PA-7

10) **There should have been a discussion of the relative importance of this (these)projects in the overall scheme of the contributions of wind energy and the whole energy picture.** The contribution for all of windpower is only 2% from what I have read so the meaning of these projects, other than taxes to the county, is really small. Conservation could accomplish this easily without the damage. 36-17 ENR-2

To quote Jeremy Worth of Englands Countryside Agency **" Future generations will want cleaner energy but they will also want tranquil places to escape to.....an ambitious pursuit of wind energy will mean we give up our wildest countryside for a very small energy contribution."**

I feel this DEIS demonstrates the lack of sensitivity by the applicant to the people of Kittitas County and especially Ellensburg. It is directly in conflict with our land use designations and the whole project (as well as the Kittitas Valley project) threatens to change forever the irreplaceable pastoral character of the valley as well as kill more of our already diminishing birds and bats than we can afford and further fragment the already fragmented sagebrush steppe habitat. 36-18 VB-3

I support the No Action Alternative. 36-19 SO-2

Yours truly,

M. Janet Nelson

M. Janet Nelson

Desert Claim Wind Power Project EIS
Kittitas County
Draft EIS Comment Form

Participant Information

Name: FELICIA M PERSSON
Address: 3561 ROBBINS RD
City, State, Zip Code: ELLENSBURG, WA 98926
Phone/Fax: (509) 925-9407
e-mail address: ~~fm~~ fmpersson@televar.com

JAN 20 2004

Would you like to receive notices about the project? Yes X No ___
Would you like to receive a copy of the EIS? Yes _ No X Have already Paid for it
If yes, do you prefer a printed copy (cost = $60) or a CD (no charge)? Printed ___ CD ___

Draft Environmental Impact Statement Review Comments

Please state any comments you have about the Draft EIS on the Desert Claim Wind Power Project published by Kittitas County in December 2003. Please be as specific as possible, and focus your comments on the adequacy of the information presented in the EIS and/or on the alternatives evaluated in the EIS. Use multiple sheets if necessary.

The Table 1-1 Summary in Chapter 1 does not adequately describe the adverse impacts addressed in detail In Chapter 3. The impacts discussed in detail are transferred to Table 1-1 with the designation insignificant w/mitigation while adequate mitigation measures are not available or discussed. Specifically the Table reports page 1-20 that "several simple practical options exist for controlling or preventing shadow flicker at the source." This is ~~false~~ indirect and I believe in error. According to the mitigation measures described in 37-1 HS-8

Completed forms may be returned at the meetings or sent by January 30 to:
Kittitas County Community Development Services
Attn: Clay White
411 N. Ruby Street
Ellensburg, WA 98926

37
P.2

Desert Claim Wind Power Project EIS
Kittitas County
Draft EIS Comment Form – Continuation Sheet

Participant Information
Name: ____________________
Address: ____________________

Page 2

Draft Environmental Impact Statement Review Comments - Continued

Please use this sheet, if needed, to continue any comments you have about the Draft EIS published by Kittitas County in December 2003.

Chapter 3 3.8.5.3 mentions 2 potential mitigation measures at the source concluding one is not feasible and the other's viability w/ respect to project costs has not been evaluated. The DEIS states that "several practical options exist for receptor locations. All of these involve controlling or preventing the flicker from entering residences through windows. It is not practical to assume that residents will or should be inside when light + wind conditions result in shadow flicker. These options are not feasible or practical. This places responsibility for mitigation of impacts on recipients. 37-1 Cont. HS-8

Table 1-1 is also contradictory in its comparisons in the summary of vegetation it is apparent that the WH alternative and Desert Claim are not similar. WH has no Wetlands and a different diversification of other vegetation. The Bird section of the table states that bird impacts at the WH. alternative will be the same due to similar vegetation. 37-2 PA-22

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Attn: Clay White
411 N. Ruby Street
Ellensburg, WA 98926

Felicia Persson
Comments Page 3

The alternatives described in the EIS do not realistically represent the proposed project. If you look at the foot print of those alternatives and the footprint of the Kittitas Valley project and compare to the footprint of the proposed desert claim the differences are apparent. The Desert claim project is unique in its patchwork appearance. The project site is identified as 5237 acres however the entire collection facility envelopes many more acres than that. The project is actually ~~several~~ 4 or 5 micro-sites that effectively surround many unwilling participant landowners. 37-3 PD-9

The EIS refers to non-participating landowners that term should be replaced throughout the document with unwilling participant landowners or as Linda Schantz said captives. 37-4 EIS-14

Because there are effectively 4 or 5 micro projects cumulative impacts and mitigation measures should be addressed for those captive properties. The disassociative properties of Desert Claim add a completely different dimension and ~~are not~~ make it not comparable to either of the alternatives or the Kittitas Valley Wind Power Project. 37-5 EIS-12

JAN 20 2004

January 25, 2004

Clay White
Kittitas County Community Development Services
411 N Ruby St, Suite 2
Ellensburg, WA. 98926

RE: Comments on Desert Claim Wind Power Project DEIS

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

Dear Mr. White:

First, I want to thank you for this opportunity to comment on the DEIS for the Desert Claim Wind Power Project. I hope you will take the following into consideration in development of the final EIS and the planning departments' recommendation to the board of commissioners.

There are a couple of wording changes I would like to recommend throughout the DEIS. For example, the term "nonparticipating landowners" should be replaced by either "unwilling-participant landowners" or "captive landowners." In addition, all instances of both "wind farm" or "wind plant" should be replaced with "wind factory." 38-1 EIS-14

I was a little distressed at the cost of a hardbound copy of the DEIS. Thorough analysis is difficult, at best without a complete copy at hand including maps and figures. How was the cost of the information derived? What was, and who paid the initial cost of the DEIS? 38-2 EIS-13

CHAPTER 1:

On page 1-4 Kittitas County Objectives are described as:

Determining the project is essential or desirable to the public convenience, the project is not detrimental or injurious to the public health, peace, or safety or to the character of the surrounding neighborhood, and the project will not be unreasonably detrimental to the economic welfare of the county . . . 38-3 EIS-4

On page 1-5, 1.5.1 the applicant states that the objective is to deliver energy to the Pacific Northwest. Can we then assume that the energy derived from this project will stay within the Pacific Northwest? 38-4 EIS-9

1.5.4 The no action alternative should be limited to existing zoning provisions without additional discretionary action by Kittitas County. The statements "Under differing scenarios, such as use of the formal subdivision process or clustering bonus provisions available under existing zoning, it might be possible to create significantly more lots in the area. Such actions would require environmental review and discretionary approval by the County, however. These are the conditions assumed to exist under the no action alternative." should be removed. Predicting all future events regarding the no action alternative is impossible. The no action alternative should only include those events with a high degree of probability based on current zoning. 38-5 ALT-1

Table 1-1 is purporting to be a highly summarized version of the impacts discussed in detail in Chapter 3. Several of the summarizations are flawed and introduce information not covered in detail in chapter 3. Error in the transfer of conclusions and mitigation was also noted. This table should be revised so that its presentation is not misleading and contradictory to the information it purports to summarize. For example:

Earth Impacts under the proposed project neglect to include the same ongoing impacts addressed in the no action alternative. Throughout the DEIS it is stated that the project will not change current land use and hence the earth impacts it will produce would be in addition to those currently occurring. 38-6 ER-4

Air Quality Impacts - No Action Alternative describes potential for some other energy facility to be proposed and generate air pollutants. This statement should be removed as its possibility is remote and should not be considered part of the no action alternative. The possibility of another energy facility is no more or less likely based on the development of this project. 38-7 ALT-1

Plants and Animals-Vegetation-Wetlands-Project facilities would overlap 9 acres of wetland area and the summary fails to relate the county's "zero net loss" policy for loss of wetlands. 38-8 PA-22

Wildlife- Birds- Alternative 1: states that the overall impacts to birds would be similar to those reported for Desert Claim due to similar vegetation types. This conclusion is flawed as the prior section discussed the representative percentages of vegetation in each of these areas and they differ significantly. Primarily there are no wetlands identified in the Wild Horse Site. 38-9 PA-22

Energy and Natural Resources-No Action Alternative- includes a statement that "The broader energy impacts of the no-action alternative would depend on how and where alternative electricity supplies were developed." This statement should be removed as it is beyond the scope of the DEIS. 38-10 ALT-1 By the same token the impacts of this project on the broader energy impacts have not been evaluated. 38-11 ENR-1

Land and Shoreline Use-Land use patterns-No Action Alternative - The statement "... and the potential for conflicts with existing agricultural activities ... " should be removed. It has not been shown that there are current conflicts between agricultural and rural residential uses in the defined area or that the potential exists. 38-12 LU-8

Health and Safety - Shadow Flicker- Proposed Action: The statement that several simple, practical options exist for controlling or preventing shadow flicker at the source is in direct conflict with the information presented in Chapter 3. There were two options presented for controlling or preventing shadow flicker at the source. The only place shadow flicker can be <u>prevented</u> is at the source. See additional discussion 3.8.5.3. 38-13 HS-8

<u>CHAPTER 2:</u>

2.1.1 The project area is described as 5237 acres. Because the project consists of 8 noncontiguous properties, the area impacted is much larger. Looking at the project footprint, there are several properties that are "outside" the project but effectively surrounded by the projects' production and collection systems. The total area impacted and effectively enveloped by the patchwork quality of this particular project should be referenced. 38-14 PD-9

2.2.1.3 This section identifies 56 landowners owning 101 parcels within 300' of the project, these again do not include some landowners and residents that are effectively surrounded by the project. To gain a 38-15 EIS-2 clearer picture of the number of residents and landowners impacted by the proposed project a ½ mile radius would be more appropriate. 38-15 Cont. EIS-2

2.2.2.1 This DEIS modeling assumes a 1.5MW turbine which is the smallest listed in Table 2-1. Why does the table of potential turbines include larger and more powerful alternatives? Only smaller and/or more technologically advanced would be assumed to produce less impact. If the DEIS addresses 1.5 MW nothing greater should be considered without additional environmental impact analysis. 38-16 PD-4

2.2.2.2 The existing turbine location plan is to maintain 1000' buffers from residences and 250' from rights of way or property lines. These setbacks do not meet the estimates for safety regarding tower collapse, ice and blade throw or shadow flicker. If the minimum setback from residences is 1000' that relationship should be preserved from rights of way and property lines as well. Establishing smaller setbacks from property lines effectively limits property use by unwilling participant land owners. To effectively negate the effects of shadow flicker a minimum setback of 2000' is required. 38-17 HS-4

2.2.2.3 States that overhead collection lines will be used to connect noncontiguous portions of the project. What are the visual and environmental impacts of additional overhead lines? Will the current poles be used or are additional poles necessary? Does the diameter of the proposed collection lines make them highly visible? The placement and number of substations have not been finalized. Without that determination the impacts are not certain. The placement of the O & M facility has not been determined; the impacts cannot be certain. 38-18 PD-8

Page 2-24 The transmission interconnection discusses the potential for an interconnection point at the Woldale substation. Would this involve any additional development or potential impacts not addressed in this DEIS? Because the characteristics of the interconnection facility would depend upon which transmission option is selected, potential impacts and appropriate mitigation cannot be adequately addressed until such variables are set. 38-19 PD-11

2.2.2.4 The number and location of permanent meteorological towers have not been determined. The specific number and placement need to be determined in order to assess the potential environmental impacts and, if warranted appropriate mitigation. 38-20 PD-4

2.2.2.5 Are the projected 23 miles of access roads included in the permanently impacted acreage per this DEIS? 38-21 PD-4

2.2.2.8 Specific plans for visitor facilities have not been proposed but will potentially be included in the development agreement. This seems that the DEIS is being circumvented. Aren't there additional impacts from such a facility that should be addressed in this DEIS? 38-22 PD-12

2.2.3.1 In the construction schedule and general sequence it states that the project could be completed in 9 months but Desert Claim may opt to construct the project in phases. Now hold on a minute! The extensive construction impacts, especially concerning air quality, noise, traffic, impaired access, etc. have been downplayed throughout this document because of the temporary nature of construction. Construction of the project could conceivably span several years if implemented in phases. This is not temporary or acceptable. The option to construct in phases should be removed. 38-23 PD-13

2.2.3.3 Use of local contractors and suppliers can and should be quantified. "...to the extent possible" is too vague. Since Desert Claim has extensive experience in development of wind factories, they probably have a good idea of what can be supplied locally. 38-24 PD-14

2.2.3.4 & 2.2.3.5 Plans for restoration and revegetation and related time lines should be documented prior to commencement of the project. In order to mitigate environmental impacts reasonable deadlines and maximum impact exposure limits should be set. 38-25 PD-15

2.2.3.5 & 2.2.3.13 Hauling immense quantities of construction materials, gravel, water etc. will have a huge impact on public roads. Waiting for completion of the project to repair and return the roads to preconstruction condition is not acceptable or realistic. Developers of the project should be responsible for maintaining the roads in preconstruction condition throughout the project construction phase. Preconstruction condition needs to be specifically defined according to specific criteria developed by Kittitas County Public Works. 38-26 PD-16

2.2.3.15 The traffic management plan should stress that community access cannot be compromised. 38-27 PD-16

2.2.4.1 What does "controlling turbine operations as necessary to meet scheduled power deliveries" mean? How often will the project area be patrolled? Are current county laws and regulations sufficient to deal with large volumes of hazardous substances? 38-28 PD-2

2.2.4.2 The applicant states that most of the full-time staff will be local. Of the 10 proposed does that mean at least 6 or more? 38-29 PD-14

2.2.4.4 Safety measures include automatic braking systems to shut down the rotor if a malfunction or excessive wind speeds occur. Is there a sound effect to this braking system and if so what is the estimated dBA when the brake engages? 38-30 NOI-1

2.2.5 Repowering should not be permitted under the county approved development agreement without formal process. Furthermore the county should retain the right to periodic review of the project and authority to implement additional mitigation measures for impacts not addressed or flawed projections presented in this DEIS. If actual impacts are substantially greater than estimated and cannot be effectively mitigated the county should have the right to stop project operation and implement accelerated decommissioning. A bond to cover estimated decommissioning expenses should be required. 38-31 PD-3

2.3.1.1, Page 2-41 References Kittitas County objectives contained in KCC17.61A.010. Only the county objectives specifically contained in this document or its appendices should be referenced here. 38-32 PD-10

CHAPTER 3:

The potential impact on property values has not been addressed in this DEIS because it is not required by SEPA. The impact to property values should be addressed in this document as it directly relates to the character of the neighborhood and the financial health of landowners in the immediate vicinity of the project. 38-33 NS-1

Page 3-24 and 3-25, 3.1.5.1 Discussion of erosion best management practices that would be implemented during construction identifies several measures for reducing erosion. Throughout the listing each measure described states that it "should" be used. In all instances "should" should be replaced with "shall." 38-34 EIS-10

Page 3-25, 3.1.5.2 In this discussion of landslide hazards the document states, "Construction of proposed 38-35 ER-3 wind energy facility would not increase existing landslide hazard risks provided appropriate mitigation measures were implemented." Proposed mitigation is a setback distance based on experience and standard practice. Discussion goes on to say that the triggering mechanism for landslides in hazard zone 1 is not known and risk will remain high regardless of construction activity. This is confusing and contradictory. Mitigation should include site-specific geotechnical study and removal of those turbines in the high risk zone, if the risk cannot be mitigated to an acceptable level. 38-35 Cont. ER-3

Page 3-27, 3.1.6 Concludes no significant unavoidable adverse impacts are expected. If removal of the turbines or mitigation as described above cannot be accomplished, then significant unavoidable adverse impacts can be expected. 38-36 ER-3

Page 3-30 3.2.2.1 Practices to control airborne dust include watering exposed soil surfaces daily during dry weather. Where will that water come from? Much of the proposed project site is comprised of dry land. The dry season often commences the 1st of June and can continue through October. If the land will potentially be disturbed for 9 months, and 23 miles of road will be constructed and approximately 1.25 acres will be disturbed per turbine, without considering the additional acreage impacted by the substation, batch plant and staging areas, there is a large quantity of water necessary on a daily basis for dust control. 38-37 AQ-3 Reducing the speed limit to 20 and watering roads, or applying a binder of some sort would further mitigate the dust impact. 38-38 AQ-3

3.2.3.3 "Under the no-action alternative, most of the land in the project area would likely remain in its current agricultural use." Land use currently involves both agricultural and rural residential. That use should be listed as well. This section goes on to identify possible development of some other energy facility. The possibility is remote and irrelevant to this discussion. The entire second paragraph should be removed. 38-39 AQ-5

3.2.6 The DEIS states that dust and vehicle emissions are temporary (limited to 9 months), "and would be minor in the context of other rural-residential, industrial and agricultural activities." This statement is not true and should be removed. The construction activity if undertaken would be in addition to those other activities. Due to the impact's concentration and activity in a small area the addition would prove to be a major impact. 38-40 AQ-2

Page 3-43 Actual well locations may differ. If an address has not been obtained prior to drilling the well the location may differ significantly from the representation on the map. Our well is shown on the map as located on the SW corner of our property; it is actually located in the NW corner. Before any decisions regarding placement of turbines in relation to required setbacks from wells it would be wise to verify well locations. Again, if setbacks of 1000' are required from wells the same setback should be required from property lines so as to not limit landowner use of property. 38-41 WR-3

3.3.2.1 The paragraph immediately prior to Turbines section indicates that portions of ephemeral or intermittent streams may be relocated. This sounds like an impact to the existing drainage pattern of the site. Would this require Department of Ecology approval? 38-42 WR-1

Page 3-47 The disruption to priority habitat designated by WDFW would be temporary according to this discussion. The displacement of the wildlife that resides there may be much longer or permanent. If wildlife is displaced for the 9 months or more of construction will it return? 38-43 WR-5

Page 3-49 The DEIS states, "Following installation of the wind power facility original preconstruction contours and drainage patterns would be restored around turbines, roads and substations. Restoration would minimize loss of stream functions or associated wildlife." What impact would the 9-month or more displacement have on wildlife?

Page 3-50 and 3-51 Blasting and wind turbine vibrations are not expected to affect wells because they are located 1000' from wells and residences. Again, verification of actual well locations should be conducted prior to placement of the turbines. 38-44 WR-3

Page 3-57, 3.4.1.1 Paragraph 3 describes classification of vegetation within the project area. The final sentence states that shrub-steppe and grassland types are also used for agriculture. Either all uses of the various vegetative areas should be disclosed (i.e., rural residential use) or all should be left for the section on land use. 38-45 PA-23

3.4.2 It is unclear what the total wetland acreage is within the project site. There are several numbers of wetlands identified, however, no total area or acreage is presented. What percentage of the total wetland area will be temporarily or permanently destroy? 38-46 PA-11

3.4.3.2 It appears that all conclusions are being based on other wind project site studies of avian mortality. The single one-year study conducted in this area has documented a higher raptor use than at any of the other wind factory sites. The Stateline factory has the highest raptor mortality. Without further study, prior to project approval, Desert Claim could easily take that title. 38-47 PA-1

The table at C1-13 follows some of the same flawed analysis concluding that bald eagle mortality risk is low due to winter foraging and low actual use of the wind factory area. The eagles come down to the valley floor during calving from the forests north of the project site. Although their use of the 8 specified, project properties may be limited, they are passing through the project minefield twice daily. 38-48 PA-13

No avian observations were taken at night and no information documented regarding nocturnal birds or migration. There seems to be a substantial owl population in the project area. Nighttime avian study should be conducted to determine potential impacts to the owl, bat and nocturnal migratory species. 38-49 PA-1

Throughout this section the statement that mortality rates on avian species, mallard, passerine and bald eagles would not have a measurable effect on their populations. Is that statement addressing their total populations or their local populations? 38-50 PA-14

Page 3-100 and 3-101 This DEIS proposes one year of standardized fatality monitoring. That monitoring should be ongoing. The DEIS suggests continuing investigation of better lighting schemes and mechanisms for deterring migrating bats from turbines but follows that with the suggestion that Desert Claim should not be required to implement better mitigation procedures if they are identified. This directly contradicts other proposed benefits and implied mitigation potential of TAC. If TAC can determine and coordinate mitigation measures then all "new" information should be available for possible implementation. 38-51 PA-4

3.4.3.6 The described lack of knowledge is incorrect in concluding that there will be no large-scale adverse impact to bat species. This lack of knowledge is incorrectly summarized in Table 1-1, chapter 1, as follows: "...nonmigratory and migratory resident bat populations do not appear to be negatively impacted by wind turbines." 38-52 PA-15

3.5 The DEIS states that "The project would generate a substantial amount of electrical energy on a long-term basis." This statement is at the least misleading and should be removed. The electricity estimated to be produced by this facility is negligible. Total wind supply estimated on a nationwide basis by the US Energy Information Administration indicates that wind will provide just over ½ of 1% of total 38-53 ENR-2 electricity by 2020. Based on that estimate alone the 60MW estimated to be produced by this project would be insignificant. 38-53 Cont. ENR-2

Page 3-111 3.5.3.3 That PSE is seeking 150MW of wind generated electric capacity has been referenced several times in this DEIS. This statement is referenced under the no-action alternative. It would be more appropriate to list its reference under Alternative 1, as that project would potentially connect with PSE lines. Discussion of other potential energy facility developments is outside the scope of this document and should be removed. If this project were approved, it would not cancel out other energy facility proposals here or elsewhere. 38-54 ENR-3

3.6.2.1 Again reference is made to transmission connection impacts. These impacts cannot be determined, as the route and distance of the transmission connection are not known. This should be determined or all alternatives should be analyzed in order to complete the EIS. 38-55 CR-2

3.6.5 The only acceptable mitigation for the adverse impacts on cultural resources is avoidance of the area. The discussion proceeds to the project engineer's evaluation of the site-specific data to determine if relocation of the turbines is feasible. If relocation is not feasible then removal of those offending turbines from the plan should be the implemented mitigation. The proposed mitigation of retrieving the scientific or cultural information from its location is not an acceptable mitigation measure. Removal of the information, artifacts, etc. from the cultural and historical environment significantly alters the character of both the site and the artifact. The retrieval of the information or artifact is itself a significant adverse impact. 38-56 CR-1

3.6.6 As referenced above the conclusion in this section is flawed as the removal of scientific and historical information from the environment, which contributes to the designation of cultural significance, is an adverse impact. Therefore there are potential significant unavoidable adverse impacts which may result from the proposed mitigation measure. 38-57 CR-1

Page 3-130 The comparison of turbines to agricultural machinery and structures is not a reasonable comparison. To presume that they are characteristic of or similar to any element of rural character is ludicrous. The statement "... wind farm operations are not inherently more intensive than other resource activities in terms of noise and associated land use impacts" is completely false and should be removed. In the current setting with agricultural and residential uses at their current state the operations of Desert Claim would be significantly more intensive. The primary agricultural use of the properties identified in the project is cattle grazing. The wind turbines are much more intensive in terms of noise than is cattle grazing. Agricultural activities and intensities are intermittent and seasonal. The constant intensity of the wind factories is much different. 38-58 LU-1

Under indirect impacts the conclusion that Desert Claim would not attract supporting land use and stating that transmission lines are already located proximate to the site indicate that a means of transmission connection has been determined. This is not the case. The proximity of transmission lines is therefore irrelevant in this context and the statement should be removed. 38-59 LU-9

Pages 3-130 and 3-131 Under direct impacts it is acknowledged that the project is incompatible with residential use. Under indirect impacts it is suggested that relocation of rural residential users is an option. 38-60 LU-3 For that to be a viable option then property value analysis and mitigation would be necessary to allow residents the financial ability to relocate. Furthermore, the suggestion that residential users currently compete with ongoing agriculture is not accurate. It has been determined that the primary agricultural use of property within the area is grazing. Most rural residents are aware of the best production areas and seek to maintain those for grazing and other agricultural pursuits. The statement 38-61 LU-8 that current agricultural activities would continue on the land leased to the wind factory cannot be substantiated. 38-61 Cont. LU-8

Page 3-131 Although not required Kittitas County objectives may be impaired if the impact on property values and appropriate mitigation measures is not addressed here. Without consideration of the impact to property values the county is derelict in its protection of the surrounding properties. 38-62 NS-1

3.7.1.7 Increasing turbine setbacks from residences adjacent to the central portion of the site would further mitigate some of the adverse impacts of the surrounding project. 38-63 LU-5

3.7.1.8 The statement that the impact on overall land use patterns would be insignificant is untrue and should be removed. Although the zoning is largely Ag-20, there are a large number of rural residents in this area. Based on the numbers alone, use is largely rural residential. The project includes only 8 of 83 residents within ½ mile of the project boundary. Of the 75 unwilling participant residents, many engage in agricultural activities although they are rural residential users as well. The overall use patterns for 90% of the residents will be significantly impacted. 38-64 LU-1

Page 3-134 cites GPO 8.9 as support for the development of wind factories. Wind factories do not conserve rural character. See preceding discussion regarding page 3-130.

GPO 8.11, again, the existing and traditional uses are both rural residential and agricultural in nature. Both land uses along with the existing character of the rural neighborhood should be protected. 38-65 LU-6

The discussion is flawed. Incompatibility with rural residential uses has been identified within this document. The construction of a wind factory would destroy the current character of this rural neighborhood. Introducing 120, nearly 400-ft tall structures would significantly overpower the existing landscape and define and dominate the character of the neighborhood.

Page 3-135 Expanding on the discussion which states that most collection lines would be located within the project area, it should be noted that additional overhead lines are proposed off site increasing the adverse impacts to unwilling participant landowners. 38-66 LU-10

Page 3-136 Kittitas County Critical Areas Ordinance (Title 17A) The project would violate the "zero net loss" policy regarding wetlands. 38-67 LU-6

Page 3-139 The discussion regarding the project's relation to the Growth Management Act is flawed in its conclusion that "the proposal would not involve significant amounts of buildings, structures or impermeable surfaces." If there are currently only 83 residences within ½ mile of the project then the introduction of 120 structures would be significant in both amount and (considering their immense size) impact. 38-68 LU-7

3.8.1.1 Are residential hazards applicable to this DEIS? That paragraph appears irrelevant to an analysis of the affected environment and should be removed. 38-69 HS-13

3.8.1.2 First paragraph, last sentence- Again, are household electrical hazards applicable to this DEIS? That sentence appears irrelevant to an analysis of the affected environment and should be removed.

3.8.1.3 Listed land uses should include rural residential. 38-70 HS-13

Pages 3-145 through 3-147 Icing conditions are estimated to occur 4 to 5 times per year on average. Is that 38-71 HS-3 a 2-year average or has historical weather data been evaluated to determine that average over a larger time frame? 38-71 Cont. HS-3

Page 3-150 In the discussion on wind turbines' influence on fire it was noted that they can be stopped to facilitate aerial fire fighting. What is the estimated elapsed time from the time the fire is reported until the turbines can be stopped? Is it longer than the estimated response time for aerial fire fighting equipment? Do the mitigation measures regarding fire hazards address the potential compromise of aerial fire fighting techniques and the resulting increased demand for firefighters and equipment to effectively battle a brush fire on the ground? 38-72 HS-1

Page 3-155 Shadow Flicker - Modeling - Consideration of fog or cloud cover occurring in the mornings and evenings is not reasonable as the presence of fog or low clouds often indicates a lack of wind. The model only addresses receptors, in this case identified as residences. Potentially anywhere the shadow contacts the terrain or a building shadow flicker can occur. 38-73 HS-7

The statement that covering a window where shadow-flicker occurs will prevent it from occurring is incorrect. The shadow-flicker will still occur. It will not be observed from inside the building with the curtains drawn. Covering a window may be one means of mitigating impact but it is not prevention. Please restate or remove the statement. 38-74 HS-8

Page 3-156 Impact Results - DEIS state "All potential receptors for the Desert Claim project have been included in the model." Due to the narrow definition of receptor this statement is misleading and should be removed or restated. The statement indicates that all potential affected places have been included when that is not the case. Again, the model addresses only residences. 38-75 HS-7

Page 3-159 Shadow-Flicker Consequences- Although a single turbine's blade pass frequency is .87 Hz, and well below the Hz likely to trigger epileptic seizures, would the combined flicker from several turbines have a different effect? Also, although not enough to cause seizures, the flicker can cause a sense of vertigo, which can result in injury. 38-76 HS-7

3.8.2.4 The level of mortality on <u>local</u> raptor populations may be more than anticipated based on the single one year study conducted. Additional studies are required. 38-77 HS-12

3.8.5.1 Mitigation measures discuss various setbacks required for various hazards. The greatest distance should be determined to mitigate all potential impacts. That same distance should be set for residences, rights of way and property lines. 38-78 HS-4

Page 3-164 2nd bullet -indicates that transformers can be located below ground. Will transformers be located below ground? 38-79 HS-6

Page 3-165 The statement that "several practical options exist for controlling or preventing shadow flicker at the receptor location rather than at the source" is false and should be removed. The only means of controlling or preventing the phenomena is at the <u>source</u>. All options listed here make unwilling participant residents responsible for mitigation of the damage imposed by the introduction of the wind factory to this area. Part of the allure of a rural neighborhood is being able to enjoy the outdoors. Suggesting that residents be confined to their homes when shadow flicker occurs is not practical. Setbacks of 2000' from residences and property lines would effectively control shadow flicker. 38-80 HS-8

3.9.1.2 It appears that the county may need to adopt noise standards based upon actual area uses. Since dBAs of 40 to 50 can result in sleep interference protection of rural residential use would require night 38-81 NOI-4 time limits of less than 40. The state standards for noise on agricultural properties should be reduced for application here. Most of the agriculture in this area consists of grazing, a smaller amount of feed crop production contributes to lower, existing, ambient noise levels. 38-81 Cont. NOI-4

3.9.1.3 Project area uses should include residential. 38-82 NOI-6

Table 3.9-4 Existing sound levels on the eastern side of the project area are quite quiet according to the measured sound levels. Introduction of this project and the increase in the average, ambient noise would result in a medium to high impact on this side as it appears the additional increase in sound from the turbines would be 5-10 dBAs. The greatest impact would obviously occur at night. 38-83 NOI-1

Page 3-177 The noise modeling provides estimates for wind speeds of 4m/s and 8m/s. Since Desert Claim has wind data from their 2 years of prospecting they should be able to provide additional information to analyze the applicability of these wind speed estimates. (i.e. how many hours per year does the wind blow less than 4m/s , 4 to 8m/s, over 8m/s?) 38-84 NOI-1

3.9.5 Minimum setbacks should be increased to 2000' or the amount necessary to obtain the 40dBA sound level at residences. 38-85 NOI-2

3.9.6 Projected sound level increases could feasibly produce high impacts based on the quiet nature of the existing conditions. How would the clusters of turbines upwind affect sound levels on the quieter east side? 38-86 NOI-1

Page 3-193, Figure 3.10-4 showing visual assessment units and key views is difficult to interpret as the specific project properties are not identified in relation to the visual assessment units. The visual impact area for key views 1A and 1E appears to be approximately a 90-degree view. To adequately portray the adverse impacts of these two key views the full 270-degree view of the project should be shown. The condensed views and photos are misleading. Also, the area of impact in and around these two specific views should be identified as to the number of residents impacted by these views. The discussion of visual impacts states that few people will be impacted by these views although those that are will be highly sensitive. Jumping ahead to information presented in section 3-12 it is easy to calculate that there will be in excess of 700 vehicles, which will pass through views 1A and/or 1E daily. That is a significant number of viewers that will be highly impacted by the visual intrusion of these wind turbines. How many residents are there currently residing in the foreground and middleground of this visual atrocity? 38-87 ALG-2

To say that only two of sixteen key views were rated as "high" impact views is misleading. The visual assessment assumes a 90-degree view of the project area at a given key view. The cumulative impact of the true 270-degree view from locations 1A and 1E should be weighted accordingly.

3.10.2.3 The lighting scheme proposed by Desert Claim will be a significant impact to the current environment. Although the daytime strobes are not so obtrusive the red flashing lights at night will be a significant adverse impact especially for those residents at the higher elevations north of the proposed project site. 38-88 ALG-1

3.10.2.4 The statement that shadow flicker can arise within or near houses is incorrect and should be removed.. As noted in my comments regarding section 3.8, shadow flicker occurs when the blades pass across the sun causing a flickering shadow on land, structures and all objects. A residential structure does not cause or contribute to the phenomena. 38-89 ALG-5

Page 3-226, 3.11.2.1 In the discussion regarding recreation traffic impacts, primarily due to construction, 38-90 RC-3 it is acknowledged that travel along highway 97 and county roads within the project area may be congested with potential delays due to construction. These impacts will also affect residents and their visitors. The traffic plan needs to address resident access priority. 38-90 Cont. RC-3

3.12.2.1 The proposed project road connections to the existing public road system should be indicated on figure 2.12 to identify areas of potential traffic disturbances. Based on descriptions in this section, most connections can be estimated however, the proposed connections to the KRD access road are not clear. 38-91 PD-4

3.12.5.2 Regarding tourism, the DEIS states that a tourism plan is recommended prior to power generation. A tourism plan should be required to be completed and approved prior to construction. The plan should be designed so as to minimize environmental and community impacts. 38-92 GT-3

3.12.6 Without continuing maintenance and repair activities on county roads during construction, there would be severely adverse physical impacts to the road conditions. The development agreement should require the roads be maintained in their current condition throughout the construction process. 38-93 GT-6

Beginning on Page 3-245, section 3-13 discusses air traffic impacts to Bowers field. The mitigation measures addressed include project modifications to comply with air traffic obstruction or changes to the existing air traffic patterns. Desert Claim has not taken the initiative in exploring any modifications to the proposed project. Again, the applicant would rather place responsibility for mitigation on those impacted by their project. Mitigation is unresolved. The applicant should further investigate means available for them to mitigate the impacts to the community. 38-94 AT-2

It seems that the lighting scheme developed for this particular project in order to meet FAA requirements involves a large number of turbines with dual lighting requirements. If the project did not have its unique patchwork footprint, how many fewer towers would require lighting? 38-95 AT-6

3.14.1.1 In the second paragraph concerning stations listed within closest proximity to the project area, the Fairview location is incorrectly described as west of the project on Highway 97. 38-96 PSU-3

Page 3-282 Since there is economic information presented for informational purposes only, which are not part of SEPA regulations, why then was the effect on property values left out of the DEIS? It appears that only favorable economic impacts are presented for informational purposes. Economic impacts on property values should be studied for this area and presented for informational purposes as well. In order to present a more complete economic impact analysis for the decision making process, all impacts should be addressed. 38-97 NS-1

Page 3-291, 3.16.2.1 The statement "However, the amount of these additional tax revenues - based on increased property values and increased consumer expenditures - has not been determined." should be modified and the reference to property values removed. Property values have not been addressed in this document. Furthermore, studies supporting an increase in property values have not been presented. No studies of areas comparable to the Kittitas Valley have been completed. Property values on turbine lease properties would increase due to the 30 year income producing potential of the property. Properties within the project area, subject to all of the impacts and none of the benefits, would likely decrease in value. 38-98 FIS-3

CHAPTER 4: CUMULATIVE IMPACTS

4.1 Earth Resources - As discussed in 3.1.5.2 landslide hazard zone 1 has a high risk regardless of 38-99 ER-3 construction activity. If geotechnical studies are not capable of relocating the turbines to avoid this hazard area those turbines should be removed. 38-99 Cont. ER-3

4.2 Air Quality - Fugitive dust emissions are dismissed as insignificant because of the temporary nature of construction activity (9 months to several years) and would not be noticeable in extensive off-site areas. How extensive an area are we considering? The potential for cumulative effects of dust and vehicle emissions (if both the Kittitas Valley and Desert Claim projects are constructed simultaneously) combined with other agricultural activities inherent to the area could be significant. 38-100 AQ-2

4.4.2 Desert Claim will impact wetlands in direct conflict with county policy. Turbines that cannot be relocated to avoid impact should be removed from the project. 38-101 PA-11

4.4.3.1 The conclusion that there will be no impact to population levels of individual species based on one abbreviated study is misleading. What will be the effect on local population levels? 38-102 PA-1 Bald eagle foraging areas include all calving operations. As was stated earlier in this document, agricultural use of the area is expected to continue. Therefore, calving will continue as well, within, or directly adjacent to the project area. Even low level mortality risk to threatened or endangered species is unacceptable. 38-103 PA-13

4.4.3.2 A lack of knowledge regarding bat fatalities and limited study should not be used as the basis for determining that significant adverse impacts are not expected. 38-104 PA-15

4.5 Electrical energy production is compared to local production to determine significance. Throughout the document references have been made to the region's electric production, now project production is compared to "local" production to boost its significance. The collective energy production of the proposed projects is significant only at the county level. 38-105 ENR-2

4.6 Desert Claim will disrupt twice as many culturally significant sites than the other two proposed projects combined. Mitigation should be the relocation or removal of turbines which would cause the disruption. 38-106 CR-1

4.7 The statement that "Some disbursed rural residential uses are located adjacent to the Desert Claim and Kittitas Valley sites, . . . " should be reworded. Many people reside in adjacent and captive properties of Desert Claim. Looking at population uses of the area, agriculture is secondary to rural residential use. 38-107 LU-1

The external impacts of these wind factories is not comparable to agricultural uses. Noise from the wind factories is constant - not seasonal. No agricultural equipment is comparable in size or visual impact. This conclusion is flawed. 38-108 LU-1

The proximate Desert Claim and Kittitas Valley proposals individually or combined would discourage residential use. Although zoning is largely agricultural, actual use is largely residential. If the developers would like to return the area to largely agricultural use and proceed with the project, they should compensate residential users for the decrease in property values and thereby encourage relocation. 38-109 LU-4

Cumulatively, the introduction of 361 to 391 turbines and specifically, the 240 in the Desert Claim and Kittitas Valley projects represent an intensive use of structures based upon the current land use and current structures. 38-110 LU-1

4.9 The statement, "While the project would result in incremental increases in typical noise levels at a small number of selected locations . . . " is misleading. It appears only four locations were selected for noise modeling. There are many areas surrounded by Desert Claim's patchwork footprint where incremental increases may be significant. 38-111 NOI-1

Page 4-17 The cumulative visual impacts section concludes that, ". . . some local residents and frequent visitors might perceive a substantial change to the overall character of the Kittitas Valley landscape . . . " It is obvious that the more exposure, the greater the impact will be but everybody will perceive the overall change in the character of the valley. This is in direct opposition to the county's objectives. 38-112 ALG-1

Page 4-24 Economic impacts are not considered part of the DEIS based on the direction in WAC-197-11-448 and not required under SEPA. Is this DEIS supposed to present a slanted view of the project? If all economic impacts are not presented then the informational aspect becomes skewed. 38-113 PHE-4

Technical corrections: Table 1-1 as referenced earlier concerning shadow-flicker 38-114 HS-8
Page 5.2 paragraph 2, location designated as King County 38-115 EIS-15

Other Issues: It seems that the comparisons throughout this document change based on the intended result. Impacts are compared against larger areas if the intended result is to be diminished and against smaller areas if the intended result is to appear greater. 38-116 VB-4

This document has addressed most of the potential adverse impacts. Many impacts have been downplayed due to their temporary nature. However, many will adversely affect this valley for the next 30 years or more 38-117 EIS-1 if this project is approved. Additional mitigation measures should include a local, 24-hour hotline to address residents' concerns and impacts if this project goes forward. All mitigation measures must be specifically 38-118 EIS-10 identified and detailed in every aspect, prior to project approval and permitting. A comprehensive decommissioning plan must be completed prior to construction. That plan should contain provisions for accelerating decommissioning of any portion of the project or the entire project if impacts are significantly 38-119 PD-3 more adverse than contemplated. It looks like the approval or rejection of this project alone will significantly alter the course of future development in Kittitas County. The decision to approve this project will forever adversely affect the character of the neighborhood and the county. 38-120 VB-3

Thank you again, for this opportunity. I hope you will take these comments, concerns, and questions into account in preparing the final EIS.

Sincerely,

Felicia M Persson
3561 Robbins Rd
Ellensburg, WA 98926
fpersson@televar.com
(509)925-9407

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KITTITAS COUNTY
CDS

39
P.1

JAN 28, 04

CLAY WHITE
PLANNER II

OIL AND WATER DO NOT MIX!

THE DESERT WIND POWER CO. HAS PROPOSED TO ESTABLISH AN INDUSTRIAL POWER PLANT IN AN AREA THAT IS MOSTLY ZONED Ag. 20

AGRICULTURE IS DEFINED AS THE CULTIVATION OF THE LAND TO RAISE FOOD AND ANIMALS.

AN INDUSTRIAL PARK, OR COMPLEX IS DEFINED AS AN AREA ZONED FOR INDUSTRIAL, AND, OR BUSINESS USE TO PRODUCE A PRODUCT, OR SERVICE.

OIL AND WATER DO NOT MIX!

IF THE COUNTY WANTS TO HAVE WIND GENERATOR POWER PLANTS IN KITTITAS COUNTY, THEN THEY MUST FIND AN AREA VOID OF POPULATION, AND THAT CAN BE ZONED INDUSTRIAL AN AREA SUITED FOR THAT PURPOSE IS EAST OF THE TOWN OF KITTITAS, CLEAR TO THE COLUMBIA RIVER.

39-1
ALT-6

OIL AND WATER DO NOT MIX!

PROPERTY RIGHTS ARE IMPORTANT TO EVERYONE OF US. IF ONE PROPERTY OWNER ALLOWS HIS LAND TO BE USED TO CONSTRUCT WIND GENERATING TOWERS, HE IS INFRINGING ON THE PROPERTY RIGHTS OF HIS NEIGHBORS.

39-2
VB-6

PROPERTY VALUES OF THE LAND IN THE AREA OF WIND GENERATOR TOWERS WILL BE

39-3
NS-1

greatly reduced. If there is anyone that believes that land values won't be greatly reduced. I will gladly sell my home, and land to them, at the present market value. 39-3 Cont. NS-1

Oil and Water Do not mix!

The views in Kittitas Valley are one of the greatest resources Kittitas County has. It is probably the greatest non-renewable resourse that draws people here. The beauty of this valley is not a renewable resource. It is the responsibility of the county commissioners to protect this valuable resource, what ever the cost. 39-4 VB-8

The decision on this matter is yours, County Commissioners. Do the right thing! Say no to the Desert Wind Power Company! 39-5 SO-5

Thank you for your time

Roy Ridenour

Betty Ridenour

From: Kestrel's Edge [kestrels.edge@elltel.net]
Sent: Sunday, January 25, 2004 9:41 AM
To: Clay White
Cc: Ellensburg Daily Record; NKC Tribune; Snoqualmie Pass Times
Subject: Wind Farm Low Frequency Sound Impacts

Clay White, Planner II
Kittitas County Community Development Services
411 N. Ruby St. Suite 2
Ellensburg WA 98926

Clay,

I thought I should send you this article concerning the effects of low frequency sound on residents living near existing wind farms within the UK. Low frequency noise associated with the operation of very large modern day wind turbines is a very real impact and can only be mitigated by placing these machines well away from people's homes.

40-1
NOI-5

Neither the KVWP or Desert Claim projects acknowledge this impact, offer any studies, or suggest ways to mitigate its effect.

Mike Robertson

===

http://www.telegraph.co.uk/news/main.jhtml?xml=%2Fnews%2F2004%2F01%2F25%2Fnwind25.xml&secureRefresh=true&_requestid=24587

Wind farms 'make people sick who live up to a mile away'

By Catherine Milner
(Filed: 25/01/2004)

Onshore wind farms are a health hazard to people living near them because of the low- frequency noise that they emit, according to new medical studies. Doctors say that the turbines - some of which are taller than Big Ben - can cause headaches and depression among residents living up to a mile away.

One survey found that all but one of 14 people living near the Bears Down wind farm at Padstow, Cornwall, where 16 turbines were put up two years ago, had experienced increased numbers of headaches, and 10 said that they had problems sleeping and suffered from anxiety.

Wind farms: doctor claims they cause an increase in depression

Dr Amanda Harry, a local GP who did the research, said: "People demonstrated a range of symptoms from headaches, migraines, nausea, dizziness, palpitations and tinnitus to sleep disturbance, stress, anxiety and depression. These symptoms had a knock-on effect in their daily lives, causing poor concentration, irritability and an inability to cope."

Dr Harry said that low-frequency noise - which was used as an instrument of torture by the Germans during the Second World War because it induced headaches and anxiety attacks - could disturb rest and sleep at even very low levels.

"It travels further than audible noise, is ground-borne and is felt through vibrations," she said. "Some people are having to leave their homes to get away from the nuisance. Yet, despite their obvious suffering, little is being done to relieve the situation and they feel that their plight is ignored."

Similar problems have been found by Dr Bridget Osborne, a doctor in Moel Maelogan, a village in North Wales, where three turbines were erected in 2002. She has presented a paper to the Royal College of General Practitioners detailing a "marked" increase in depression among local people.

"There is a public perception that wind power is 'green' and has no detrimental effect on the environment," said Dr Osborne. "However, these turbines make low-frequency noises that can be as damaging as high-frequency noises.

"When wind farm developers do surveys to assess the suitability of a site they measure the audible range of noise but never the infrasound measurement - the low-frequency noise that causes vibrations that you can feel through your feet and chest.

"This frequency resonates with the human body - their effect being dependent on body shape. There are those on whom there is virtually no effect, but others for whom it is incredibly disturbing."

A report by Dr Geoff Leventhall, a fellow of the Institute of Physics and Institute of Acoustics, has endorsed the findings. "Low-frequency noise causes extreme distress to a number of people who are sensitive to its effects," it says.

The claims have sparked an inquiries by the British Wind Energy Association and the Department of the Environment, Food and Rural Affairs, which has commissioned scientists at Salford University to research the effects of wind turbines on human health.

There are more than 1,000 turbines on 80 wind farms around Britain. They have rapidly increased in number during the past decade as a result of the Government's aim of getting 10 per cent of Britain's energy needs from renewable sources by 2010. To meet that target, there would have to be at least 5,000 turbines.

In Denmark, where wind turbines were introduced as long as 30 years ago, the government has responded to public demand and stopped erecting onshore turbines because of the noise hazard.

Dr Stephen Briggs, an archaeologist who lives in the village of Llangwryfron in West Wales, initially welcomed the news that 20 turbines were to be built in the hills behind his home.

He said: "I'm as green as the next man and the developers assured us that the windmills would cause hardly any disturbance, but once they began operating I couldn't work in my garden any more - the noise was unbearable. It was as if someone was mixing cement in the sky."

Two neighbours became ill from a lack of sleep and after four years of frustrated appeals, the Briggs family left their home of 17 years. House prices near to wind farms have also plummeted.

Mark Taplin, who has lived close to a wind farm near Truro in Cornwall for almost a decade, said: "It has been a miserable, horrible experience. They are 440 metres away but if I step outside and they are not generating I know immediately because I can hear the silence. They grind you down - you can't get away from them. They make you very depressed - the chomp and swoosh of the blades creates a noise that beggars belief."

National Wind Power, a company that builds turbines, recommends that they are erected at least 600 yards from human habitation, but government planning guidelines allow them to be put up just 400 yards from houses.

Alison Hill, the communications manager for the British Wind Association, said: "Wind farms make people feel better - they are a visible evidence of a cleaner, better future. However, we are currently doing research into the health impact of the turbines and shall be publishing the results within the next six months." 40 P.3

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P.1

Comments pertaining to the accuracy and completeness of the:

Desert Claim Wind Power Project

DEIS

December 2003

(Summary of Comments starts on Page 8 of this document)

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JAN 1 9 2004

KITTITAS COUNTY
CDS

Michael H. and Elizabeth F. Robertson
4101 Bettas Rd.
Cle Elum WA
98922

Fact Sheet

The statement that the proposed project will produce 180-megawatt (MW) wind energy is incorrect (or at a minimum – misleading). A conservative estimate of wind-energy facility efficiency is 30% of stated nameplate capacity. This project will, at best, only contribute 60 MW of intermittent power.

Chapter 1
Summary

41-1
PD-5

1.3 APPLICANT'S OBJECTIVES FOR PROPOSAL

The statement that the proposed project will produce 180-megawatt (MW) wind energy is incorrect (or at a minimum – misleading). This project will, at best, only contribute 60 MW of intermittent power. Instead of stating this throughout the whole document, please replace this reference with the words, "60 MW of effective power".

The application stated that one the site-specific criteria needed to support such a facility required ready access to sufficient available capacity on an existing electric transmission system. This may be criteria by the applicant from a business profitability standpoint, but should not be stated as a requirement for evaluation within this DEIS (unless the applicant is proposing to build increased transmission capacity). 41-2 EIS-9

1.4 KITTITAS COUNTY OBJECTIVES

To meet the Kittitas County's requirements to obtain a Wind Farm Resource Development permit, execute a development agreement, adopt a site-specific amendment to the Comprehensive Plan use designation map, and adoption of a site-specific rezone of the project area to Wind Farm Resource Overlay Zoning District; evaluation is required of the following:

- The project is essential or desirable to the public convenience.
- The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood. 41-3 EIS-4
- The project will not be unreasonably detrimental to the economic welfare of the county and will not create excessive public cost for public facilities and services.

There is no data offered to substantiate why this project is desirable to the public convenience. Utilizing data provided, this project will disturb the peace in the project area, introduce significant potential public safety hazards, and may affect the public health.

1.5 SUMMARY OF THE PROPOSAL AND ALTERNATIVES

No alternative site was provided that was not already near existing transmission lines. 41-4 ALT-7

1.6 SUMMARY COMPARISON OF ENVIRONMENTAL IMPACTS

Table 1-1

PLANTS AND ANIMALS

Wildlife

Birds

Compared to other wind plants that have been studied, raptor use for the Desert Claim site is above average. **The studies provided are insufficient to support the statement that 3 to 4 raptor fatalities a year could be possible.**

The study deficiencies are mostly due to the small data samples used and the frame of reference scope. 41-5 PA-13

Their main data collection technique was a 'Fixed point' observation scheme augmented with informal automobile travel and helicopter flights to discover raptor nesting sites. They had six observation stations within the project area that were visited once a week by a single individual for 30 minutes at each station. There were a total of 162 ea; 30 minute station observations documented. The math doesn't add up (52 weeks x 6 stations = 312 possible station observations) with the total of 162 observations being only 51% of the total possible in the time period given.

The local Kittitas Audubon group has stated that a two year baseline study of the whole valley (day and night and including bats) is required to sufficiently analyze potential impacts to bird populations. This makes sense to determine migratory patterns (local and transitory). 41-6 PA-1 It would also help in determining how one wind farm project might affect another (cumulative affects). WEST's studies 'live in a vacuum'. They only address the proposed project area for which they are contracted. Their risk assessment data is based on all the projects they have done previously, but if their methodology is deficient, they will always get the same answer (which is why wind developers use them). Arial helicopter surveys of raptor nests are without merit. 41-7 PA-13 They will most likely observe Buteo and Great Horned owl nests, but Kestrels are cavity nesters and are hard to find even if your are an experienced bird watcher. They will never discover Accipiter nests (if there are any in the area - they prefer mixed wood/meadow) because they are low flying 'sprinters' that rely on surprise (from tree to meadow) to take prey. The lack of rodent surveys suggests they have not determined with any accuracy, the raptor 'feeding' environment potential. All the same concerns of mortality count methodology in existing wind farm installations still exist and if this is not improved, the projected mortality data is just noise. Reduction of raptor populations would imply that there would be a corresponding increase in rodent populations. 41-8 PA-16 This could present a significant health risk with the increased risk of Hantavirus exposure to neighboring residents. No follow up baseline studies of other operational wind farms are offered to determine if wind farms change the 'overall' ecology of a wind farm project site. 41-9 PA-20

- No night time observations were performed (i.e radar studies or night vision eyewear). 41-10 PA-1
- No bird sound observations were performed.
- No Bald Eagle roosting sites were looked for outside the project area to determine if their travel patterns might intersect with the wind farm.

- No bats studies were provided.
- Residents were not asked if they were aware of any raptor nests in the project area.

41-10 Cont. PA-1

This project violates at least 3 of the following US FWS guidelines to site wind turbines (2, 4, and 10). Without the required study, item 3 cannot be determined and bats should be considered at risk.

Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines US Fish and Wildlife Service May 3, 2003

Site Development Recommendations

The following recommendations apply to locating turbines and associated structures within WRAs (Wind Resource Area) selected for development of wind energy facilities:

1. Avoid placing turbines in documented locations of any species of wildlife, fish, or plant protected under the Federal Endangered Species Act.
2. Avoid locating turbines in known local bird migration pathways or in areas where birds are highly concentrated, unless mortality risk is low (e.g., birds present rarely enter the rotor-swept area). Examples of high concentration areas for birds are wetlands, State or Federal refuges, private duck clubs, staging areas, rookeries, leks, roosts, riparian areas along streams, and landfills. Avoid known daily movement flyways (e.g., between roosting and feeding areas) and areas with a high incidence of fog, mist, low cloud ceilings, and low visibility.
3. Avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies, in migration corridors, or in flight paths between colonies and feeding areas.
4. Configure turbine locations to avoid areas or features of the landscape known to attract raptors (hawks, falcons, eagles, owls). For example, Golden Eagles, hawks, and falcons use cliff/rim edges extensively; setbacks from these edges may reduce mortality. Other examples include not locating turbines in a dip or pass in a ridge, or in or near prairie dog colonies.
5. Configure turbine arrays to avoid potential avian mortality where feasible. For example, group turbines rather than spreading them widely, and orient rows of turbines parallel to known bird movements, thereby decreasing the potential for bird strikes. Implement appropriate storm water management practices that do not create attractions for birds, and maintain contiguous habitat for area-sensitive species (e.g., Sage Grouse).
6. Avoid fragmenting large, contiguous tracts of wildlife habitat. Where practical, place turbines on lands already altered or cultivated, and away from areas of intact and healthy native habitats. If not practical, select fragmented or degraded habitats over relatively intact areas.
7. Avoid placing turbines in habitat known to be occupied by prairie grouse or other species that exhibit extreme avoidance of vertical features and/or structural habitat fragmentation. In known prairie grouse habitat, avoid placing turbines within 5 miles of known leks (communal pair formation grounds).
8. Minimize roads, fences, and other infrastructure. All infrastructure should be capable of withstanding periodic burning of vegetation, as natural fires or controlled burns are necessary for maintaining most prairie habitats.
9. Develop a habitat restoration plan for the proposed site that avoids or minimizes negative impacts on vulnerable wildlife while maintaining or

41-11 PA-3

enhancing habitat values for other species. For example, avoid attracting high densities of prey animals (rodents, rabbits, etc.) used by raptors.
10. Reduce availability of carrion by practicing responsible animal husbandry (removing carcasses, fencing out cattle, etc.) to avoid attracting Golden Eagles and other raptors. 41-11 Cont. PA-3

HEALTH AND SAFETY

No analysis was provided on the potential increased exposure of residents in proximity to the project area to the Hantavirus as it relates to increased rodent populations due to declining raptor populations. No analysis was provided on the potential increased exposure of residents to the project area to the West Nile virus as it relates to increased mosquito populations due to declining bat populations. 41-12 HS-12

Shadow Flicker

Not a single minute per year of this effect should cross any non-participating adjacent land owner property line without his or her permission. This is a property rights issue due to the fact it would limit the use of non-participating land owner property as it relates to: 41-13 VB-7

- Where a land owner is able to build his or her residence
- Whether transitory horses can be boarded*
- Enjoyment of 'undisturbed' property value

***Reference: THE BRITISH HORSE SOCIETY**
Revised Policy Statement on Windfarms and Horses/Ponies

1. The Society is conscious of the need for developers and planners to be made aware of the safety implications to horses and their riders or drivers arising from the construction and operation of wind turbines in the vicinity of routes for riding and/or driving horse drawn vehicles (HDV).
2. The natural instinct of a horse when faced with perceived danger is flight so its reaction depends very much on, in that first split second, the horse's perception of the hazard, and equally as important the riders/drivers ability to handle the horse or pony when faced with unexpected circumstances.
3. The horse and rider unfamiliar with the area may react in a potentially dangerous manner to any of the following characteristics which can arise from the operation of a wind turbine: sudden appearance in the horses' sight line of turning blades, the low frequency noise emitted by the turbines punctuated by the "whoomph" as the blades pass the nadir point and sometimes said to be felt rather than heard, shadows sweeping the ground or bushes/trees in sunny weather, the unexpected starting up of the turbine if the wind builds up as the horse approaches.

The noted effects on horses can be applied to deer and elk with the net effect of driving these animals away from the area. 41-14 PA-9

NOISE

It is not relevant to this DEIS that "*Low-frequency noise impacts are not anticipated due to "upwind" design and streamlined turbine design. Tonal noise from turbine operation is possible, but cannot be predicted*". The purpose of an EIS is to 'anticipate' and assess just such factors and offer mitigations. There is abundant documented testimony from around the world of residents living in close proximity to modern wind farms. The noises they find most irritating are 'thumping' noises heard as the blades pass in front of the tower structures and 41-15 NOI-5 'whoomphing' noises (as indicated in the previously quoted British Horse Society policy statement) when the blades pass the nadir point. This is a cumulative effect as more turbines in an area are added. **If the applicant cannot offer any data regarding these impacts, then a minimum 2 mile setback from any non-participating property owner should be required.** 41-15 Cont. NOI-5

AESTHETICS/LIGHT AND GLARE

A majority of the simulations were pictures taken when either the sky was hazy, there were low clouds, or taken in the winter with snow covering in the background. There was no indication of an intense strobe light "light source" on the tower tops (FAA requirement), no blade motion simulations, and of course, no night time simulations with blinking red lights. 41-16 ALG-2

Every advertiser knows that movement, color, blinking lights, or sound will draw a person's attention. The Proposed wind turbines are two and a half times as tall as the tallest BPA power transmission line support structure. Their rotor blade diameter alone is much greater than the height of the tallest power transmission line and the rotors move. In the morning hours and afternoon hours these turbines sweep large shadows across the landscape referred to as shadow flicker. Add to this a blinking strobe light designed to draw attention to unwary pilots and you have a landscape feature that no one will be able to ignore. Now spread 240 of these monsters across the highest ridge tops in the upper Kittitas Valley. You would not be able to even drive on Hwy 97 without being distracted. Put one of these machines within 1,000 feet of a resident's home and you tell me if it will bother them. 41-17 ALG-1

No visual simulations were provided from the homes of neighboring, non-participating home owner properties. 41-18 ALG-2

This particular impact alone is enough to deny siting this project anywhere near non-participating land owner property. 41-19 VB-7

PUBLIC SERVICES AND UTILITIES

Police Service

It should be anticipated that there will be an increased call rate to the police department due to private land violations from curious non-residents wishing to get "up close" to a gigantic wind turbine. 41-20 PSU-5

FISCAL CONDITIONS

"*Potential property tax revenues from the project are estimated at a maximum of nearly $1.1 million for the first year of operation. Tax revenues in subsequent years would be based on depreciated value of the project and have not been estimated.*" 41-21 FIS-2

Why have the tax revenues for subsequent years not been provided?

1.7.4.3 Wildlife

Birds

The conclusions presented are without merit due to the lack of a minimum two year base line study of the whole valley. Other deficiencies were noted in previous section "**PLANTS AND ANIMALS, Wildlife, Birds**". 41-22 PA-1

1.7.5 Energy and Natural Resources

"The three proposed wind power projects would provide a combined nameplate capacity of approximately 540 to 545 MW of electricity (under the "middle scenario" for development of the Kittitas Valley project). Assuming long-term operation of the three projects at a typical plant factor of 33 percent, the Kittitas Valley, Desert Claim and Wild Horse projects would produce approximately 180 average MW of electricity on a long-term basis. Operation of the three projects would add substantially to the capacity, production and availability of renewable energy sources in Washington and the Pacific Northwest."

41-23
ENR-2

On the other hand, these combined projects will only be capable of supplying 1.1% of the anticipated Pacific Northwest Electricity demand through 2025*. This is an insignificant contribution when you consider that the recently approved Sumas Energy 2 Generation Facility will nominally produce 660 MW of also available (dispatchable) electricity and only occupy a portion of a 37-acre site within the industrial area of Sumas, Washington. The Pacific Northwest receives approximately 80% of its electrical power from hydro-electric resources. No common sense case can be made that we need any more renewable energy sources of power provided at significantly increased rates to the utility consumer.

*Table 1-1 (Projected Pacific Northwest Electricity Demand, 2000-2025) Kittitas Valley Wind Power Project DEIS.

1.7.16 Fiscal Conditions

"Current statewide legal limitations on property taxes would likely result in actual tax revenues lower than those indicated above. Initiative 747 limits the growth of local government property tax revenues to 1 percent 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 percent) 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 <above>, although all 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."

No data was provided as to the estimate of increased utility rates to Kittitas County residents with the introduction of 180 MW of intermittent power to the regional grid. Any savings in property tax rate assessments will more than be lost by these increases. 41-24 FIS-4

1.8 MITIGATION MEASURES

1.8.4.3 Wildlife

In addition, consideration could be given to developing, in cooperation with other industry participants, a focused monitoring study that addresses a specific question regarding impacts from wind plants, such as:

41-25
PA-20

- *effects of different turbine lighting schemes or guy wire BFD's on avian mortality.*
- *the impact of the facility on wintering mule deer.*
- *whether wind turbines attract migrating bats.*
- *mechanisms for deterring migrating bats from turbines.*

You don't "monitor" the operational situation after building an environmentally impactive industrial power generation facility and "hope" you can mitigate anything that may come up. If this is an accepted methodology, then a "test" installation (one turbine, let's say) should be erected and closely monitored for a minimum of two years. If this is not acceptable, then bat studies and a two year avian baseline study should be required. 41-25 Cont. PA-20

1.8.8.3 Shadow Flicker

No resident should have to endure one minute of this effect anywhere on his or her property. The only mitigation possible is to position these turbines in a way that the effect never crosses a non-participating land owner property line without their permission. 41-26 VB-7

1.8.9 Noise

The definition of "noise" is a sound that is loud, unpleasant, unexpected, or **undesired**.

As stated previously, no analysis was provided on the impacts of low frequency noise. There is abundant documented testimony from around the world of residents living in close proximity to modern wind farms. The noises they find most irritating (**undesired**) are 'thumping' noises heard as the blades pass in front of the tower structures and 'whoomphing' noises when the blades pass the nadir point. This is a cumulative effect as more turbines in an area are added. To insure that non-participating residents are not impacted, a minimum 2 mile (10,560 feet) setback should be required to mitigate these effects. 41-27 NOI-5

1.8.10 Aesthetics, Light and Glare

You cannot disguise a 400 foot structure that moves and blinks. These machines are visually distracting and demand your attention. The only mitigation possible is to build them in a location that does not impact the aesthetic beauty that non-participating land owners consider as the prime reason for living where they live. 41-28 ALG-4

Chapter 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1.1 Proposal History

"Areas indicated as having sufficient wind resources were then screened against other site selection criteria standard to the industry, including access to existing electrical transmission facilities.."

Proximity of transmission facilities is not a criterion that is required for an EIS evaluation unless the applicant is proposing to build new capacity. No alternatives were presented of remote locations in the county that have sufficient wind resource, but no access to existing electrical transmission facilities. 41-29 ALT-7

Chapter 3
AFFECTED ENVIRONMENT, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Comments previously stated in Chapter 1 – Summary

Chapter 4
Cumulative Impacts

Comments previously stated in Chapter 1 – Summary

Summary of Comments

This document has not provided any demonstrable public need for the insignificant amount of power this facility is capable of producing. No valid, compelling local (or even statewide) economic reasons were offered to potentially offset the overwhelming negative impacts that will result if built. 41-30 EIS-7

Various mitigations offered are unacceptable or unworkable.

The following are areas of analysis that were either deficient or not performed at all:

- List of offsite alternative locations regardless of cost incurred to transport the power produced. 41-31 ALT-7
- A two year avian baseline study for the whole Kittitas Valley to accurately assess potential cumulative avian mortality rates associated with the construction of multiple wind power facilities.
- Study to locate Bald Eagle roosting sites outside of the project area to asses risk traveling to and from as it relates to the wind facility.
- Rodent population survey to determine raptor habitat desirability. 41-32 PA-1
    - No analysis was offered on the potential effect of declining local raptor populations, increased local rodent populations, and the potential increased risk to local residents of exposure to Hantavirus.
- Studies to assess potential bat mortality.
    - No analysis was offered on the potential effect of declining local bat populations and the potential increased risk to local residents of exposure to West Nile virus.
- Night time point count and in-transit surveys to estimate potential owl mortality rates.
- Visual simulations utilizing 3 MW wind turbines, on a non-hazy day, and against a cloudless sky. 41-33 ALG-2
- Visual simulations from the homes of residents living within the proposed project site.
- Low frequency noise analysis relating to the sound made when a rotor blade passes in front of the tower structure or passing the nadir point of its rotation. 41-34 NOI-5

Mitigation measures offered in some cases are unworkable, insufficient, or unacceptable to local residents.

In the general area of mitigating setbacks associated with individual turbine placement:

- Shadow-flicker analysis provided indicates that a much greater distance is required to eliminate this effect. 41-35 HS-4
- Low frequency noise mitigation would suggest a much larger distance is required. 41-36 NOI-2

January 30, 2004

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JAN 3 0 2004
KITTITAS COUNTY
CDS

Clay White
Kittitas County Planner II
411 N. Ruby St., Suite 2
Ellensburg, WA 98926
VIA EMAIL

RE: Desert Claim Wind Power Project DEIS

Dear Clay,

Below are my comments Desert Claim Wind Power Project DEIS.

THE APPLICANT	The DEIS is so what misleading in that it implies that EnXco is a US corporation: "EnXco develops, builds, operates and manages wind energy projects throughout the United States". In fact EnXco is a French corporation with a few projects in the US.	42-1 EIS-9
OUTPUT FROM THIS PROJECT	The DEIS claims that the project is "a 180-megawatt wind energy facility". In fact this is a theoretical capacity that is never achieved. Actual produced electricity is only 25 to 30% of this amount.	42-2 PD-5
	The DEIS claims that the applicant's objective is to "deliver renewable energy to the Pacific Northwest." Since there is as yet no contract with a utility company there is no evidence that the Pacific NW will benefit. Thus this statement should not be in the DEIS.	42-3 EIS-9
	Elsewhere the DEIS states, "Electricity generated by the project would be sold to power marketing entities, such as Bonneville Power Association, local and regional utilities, such as Kittitas County PUD and Grant County PUD; and/or regional investor-owned utilities, such as Puget Sound Energy and Avista." Again, this is not a fact since no contract with these entities exists. Similar claims appear elsewhere in the DEIS. All should be removed.	42-4 PD-6
	The DEIS states "The project would have little or no impact on the supply and price of electricity available to local consumers. Since EnXco has no buyers for the power, they cannot comment on the impact. In fact, since wind power is more expensive than other forms of electricity, it is likely that prices to consumers would increase. The DEIS should provide evidence why this will not happen.	42-5 ENR-1
	In the section "Summary Comparison of Environmental Impacts" it is stated that if the wind farm was not built that a fossil burning energy would have to be built to replace lost wind energy. No evidence at all is provided for this dubious claim.	42-6 ALT-1
IMPACTS ON WILDLIFE	The section "Summary Comparison of Environmental Impacts" states conclusions from a limited 1-year study performed by WEST Inc., consisting of several 30 minute visual observations at random locations in daylight. The Kittitas County Audubon has publicly stated that the WEST study is inadequate. Many of the WEST results were produced	42-7 PA-1

	"statistically" and not from actual observations. No night studies were made and no confirmation of migratory pathways were studied. Documentation from other wind facilities has stated significant raptor and bat fatalities and these documents were not acknowledged. No bat studies were performed in the project area. The proposed project area is in confirmed bald eagle hunting and roosting areas. Bald eagles are protected at the Federal level by the Bald Eagle Protection Act. Raptors are protected by State law. Aerial observations by helicopter for active raptor nests is insufficient. Some species of raptors are cavity dwellers, which cannot be seen from the air.	42-7 Cont. PA-1
	Guidelines for minimizing impact of wind turbines on wildlife were issued by the US Fish and Wildlife Service, dated May 3, 2003, were not mentioned. The DEIS should state EnXco's level of compliance with these guidelines.	42-8 PA-3
	The DEIS statement "To date, no bald eagle fatalities have been reported from wind plants in the US" is patently false. US government agencies state that hundreds of raptors, including golden and bald eagles, have been killed by the wind farm at Altamont, CA. The Desert Claim as well as the Kittitas Valley Wind Power Project areas are in bald eagle hunting grounds. The Kittitas Valley Audubon has confirmed that fact. There is a high potential that these two projects, if operational, will take a toll on our local eagle population. This is in violation of the federal Bald Eagle Protection Act.	42-9 PA-12
	The DEIS acknowledges that "based on experience at other wind plants, bat fatalities are likely to occur at all three Kittitas County projects". Yet, the WEST study did not review bat fatalities. This should be required of the applicant.	42-10 PA-15
CONSISTENCY WITH LOCAL LAND USE	The DEIS states that project facilities are "not expected" to significantly impact existing activities, and changes to "land use patterns are not seen as significant". No evidence is provided for these claims, and on the surface it appears obvious that these claims are false. The project is in the middle of recreational and residential land and owners will be impacted. The DEIS should providence evidence for its claim that this is not so.	42-11 LU-1
	The DEIS states Chapter "current research has generally found that wind farms have either no effect on tourism or a positive effect". Yet it provides no evidence, and there is a prima facie argument that the opposite will be true – recreational users of Kittitas County value the unspoiled scenery and will likely avoid the area if it is littered with hundreds of huge turbines.	42-12 PHE-1
	The DEIS acknowledges that "it is possible that the proximate Desert Claim and Kittitas Valley proposals (together more than 12,000 acres) could cumulatively discourage residential uses to some degree in their general locations". It also states "some nearby residential users might seek to relocate if they felt that wind facilities, individually or collectively, conflict with elements of their lifestyle." This is reason enough to not approve the project.	42-13 VB-7
	The DEIS states, "The proposed project would be consistent with the land use and utilities policies of the Kittitas County Comprehensive Plan." To be consistent with the KVCCP the following conditions must be met:	42-14 LU-6

	1. The project is essential or desirable to the public convenience. The project has not been proven essential or desirable. **2. The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood.** In fact, there is a great deal of evidence that the project will introduce fire risk, ice throw risk, blade and tower failures, driving distractions, increased light and noise pollution, shadow flicker and blade glint effects which are detrimental and injurious. In addition, there is much evidence that neighboring property values will plummet. The DEIS acknowledges, "Development of the project as proposed would result in significant unavoidable adverse impacts to the visual environment, especially for nearby rural residents in the northern half of the Northwest Valley." It also admits, "The scale of the wind turbines would be significantly larger than other land uses; this contrast is unavoidable because of the nature of wind facilities." By its own admission it is not consistent with the character of the surrounding neighborhood, and cannot be made consistent. **3. The project will not be unreasonably detrimental to the economic welfare of the county and not create excessive public cost for public facilities and services.** Recreation and rural development are the growing major economic force for land ownership in Kittitas County. There is a prima facie argument that property values will decline, recreation will suffer, and that area will become far less attractive as a place to live, causing the local economy to suffer. The DEIS provides no evidence that this is not so.	42-14 Cont. LU-16
SAFETY ISSUES AND HUMAN IMPACTS	The DEIS states that turbine tower collapse and blade failure (throws) are extremely remote, but then states it has occurred in the past. However, the large1.5 MW turbines proposed by the applicant are new technology with little or no track record. Thus large safety setbacks should be mandated by the county – 2500 feet from feet from property lines and roads.	42-15 HS-4
	The DEIS states "the presence of the project would likely have little long term effects on the level of fire hazard". In fact there is much evidence that such projects increase the fire hazard. Only a few months ago an employees at an EnXco wind farm was killed when a transformer at that facility exploded, causing a fire.	42-16 HS-1
	The DEIS states "The distance threshold for shadow flicker impacts is approximately 2,000 feet." And, "38 receptors (residences) in the project area could be exposed". This fact is argument for a setback of at least 2000 feet from property lines (NOT existing residences).	42-17 HS-4
	The DEIS states "project noise impacts would be rated at either low or medium, and would not be significant." There is ample evidence that noise from such facilities is a major disturbance to neighbors. This again argues for setbacks from non-participating property lines of at least 2500 feet. The DEIS also states "tonal noise from turbine operation is possible, but cannot be predicted." If it can't be predicted then the project should not be approved.	42-18 NOI-2 42-19 NOI-1

	The DEIS states "Blade glint or glare can be noticed over distances of 6 to 9 miles and could be an occasional occurrence." This impact can affect the public driving on public roads out to 9 miles if the information is correct. This is a significant impact on public safety. The DEIS states that 27 turbines would "likely be considered hazards to air navigation and a potential adverse impact on air traffic operations in the traffic pattern". Those 27 turbines identified as hazards should therefore be eliminated from the application. The DEIS does not address mitigation measures for wells that could be damaged by the blasting to create each turbine base. There could be silting or other water quantity or quality issues. The long-term effect of the huge amount of concrete proposed for these turbines ground has not been evaluated. Concrete is known to leach minerals over time.

42-20 ALG-3

42-21 AT-2

42-22 WR-2

42-23 WR-3

This project, as judged from the DEIS, has many impacts on Kittitas County that cannot be satisfactorily mitigated. I believe that the County should not approve this project in the proposed location. 42-24 SO-5

Sincerely,
Geoff Saunders
8241 Elk Springs Rd
Ellensburg 98926

EnXco Desert Claim Wind Power Project Comments

RECEIVED

JAN 30 2004

KITTITAS COUNTY
CDS

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Chapter One

1.8.3.1 Surface Water

This section should include assurances that current surface water flow will not be changed from current sites or current flow and direction. 43-1 WR-2

1.8.3.2 Ground Water

This section should assure that any placement of turbine not be in contention with current ground water amounts and are not running below the base of the turbine. 43-2 WR-2 Also, there should be assurances that any blasting will not change the actual direction or cause the ground water to "leave" the current location. Mitigation measures should be in place for homeowner's wells. 43-3 WR-2

1.8.4.1 Vegetation

The amounts of land replacing the grass and shrub steppe should not be used for farming as well? Otherwise, we lose the area that the turbines and roads are placed. 43-4 PA-5

1.8.4.3 Wildlife

A monitoring program would be in place after the Wind Factory is operational to monitor bird kills. While I cannot disagree with this, we need to know more completely how the birds will be affected before we can approve a Wind Factory. 43-5 PA-1 Any post construction monitoring has to be done with non-wind factories employees; otherwise, we will never get the truth. 43-6 PA-20

1.8.7 Land Use

I disagree that increasing the turbine setbacks for residents adjacent to the center portion of the site could reduce visual and proximity impacts. The DEIS goes on to state that other impacts do not warrant mitigations. Unless the setbacks are made for all noise, shadow flicker, ice throws, tower collapses for ALL the residents on the site, land use will be significantly changed for all involved. This will include building sites, outbuildings, 43-7 LU-5 riding arenas, grazing and pasturing of animals as well as use of those landowners by not being "comfortable" or feeling safe on their own land. 43-7 Cont. LU-5

1.8.8 Health and Safety

Blade Throw

I think additional proof that a blade will not travel more than 540 feet in a 30 or 70 mph wind is warranted. I do not trust these figures. At the open house, the engineer stated "normal wind speed" was used for his purposes. 43-8 HS-2

Fire Hazards

Additional Information is warranted on how a fire could be fought in the Wind Factory site. How fire fighters would attain access. 43-9 PSU-2

1.8.8.2 Electrical Hazards

The DEIS should include stray electricity, how it occurs in wind factory sites and how it can be mitigated "at the source". There should also be a plan to assure electricity cannot back up into residents systems, via lightning or other natural occurrences. 43-10 HS-6 EnXco should be responsible for all damage caused by these occurrences. 43-11 HS-10

1.8.8.3 Shadow Flicker

The several options discussed should NOT include receptor sites. It is EnXco's responsibility to mitigate this at the source. Most of the suggested mitigation measures sum up to "close your eyes and you will not see it". Examples:

- Residents to call hotline and report it so WF can shut those turbines off.
- Residents to plant trees.
- Residents to put up curtains.

43-12 HS-8

We own 60 acres, so that would mean do not go outside during these times? Our suggestion is to place turbines at least 2000 feet from property lines, right of ways and roads to assure health and safety. Why wasn't this mitigation measure suggested? 43-13 HS-4

1.8.9 Noise

- Setbacks suggested were 1000 feet. Turbines can be heard 2 miles away. The DEIS needs to look at other WF sites to assure 1000 feet is adequate. 43-14 NOI-2

- Low frequency sound needs to be explained and the public made aware of what that is, the impacts before mitigations can be understood. 43-15 NOI-5

1.8.10 Aesthetics, Lights, Glare

When reading all that EnXco is willing to do to minimize a wind factories look in the valley should tell us that these turbines do not belong in populated areas. Clusters of 10-15 turbines spread out across 5200 acres, essentially the whole base of the NW and Central valley will not minimize the impacts to the residents living there. In fact, it will encircle many of us, as we will not be able to not see turbines when we look south, north, east of west. Glare cannot be minimized when you are held captive on 3-4 sides of your property. 43-16 ALG-1

They state that there will be large changes in the rural landscape. We should listen to what they say and re-site this project, based upon this alone. 43-17 ALG-1

1.8.12.1 Construction

There is no mention of dust mitigation. 43-18 GT-7

1.8.13 Air Transportation

As stated in the DEIS, 27 turbines will be over FAA height restriction on the VFR flight pattern. We also have 185 students that add 44000 operations to the airport annually in addition to the 39000 operations or 85 flights daily. 43-19 AT-1

The mitigation suggested was to change the take off flight patterns for the VFR to a South turn, rather than a North turn. This will increase noise and traffic over the City of Ellensburg and the campus of CWU. I also think we should look at the impact of sending ALL flights southbound. I would think that there would be an increased chance of accidents to move traffic all in one direction. 43-20 AT-2

As a better mitigation proposal, we should consider eliminating 27 turbines or lowering the tower height to meet FAA approval. 43-21 AT-2

The lighting pattern required by the FAA will be obtrusive to the residents that live within the project and to those who live to the east, south and west of this area. As a resident in the middle of the project, I find it unacceptable to place turbines anywhere near the airport. 43-22 AT-6

1.8.14.1 Fire Hazards

How will a fire be fought in a 5200-acre site that can't be fought from the air? How will that jeopardize the safety of the public, their homes and animals? This is the main issue and it is not addressed, other than to say, a plan will be put in place later. NO, we want to hear from the WF and the Fire chief to know the issues. 43-23 PSU-2

Secondly, while EnXco states they will employ all possible mitigations to minimize the risk of starting a fire, most of those factors depend upon humans to perform them. Accidents do happen. Slip-shod maintenance does happen, whether due to lack of knowledge, time or laziness. The wind factory is adding another large risk to a known list of fire risks in this area currently. Placing them where people live is just not a good idea. I also believe that this section, or in the adjoining sections, insurance rates should be researched and discussed. 43-24 HS-1

My third point is that EnXco states, no burning, other than natural vegetation will occur. EnXco should also operate within the restrictions of "county fire rules and restrictions" and common sense, like don't burn on a windy day, August, September, etc. 43-25 HS-1

<u>1.9.1 Significant Unavoidable Impacts</u>

1.9.2 Air Quality

Construction will add dust to the valley floor, especially if several turbine sites are being prepared at one time. Dust mitigation should be addressed. 43-26 AQ-3

1.9.3 Water

The DEIS states that there are no significant impacts on the water.

- Depends upon damage to wells from blasting
- Depends upon no re-routing of surface of ground waters
- Depends upon no hazardous material spills

These are all huge risks for the residents living in the WF site as they depend upon wells for their drinking water; they depend upon wells and surface water for livestock. In fact, all life in this site depends upon water. To state that there will be no significant impacts is irresponsible. 43-27 WR-3

1.9.4 Wildlife
The DEIS states bird mortality would be adversely affected. And this conclusion is based upon a study that is incomplete and the data flawed. My conclusion is that the Wind Study did not include bats, nighttime birds, migration paths, in fact West, Inc. Did not even know where the Eagles nested! We cannot accept these facts until a more comprehensive bird study is completed. We also need to include who gets fined or arrested when the protected species are killed.

In the December 2003 Issue of the Audubon Society Magazine in an article called "Answering a Call". This article states: {Biologists believe the nation's 138000 communication towers, which range from tiny antennae mounted in church steeples to steel spires souring 2000 feet into the sky, kill between 5 million to 50 million birds a year (see "Faulty Towers," Audubon, September-October 2001). Historically, the biggest kills–thousands of birds at a time-have occurred on cloudy nights during fall migration at tall, lighted towers. "The birds appear to be attracted by the lights, then die in gruesome collisions with girders and guy wires, says Art Clark, an ornithologist in Buffalo, New York, who has studied the problem for decades."} 43-28 PA-1

My point is this, if cell towers cause millions of deaths a year, these turbines will cause the death of many more birds than stated in the West, Inc. Study. Particularly at night, migrations were not looked into and should be before any decisions are made.

1.9.6 Cultural Resources
Based upon the little information that is in this section, I would doubt any meaningful conversations took place with the Yakima Nation. We need to include which sites will be affected, understand the value to the tribe, how wind turbines will affect access to tribe members, their safety, how will turbines interfere with customs and ceremonies? This section is incomplete at best. 43-29 CR-3

1.9.7 Land Use
Again, the DEIS states that effects on land use are insignificant. We beg to differ.
Unless setbacks can be at least 2000 feet from property lines, shadow flicker will affect how you use your land. If a 2000-foot setback is not regulated, safety concerns over throwing ice and blades, tower collapse may cause residents on adjoining properties to not use those areas for home sites, out 43-30 LU-5

buildings, animal grazing and pasturing. We do not trust that a collapsing tower and pieces of a collapsing tower will only fall 540 feet. Add a 30 or 50 mph wind to that formula and we could have some terrible consequences. Again, the 540 ft estimate did not include any high wind speeds. 43-30 Cont. LU-5

1.9.8 Health and Safety

The DEIS states that 38 residents will have shadow flicker. This is unacceptable to those 38 residences. What about the roads? This section does not address the safety of shadow flicker over roads. 43-31 HS-7 They also state there will be no significant adverse effects. However, it is recommended that the 38 residences or receptors be responsible for all the mitigation. This is just plain wrong and irresponsible on the WF owners to even suggest. 43-32 HS-8

I suggest we add one mitigation to the list.

- Remove all turbines that cause shadow flicker to residences in the project site and 2000 feet beyond.

1.9.9 Noise

Again, no significant adverse impacts. See a pattern here? It almost appears that EnXco is hoping the public will only read Chapter one. 43-33 NOI-1

While my residence is at an avg. of 45 decibals, the graph shows ratings going into the mid to high 50's. This will have an impact on my life, especially during windy months. The significance HAS to be measured at the receptors level, not estimated based upon a 5200-acre site. 43-34 NOI-1

What if the projected calculations are wrong, as they were in the Lincoln Township Wind Factory? What will be the mitigation factors for landowners whose life is made miserable? This needs to be added to the DEIS. 43-35 NOI-3

Low-Frequency Noise and it's impacts are not addressed and need to be added to the DEIS. 43-36 NOI-5

1.9.10 Aesthetics, Lights, Glare

Anyone that says they can make 121-393 foot towers look better in a rural setting is lying. Unless of course, they are moved 20 miles away. 43-37 ALG-4

1.9.13 Air Transportation

A change in flight pattern that causes ALL flights to turn south is a significant impact to those living in the north portion of the city. It is also a safety concern as there are 184 student pilots that may get confused or have an emergency situation over the city. 43-38 AT-2

IF there is an in-flight emergency and the pilot has to risk a low altitude landing or fly through the 27 turbines, it will put undue danger on the pilot and his passengers and craft. Insignificant? I don't think the FAA will approve this and they should not. 43-39 AT-7

Chapter Two-Land Use

Introduction

The DEIS states there are 31 non-participating residences within the project area. While it appears there are 31 landowners whose property adjoins wind factory leased land, there are many more residences affected. This is due in part to the broad acreage that is used across the valley floor to site the turbines. Many more residents are "encircled" by towers on all of parts of their land, it may not adjoin, but the structures will be quite visible and noisy from their vantage. 43-40 EIS-2

The DEIS needs to include residents affected from ¼ mile in 1/4 mile increments up to 2 miles away. This will enable to the county to really see the potential impacts to valley residents and to look at the total impact from the project footprint and suggested distances. There are hundreds of landowners that will be affected.

2.2.2.3 the project also will add collection lines down Smithson Rd. These will be in towers of 37 feet. It should include whether these are additional poles, at the same height or not of existing power lines and if they will encroach on property owned along Smithson. 43-41 PD-8

Additional underground cables will be installed on non-leased property. This statement needs to be better explained. Will they need "unwilling property owners" permission? Or will they use existing county right-of-ways? If county right-of-ways, will EnXco foot the bill? Or taxpayers?

No site selected for meteorological towers, DEIS is incomplete. 43-42 PD-4

This section does not state how many cubic years of material will be disturbed, removed, moved, etc. We need to know this information to adequately address environmental concerns. 43-43 PD-1

In addition, a visitor center location is not addressed, as well as the impacts associated with a visitor center. 43-44 PD-12

Hazardous materials, i.e. oils, lubricants, etc. are not listed in their entirety and impacts addressed. 43-45 PD-7

2.2.2.7 Safety and Controls

This section states additional telephone lines will be needed for each of the turbines for communication and will be a part of telephone poles for electricity. We really need to require these to be underground as additional above ground poles and lines will add to the bird kills and worsen the aesthetics. 43-46 PD-8

CHAPTER THREE-AIR QUALITY

3.2 AIR QUALITY

3.2.2.1 Impacts during construction

In regards to the mitigation steps, Please be more specific to watering the soil surfaces when blowing dust is noticeable. Please add road and site surfaces will be watered during construction hours and after construction hours if needed. 43-47 AQ-3

Last paragraph states that the wind turbines rotors actually slow the wind and therefore will not add to the current level of dust and pollution. If this statement does not prove to be true and there is added dust and pollution, there should be a statement about appropriate mitigation measures. 43-48 AQ-3

3.2.3.3 No Action Alternative

The statement about another energy facility being build should be removed from this DEIS as it is an untrue statement. The power from this project isn't even sold and is likely to be sold out of state. 43-49 ALT-1

In addition, this paragraph should include residential use where it states the land would continue to be used for agricultural use.

3.2.6 The dust and air quality impacts would be *in addition* to current use impacts. If mitigation measures work, the impact may be negligible, however, it may not be insignificant. 43-50 AQ-2

Water Quality

3.3.2.1 Surface water

In this section, the DEIS projects crossing streams 24 times for road beds and 17 times multiplied by "several" crossings for underground cable. Because they are not specific, I estimate 100 crossings, disturbances of the vegetation, surface water, and soils. This potentially is a huge impact on the residents who depend upon this water for irrigation of hay fields and stock watering. It is not insignificant. 43-51 WR-1 There should be mitigation for loss of water and water quality. 43-52 WR-2

In the last paragraph they state some stream water will be used for dust control. This should NOT be allowed in this project. 43-53 WR-4

3.3.2.2 Ground-Water pg 3-47

Up to 200 acres of impervious surfaces will be disturbed, destroyed permanently or temporarily. This is a lot of acreage and represents almost 4% of the project area. This will have an impact if underground water flow if affected. We need to put wording in the EIS to state that placement of turbines cannot be over known underground rivers to help protect landowners. 43-54 WR-2 This is very important as blasting will occur at turbine sites and admittedly, the turbines vibrate in operation. I believe we need more information (engineered or real-life situations) to compare and evaluate the impact of this vibration in combination with blasting. 43-55 WR-3

The 1000-foot set back from residences is not far enough based upon this information, blasting and vibrations and should be changed to 2000 feet from property lines. 43-56 WR-2

3.3.3.1 Alternative Sit Impacts

Again, Alternative 1 is the better site as it affects one resident. 43-57 SO-4

Ground Water Conclusions state that overall impacts are insignificant. How can this statement be made when there are no facts to back up that blasting will not alter well depth, ground water flow? Blasting will take place 1000 ft from residences, down to 40 feet and wells are an average of 165, but could be shallower. Where is the study? 43-58 WR-3

Mitigation measures to protect residents HAVE to be put in place and EnXco has to be held responsible for well issues during and after construction. 43-59 WR-2

3.4 Plants and Animals

Birds

West Study was incomplete and on-site surveys were cursory. Only one person conducted surveys, one time a week for 30 minutes. No nighttime surveys were conducted. Migration of birds was not studied. 43-60 PA-1 An example of their finding were only 3 Horned Owl nests were located within ½ mile of project. I have 2 great horned owls on my property and another nesting pair at our cabin in Suneast within 11/2 miles of the project. I know my property has to represent many more properties in the Wind Farm vicinity. 43-61 PA-14

Eagle nesting was looked at in May and June. While we know, some eagles stay year round, the winter nesting takes place from December through March or April. At the Audubon meeting, Wilson Creek residents stated 2 dozen or more come down from the Wilson Canyon every morning and fly across the Wind Factory site. West was not aware of this. They did not talk to residents! 43-62 PA-13

There was no discussion of Raptors along ridgelines, other than in the mitigation measures. 43-63 PA-13 No Bat mortality numbers, as they are unknown. 43-64 PA-15 This study needs to be extended another year and include more people, more time, bird migrations and night birds. What will the effect be on west Nile virus if bat populations are killed? Horse populations are large in our Valley and a big part of our economic profile. Please refer to the Audubon study on birds that are killed each year on cell towers. 43-65 PA-16

Risk of Turbine Collision, pg 3-91

How can we assume that bird mortality rates will be like other projects, when the study is flawed and the information from other sites is very sketchy (for the obvious reasons). 43-66 PA-1

Mitigation Measures

Where the word "could" is used, change to shall or will. 43-67 EIS-10

3.4.4.3 Alternative Site Impacts

Again, Alternative 1 is the better site as no Eagles are sited; there are low population of horses. 43-68 SO-4

3.5 Energy and Natural Resources

Again, no projected displacement of natural resources are listed in the cubic yard or ton measurements. This needs to be added to the DEIS. 43-69 ENR-4

3.6 Cultural Resources

No conversations and research conducted with the Yakima Nation. Private property use was not identified. We cannot make this assumption until the Yakima Nation is included. It is a big risk, if they decide to "sue" during the construction phase. 43-70 CR-3

Several direct ad indirect impacts were identified, the main ones being placement of turbines or roads in current historical sites and the hardship or trying to control loss of artifacts due to the workers in these areas. Six sites were identified as having a large impact of this type. 43-71 CR-2

3.6.5 Mitigation

I found this section to be stated as what might be done. It needs to be specific. Also any turbine or road that will be sited in these areas needs to be re-located, period. 43-72 CR-1

3.6.3.1 Alternative Site Impacts

Again, alternative 1 is the better site, as NO historical sites will be near a road or turbine placement. 43-73 SO-4

3.7 Land and Shoreline Use

Desert Claim Project Vicinity states in the 3rd paragraph that 83 residences within ½ mile of the project will be affected. I believe this information is incomplete and needs to include residences in the project area, surrounded by the project area and within ¼ mile increments up to 2 miles. The county really needs to have an accurate picture of residential impact, as it will affect residents up to 2 miles away. Admittedly, 2 miles away the impacts would be lesser than ½ mile. 43-74 LU-1

In the introduction to Land Use Section, DEIS states that there is an average of 1 household per 20 acres and that there are an additional 83 residences within one half mile of the boundaries. Based on a 5200-acre site, I estimate that to be 360 residences, 8 of which are participating landowners. So 8 landowners are going to impact 350 other landowners? That is the tail wagging the dog. That is allowing 10 landowners to affect 350 families land 43-75 VB-6 rights, their quality of life, potentially their health and their animal's health and the value of their homes.

Desert Claim Project Area pf 3-126
Please note that 8 landowners who are "willing participants" are affecting this number of residents that the additional numbers (above paragraph) will show. The tail is wagging the dog here, there will be hundreds affected. 43-75 Cont. VB-6

Table 3.7.2 is a manipulation of the #'s that may be impacted. As you can see, there are missing residences to the west of Howard Rd, to the south of Smithson, other than the residents within 1000 feet, Sun East is primarily not accounted for and views are not accounted for. This graph is a ploy to show what little impact the project will have on surrounding neighbors and neighborhoods, as if only residents within 1000 feet will be affected! Do not let these numbers be manipulated! 43-76 LU-1

Alternative Site Impacts
Again, at Alternative 1 site, only 1 landowner is affected, it is the best site, hands down. 43-77 SO-4

3.7.1.2 Environmental Impacts of the Proposed Action
Direct Impacts
<u>The proposed wind turbines would be significantly larger than surrounding structures. While this difference in scale would generate visual impacts (see Section 3.10), it would not inherently conflict with rural land use patterns. Many agricultural activities include associated large structures and mechanical/industrial equipment; such appurtenances may be considered to be a characteristic or element of rural character.</u>

Are they suggesting that 393 ft tower structures that spin between 10- and 23 times each minute, have flashing red lights at night and white during the day will be considered part of a rural element or character? The towers are industrial in nature, let there be no mistake about this. These are Wind Factories. The DEIS should treat the towers as such. 43-78 LU-1

They also suggest that we should really look at the impact of Wind turbines in a larger context that they are compatible with farming uses. If there were only participating farmers in this area, then that might be true. It is not true, there are only 8 willing participating farmers, and the rest of us are captives or unwilling participants. Wind turbines would be located at least 1,000 feet 43-79 LU-5 from existing residences and 250 feet from any public right-of-way and adjoining non-project property lines. This will affect all adjoining properties from using their property to its full extent. The 1000 foot set back is for safety, so essentially, if you border a public right-of-way, you are losing 750 ft x your property length. Property owners will need to be compensated for this. If for some crazy reason, this project would be approved, mitigation and compensation needs to occur. 43-79 Cont. LU-5 43-80 LU-4

Land Use Indirect Impacts

In this section, the DEIS discusses the impact of compatibility and incompatibility of residences and suggests that by placing turbines here, it will encourage agricultural uses and stop the growth of residential use. I must agree completely, who in their right mind would buy land and build their home of their dreams surrounded by turbines! What would the impacts be on the tax base and economic health of Ellensburg is residential growth slowed or stopped in these areas? 43-81 LU-2 43-82 FIS-3

They go on to suggest and I quote, "Some nearby rural residential uses that viewed the wind facility as incompatible could seek to relocate. This would be an adverse impact to these property owners." Approximately 80% of the residents in this area are small ranchers with horses, small wheat fields and some other cattle. Any DEIS that suggests the possibility that 80% of the residents that live here should relocate is irresponsible and insulting! In essence they are telling us wind Turbines are not compatible with residential/ranch use. Based upon this, the application should be pulled and the Wind Farm re-sited. 43-83 LU-3

The range of the project is from the foothills of the Wenatchee Matins. Along Hwy97 and State Route 10, across to north of Bowes field, which includes Green Canyon, Reecer Creek Canyon and Wilson. The pattern that EnXco has selected is random and encompasses all of this area. Basically, there is no relief to residences from looking at turbines and additional power connector lines as they are scattered across 5200 acres. This will have a cumulative impact on all residences from the view, the noise and the values of their properties. This is not addressed at all in the DEIS, other than to dismiss it as compatibility with a rural lifestyle. In addition, non-participating landowners are participating after all; we are captive landowners, as we will get ALL the impacts of the Wind Factory and none of the benefits. 43-84 LU-1 43-85 VB-2

Property Values

In the Lincoln Township, after 2 years, Homes ½ mile away from the turbines loss value of 26%. Homes within 1 mile of the wind factory lost 18%. I did not find this addressed in the DEIS, other than to refer to the biased study put on by the Dept of Energy and wind power. There needs to be mitigation for homeowners. I suggest that each parcel be valued based on a Real Estate Assessment and a Market Value analysis to find an appropriate selling price. For those residents where the impact is incompatible with their residential lifestyle, EnXco will buy out their property. For those who choose to stay and lose value over time, they would also be compensated, based upon initial loss and yearly real estate average valuation. EnXco would have to post a bond to assure money was available to the Wind Factory victims. It seems fair, since EnXco is convinced that the Wind Factories will have no affect on property values, they should be able to make a profit on this approach. This needs to be addressed in the DEIS. This is the only way the County can protect themselves from the myriad of lawsuits that will happen if this project is approved. 43-86 NS-1

Indirect Impacts Alternative 1, pg 3-132, again, no negative impacts on land use because only one family lives there!! See a pattern here?? 43-87 SO-4

3.8 Health and Safety

3.8.1 Mechanical Hazards

6th paragraph once again states that the alternative site 1 is a better location, as it would not have the same level of potential hazards to residents. 43-88 SO-4

3.8.1.2 Electrical Hazards pg 3-143

Paragraph 1 states electrical overhead lines increase potential for safety hazards due to fire. By adding more to this fire prone area is only "adding fuel to the fire". In addition, the added increase for personal injury due to transmission line failure and tower collapse is unacceptable in this area due to the increase of existing conditions. 43-89 HS-6

Stray voltage is not addressed. Please read the following excerpt from the Lincoln Township study Findings: 43-90 HS-6

Stray voltage

Another issue addressed by the Moratorium Committee is that of stray voltage and earth-current problems that may be exacerbated by the wind factories. This issue was brought to the attention of the Lincoln Town Board by the committee and concerned residents. An ordinance was passed by the Town Board to study the potential effects and to declare a moratorium on any further turbine development. The Committee agreed that any study of earth currents and stray voltage issues must include an analysis of the distribution system, analysis of the wiring from the utility's grid to the wind turbines, and an analysis of the grounding system used for the wind turbines. They also drafted a request for proposals to identify an expert that could help pinpoint the issues surrounding stray voltage and earth currents. The issue has yet to be resolved.

In the meantime, farmers and their livestock in Lincoln Township have been suffering. There are over four farms that are battling -- among other problems -- herd decline due to diseases that were not present in the herds prior to turbine construction, but are present now, according to farmer Scott Srnka. These problems are not limited to non-participating leaseholders. Farms <u>with</u> turbines have been affected as well, as evidenced by the trucks, which have grown more and more frequent, hauling away animal carcasses, Mr. Srnka said.

Mr. Srnka is a <u>former</u> supporter of the WPSC wind power project that is across the road from his family farm. His dairy herd is about 175 cows on 800 acres of land. Mr. Srnka said, "Thirteen turbines were proposed for my land, but we decided to wait. Thank goodness we did or we'd be out of farming."

Mr. Srnka has traced the decline of milk production and increase of cancer and deformities in his formerly award-winning herd to an increase of electrical pollution on his farm after turbine construction. He also has seen the same chronic symptoms that are in his herd in his family.

Animal health problems in the Srnkas' formerly award-winning herd include cancer deaths, ringworm, mange, lice, parasites, cows not calving properly, dehydration, mutations such as no eyeballs or tails, cows holding pregnancy only 1 to 2 weeks and then aborting, blood from nostrils, black and white hair coats turning brown, mastitis, kidney and liver failure.

Within a few months in the first year after the turbines were erected, 8 cows died of cancer. No previous cases of cancer were detected ever before in the Srnka herd, which is a closed herd, according to Mr. Srnka.

Mr. Srnka also detected a change in well water on his property, and there has been a definite change in taste, he said, which has contributed to the decrease in water consumption by his herd. In the past his cows consumed 30 gallons of water a day, but that figure declined to 18 to 22 gallons of water a day after turbine construction. As a result, cows became dehydrated and terminally ill.

<SPANVideo: What the Zoning Board of Appeals members saw was a brief, unedited video interview with Mr. Srnka in his dairy barn, taken this spring. In it there were some of the cows in his herd and Mr. Srnka talking about some of the rewiring that he has had to install to try to combat problems of electrical pollution. Mr. Srnka said that he has had to resort to insulating the farm through electrical wiring to put his farm, in effect, on what he calls its own island.

Dr. Pettegrew; testifying before the Bureau County Zoning Board of Appeals, said he would be remiss as a doctor if he didn't tell the board that he thought the weaknesses and illness he saw in the cows in the video were most likely caused by EMFs or electrical pollution. Dr. Pettegrew also said the risk would be greater in Indiantown and Milo for animals and humans to become ill than in Wisconsin because the proposed turbines would be taller and would produce more electricity.

Back to what Mr. Srnka has personally experienced. Mr. Srnka and neighbors report serious health effects on not just dairy cows. Health problems in residents include

- sleep loss
- diarrhea
- headaches
- frequent urination
- 4 to 5 menstrual periods per month
- bloody noses: Mr. Srnka had cows bleed to death from uncontrollable bleeding from the nostrils
- inability to conceive

Sometimes even short-term visitors to the farms or homes contract the symptoms, including construction workers on the Srnka property who broke out in nosebleeds after only a few hours. One of the workers left and refused to return.

The Srnkas are so concerned with health effects that they "aren't going to have kids anymore because we're so afraid."

At the time of his testimony before the Bureau County ZBA in October, Mr. Srnka said he had spent upwards of $50,000 of his own money to try to remedy the electrical pollution in his home and on his farm. Mr. Srnka stated that in his opinion, there were three other farms in the area facing enough problems with their herds in the aftermath of the turbines going online that those three farms are "almost ready to sell out."

Representatives of WPSC have denied that there are stray voltage or earth currents affecting Mr. Srnka's family or livestock and will not compensate him for his family health bills, electrical system upgrades, loss of herd or decrease in milk production.

How did the situation become so grave when wind factory developers swore there would be no problems?

Even if a wind developer may claim that the wind factories, substations and power grids will not contribute to stray voltage or electrical pollution because 1) insulated cable will be used, 2) all cable will be buried feet beneath the surface, and 3) cables are laid in thick beds of sand -- these statements should be viewed with suspicion because of poor project track records, according to Larry Neubauer, a master electrician with Concept Electric Inc., in Appleton, Wisconsin. Mr. Neubauer, who has customers who are dairy producers, who are homeowners with stray voltage problems, and who are farmers with turbines on their property, said that currents from each ground on the cables and project substations, as well as the regional transmission lines that receive electrical energy and that are electrically tied together, do not harmlessly dissipate into the soil. Energy disperses in all directions through the soil and these currents seek out other grounded facilities, such as barns, mobile homes and nearby residences. Only in California is it illegal to use the ground as an electricity conductor. In the rest of the country, including Wisconsin and Illinois, power companies are allowed to dump currents into the ground, according to Mr. Neubauer.

Residential properties that are in a direct line between substations and the ground conduits are particularly at high risk since electricity takes the path of least resistance. Mr. Neubauer said that burying the cables, as the Illinois Wind Energy, LLC, project intends to do, "makes it worse," citing the short life spans of buried cables, frosts that wreak havoc on the cables, and the problems of locating trouble spots that cannot be seen without digging up the cables.

3.8.1.3 Shadow Flicker pg 3-143

The 1st paragraph contradicts residential counts in the Land Use section. 80 within ½ mile of project, while land use states 83 residents within ½ mile. All residents should be accounted for within 2 miles of project. 43-91 LU-1

3.8.2 Environmental Impacts

Mechanical hazards

A recent death occurred in the Altamont Wind Factory site, due to mechanical failure. This same failure caused a fire. 43-92 HS-1

Tower Collapse

Figure 3.8.1 shows number of feet a tower would fall. I challenge this figure, as common sense tells me fragments would break off and "fly" further than the 393-foot hazard zone. This section needs to be updated and better address potential distance in a worst-case scenario. 43-93 HS-2

Blade Throw

This states there are 2 documented blade throws, however, no advanced modeling has occurred. Also, no wind speeds are used in the calculations of throw distances on table 3.8.1. It is common sense that will tell you wind will add to this distance. An accurate study needs to be conducted. 43-94 HS-2

Ice Throws

DEIS states recorded throws of about 320 feet have occurred. However, they are suggesting 250 foot set backs for right-of-ways. This needs to be expanded based upon further study as suggested for blade throws.

The DEIS also estimates 3 ice throws of 1000 feet in 20 years could happen. However, the DEIS is suggesting 1000 foot set backs form homes. This assumes that animals, out buildings and humans do not use their land less than 1000 feet from turbines. A minimum setback of 2000 feet from property lines will address all these potential hazards. 43-95 HS-4

Fire Hazards

The DEIS states that the wind turbines mechanical failures can cause fires and that their wind turbines will withstand a brush fire. However, there is a much bigger issue here. The residents that live in the area!! 43-96 HS-1

1. We are in a fire prone area.
2. We have an arsonist in our community.
3. There are difficulties fighting fire with airplanes in the turbine area.

4. There are several home sites downwind of the areas where a fire would be started.

I also find the shallow approach in this DEIS to the fire issue a large concern. This affects our homes, our families and our insurance rates. 43-96 Cont. HS-1

3.8.2.2
Stray voltage issues not addressed. Overhead lines add to the potential for fire and bird kills. Magnetic and electromagnetic fields that can cause health issues to animals and humans in addition to nuisance shocks as well as computer screen problems. 43-97 HS-6

Due to the close proximity of the residences, I find this section glossing over potential impacts and mitigations. IT does not refer to any engineered or real life studies conducted. 43-98 HS-6

Electromagnetic Interference
The actual towers are known to cause interference with TV and Radio reception. Are we to take the DEIS at their word, these impacts will be insignificant, when we know several Wind Factories where the residents waited 2 years or more for this to be fixed? A study needs to be conducted and full mitigation measures inserted into this DEIS. 43-99 HS-5

3.8.2.3 Shadow Flicker
Modeling

- No site-specific assessments? So basically we are guessing who and how they will be impacted.
- The map does not adequately show the impacts, is it hiding something? 43-100 HS-7
- The suggestion of potential mitigation at the receptor is unacceptable. The source needs to mitigate and be held responsible for the impacts. 43-101 HS-8

3.8.3.1 Alternative site Impacts
Alternate site # 1 has no impacts. This is the best site for shadow flicker mitigation. 43-102 SO-4

3.8.5.1 Mitigation
Tower Collapse-Set backs of 435 feet should be stated from property lines and another study with flying fragments calculated. 43-103 HS-4

Blade Throws and Ice Throws pg 3-163
Human access and high value facilities should not be built within 540 feet from turbines. So minimally, a 540 ft set back from property lines is being suggested? This does not include a more comprehensive study that accounts for throws during high winds. 43-103 Cont. HS-4

Ice sensors should be required as part of this project. 43-104 HS-3

Fire Hazards
Fire fighting plan is not addressed and HAS to be part of this DEIS before we can accept it. 43-105 HS-1

3.8.5.2 Electrical Hazards
Stray electricity is not addressed. 43-106 HS-6

3.8.5.3 Shadow Flicker
There are no mitigation steps that the source is responsible mentioned here. We should add "Removal of turbines that are projected to cause shadow flicker and after construction, removal of turbines that do cause shadow flicker".

I find it irresponsible of the Applicant to suggest that the receptors be responsible for 100% of the mitigation for shadow flicker and find their suggestions unacceptable. 43-107 HS-8

- Telephone hotline to call to stop rotors
- Add curtains
- Plant trees in front of your windows
- Turn on lights in room where flicker is occurring.

Indirectly they are also suggesting that we stay inside; do not look outside during these times. What about animals? Flight response of horses, turtles, etc?? These areas are not addressed, but in the discussion, a 2000-foot set back should be ample to prevent shadow flicker. Again, a 2000-foot set back from property lines should be one of the mitigations!! 43-108 HS-4

3.8.6 Significant Unavoidable Impacts
Other than lightning. All electronic issues are insignificant. What about lightning? What are the potential hazards if lightning hits in the turbine field or hits a transmission line in the WF site? What is the mitigation?? 43-109 HS-6

Also, regarding stray electricity, tell the farmers in Wisconsin who spent 50k and 200 k to make their farms a separate grounded island due to the WF!

This section dismisses the potential for fire as insignificant. 43-110 HS-1

3.9 Noise

The graphs in Decibel Bitmap 003410, show the result of the decibel ranges and actually average our range proximate to the wind tower and residence locations. My home is in the 45-decibel range. Based on the Lincoln Township Moratorium Findings and Survey, they allowed turbines to be placed that put the residences in a 50 zone. They asked for 40, they settled for 50 and now that they have bought and bull dozed several residences, they would have not placed any turbine closer that a 35 decibel rating. There are significant sleep problems and health issues that have occurred in over 60% of the residents. There were also errors in the sound measurement predictions or models. A second opinion should approve the current model before moving forward. 43-111 NOI-1

Other mitigation measures need to move turbines far enough from homes that a 35-decibel rating can occur. In essence, by moving to a 35-decibel rating that will allow residents to reasonably live with these turbines, there won't be many turbines to construct. This should tell us this is not the site to place turbines in an area where people have ranches and home. 43-112 NOI-2

On page 3-177, 3.9.4, noise modeling uses 4-8 mph wind speeds. When the wind blows our wind speed is much higher than 4-8 mph. Noise decibels needs to measures using 20-35 mph wind speeds. I believe this will bring our levels up in the high 50 and 60 decibels. Mitigation of 2000 feet of more set backs may reduce the impact. 43-113 NOI-1

Normal rural uses are not the same and will have an impact. The main reason for this other than the obvious is that cows stop bawling and tractors turn off and on, but wind turbines cannot be turned off!! 43-114 NOI-1

I recommend that the county take steps to do on site observations of current Wind Factory sites to verify this model before it can be accepted. 43-115 NOI-1

3.9.3.1 Alternative Site one is once again the best site with least issues. 43-116 SO-4

3.9.6 Unavoidable Adverse Impacts
I don't know what to say, all this sums up to no adverse impacts of any significance! Too bad our consultants and applicants don't live in a Wind Factory site. 43-117 NOI-1

3.10 Aesthetics/Lights and Glare
Project area view shed 3.10.3
View 1A states the primary view is to the northeast. My view to 360 degrees, with turbines to the NE, NW, W, N and SE.

Figure 3.10.6. The view looks south and places the turbines behind the power transmission lines. This is misleading as most of the resident views will be looking NW, NE or N and the transmission lines will be behind the Wind turbines.

Figure 3.10.7 These pictures should be taken from a closer location so the residents along the NW portion of E-Burg and along Dry Creek Road/Reecer can really see what they will be looking at. These pictures do not show a real case scenario nor a worst-case scenario, which is what we will be looking at! 43-118 ALG-2

I find that these obvious manipulations of the view shed and the lack of pictures that depict what each affected resident will look at insult our integrity and put EnXco's integrity in question. Doe we really know what we will be dealing with from a view shed standpoint? NO. Can the County make a correct decision with this information? NO.

3.13 Air Transportation
I believe that moving all take off patterns to the south will impact the City of Ellensburg from a noise level and a greater potential of hazard in case of an accident. In addition, I find it unsafe from the standpoint that we have 15 students that fly 40000 operations yearly. Plese refer to my specific comments in Section One. 43-119 AT-2

In summary;

- I believe the DEIS measures significant adverse impacts at the overall project level and they HAVE to be measured at the individual resident level to be real. 43-120 EIS-1
- I believe this DEIS proves the project does not meet with Kittitas County Objectives; 43-121 EIS-4
    - The project is desirable for the public convenience
    - The project is not detrimental or injurious to the public health, peace, or safety or to the character of the surrounding neighborhoods.
    - The project will not be unreasonably detrimental to the economic welfare of the county and create excessive public cost for facilities and service.
- I also request that "Wind Farms" be replaced with "Wind factories" and that "non participating land owners" be replaced by "unwilling landowners" or "captive land owners'. 43-122 EIS-14
- I have attached the US Dept. of Fish and Wildlife Wind Farm Site Recommendations for your perusal and would like to point out that this project does not meet 6 of the 10 criteria, specifically the 6 criteria listed. 43-123 PA-3
- Alternative Site #1 repeatedly was the better location for most issues and should be considered strongly to re-site this application to Wild Horse proximity. 43-124 SO-4
- There are several areas that are not complete, specifically the fire protection plan, the noise modeling data used, the nonexistent ground water blasting studies and wind speed use in the calculations used for Ice and Blade throw. No calculations were given for displaced ground cover, dirt and bedrock and no estimates of hazardous materials use in the turbines other than oil. 43-125 EIS-1
- It is unacceptable that the applicant would recommend the receptor be responsible for shadow flicker mitigation. 43-126 HS-8
- Stray voltage is not addressed in Electricity section. 43-127 HS-6
- I have also attached the excerpts form the Lincoln Township Survey and Study. A printed copy of the final report is available from the Township. 43-128 EIS-1

Thanks for allowing us to comment on the Wind Factory Application. I hope you will find our comments, concerns and incorrect data pointed out helpful to finalizing the DEIS.

US Dept of Fish and Wildlife Services Wind Farm Recommendations

The US Fish and Wildlife Service have produced the most recent comprehensive document "Interim Guidelines to Avoid and Minimize Wildlife Impacts From Wind Turbines, 3 May 2003", follows the examination by scientists of bird kills and disruption to bird habitat and formulated using information from the worldwide scientific community. It contains a series of recommendations for the siting of wind energy facilities that include the following:

* Avoid placing turbines in documented locations of protected species,
* Avoid locating turbines in known local bird migration paths or in areas where birds are highly concentrated. Examples of high concentration areas for birds are wetlands, State refuges, private duck clubs, staging areas, rookeries, roosts and riparian areas alongside streams. Avoid daily movement flyways (egg. between roosting and feeding areas),
* Avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies,
* Configure turbine locations to avoid areas or features of the landscape known to attract raptors (hawks, falcons, eagles, owls),
* Configure turbine arrays to avoid potential avian mortality where feasible. For example, group turbines rather than spreading them widely, and orient rows of turbines parallel to known bird movements, thereby decreasing the potential for bird strikes. Implement storm water management practices that do not create an attraction for birds, and maintain contiguous habitat for area-sensitive species,
* Avoid fragmenting large, contiguous tracts of wildlife habitat. Where practical, place turbines on lands already altered or cultivated and away from areas of intact and healthy native habitats

Al & Diane Schwab
P O Box 290
Maple Valley, Wa. 98038

425-432-366

Mr. Clay White
Planner II
KCCDS

JAN 2 0 2004

Re: Desert Claim Wind Power DEIS

Dear Mr. White,

Once again we are very disappointed in the results of this DEIS. This DEIS of full of scare tactics, lies and half truths. They give the idea that if this area were not developed for wind farms, as many as 400 homes could or would be built. This is far fetched. On page 3-124, they state that this area generally consists of 1 house per 20 acres. This DEIS has also missed the points that we have been bringing forward for the last almost two years. Homes in close proximity to wind mills and the effects these wind mills will have on those homes including but not limited to shadow flicker, ice/blade throws, values, and the salability of those homes, just to name a few.

44-1 ALT-1
44-2 LU-1

They state that the towers could be 393 feet tall, approximate numbers are given for their newly run overhead cable, several hundred feet or up to several miles is not definite enough, approximately 4 guyed meteorological towers, again not a definite answer, a network of graveled project roads, again not a definite. They do not even state how many turbines they will put up.

44-3 PD-4

On page 1-4, they state "The project is not detrimental or injurious to the public health, peace, or safety, or to the character of the surrounding neighborhood." This statement is not true. If it were true, the people who will be living on adjoining properties would not be fighting this wind farm. As many as 83 residences lie within ½ mile of the project boundary. In figure 3-7-2, you can clearly see where the residences are. Some of these residences will be totally engulfed in wind mills, and at a close range. This will definitely affect the life styles of those residences and will be detrimental.

44-4 EIS-4
44-5 LU-1

All of the maps included in this DEIS are not legible enough to pin point certain areas, also they do not include enough of the area. I want to know where is our property in relation to these wind turbines. As far as we can determine, we will be affected by these turbines by our loss of the view to the Northeast. Shadow flicker?, we can't tell by their maps.

44-6 EIS-3

On page 3-131, they state that if these wind mills are not compatible with the people living next to them, the people could move, no mention of restitution? They claim wind production is compatible with rural resources. No where do they claim wind production is compatible with residential land uses, and, that is what we are talking about.

44-7 LU-3

In figure 1-1, they show the location again of their power project, but again the roads are not legible. They should have shown the location of their project on figure 3.10-2. This would have made them not look so good, but it would have given us a better description of exactly where their turbines would be going.

44-8 ESI-3

Figure 3.10-3 is showing the view shed, but once again it is still not clear. On page 3-225, they claim they could make their project look better (blend in better). How is it possible to hide several hundred 393 foot wind turbines with rotating blades and flashing lights?

44-9 ALG-2
44-10 ALG-4

In section 3-9-5 they claim that although medium noise impacts were identified at several of the agricultural residences in the project vicinity, either due to overall sound levels exceeding 50 dba or due to projected sound level increases, no high (i.e. significant) unavoidable adverse impacts were identified. Do I read this right? This paragraph contradicts itself. 44-11 NOI-1

They claim sound levels for equipment. What will the sound levels be when more than one piece of equipment is running at the same time, then the blasting that will be needed. No where in this DEIS are these true sound levels stated. 44-12 NOI-2

In Section E, there are approximately 189 pages of graphs, I believe this was put in to throw us off. These graphs meant nothing to me and I found them very difficult to read and understand. 44-13 HS-7
They also claim on page 3-155 that in most areas, cloud cover (or fog) is likely to be present in the morning and evening hours. In the summertime, we never have fog, we like to get up and look at the beautiful sunrise. 44-14 HS-7

There is also navigational hazards which need to be taken into consideration. There is a small landing strip very close to their turbines, planes land on it daily. Also small planes fly over this area on a daily basis. 44-15 AT-7

Who is going to police this company. What about mitigation measures to appease the adjoining property owners. Who is a person going to complain to if they have a problem with their television, shadow flicker, ice/blade throws etc. I have spoken to a person who has a farm just outside the boundary of a wind farm in California, he advised me to mitigate before construction, because after construction is too late. The wind mill company could care less about his problems connected to their wind farm. He also says the noise, shadow flicker etc. is unbearable at times. He can't pull down the shades and go in to watch television because since the wind mills, he has little to no television reception. I asked him if he has complained. His response was "I've complained to everyone, wind mill company, county officials, everyone, but no one cares. After talking to this gentleman, I get the distinct impression that if us property owners have a problem, we're on our own. Perhaps this company should step up to the plate and so some mitigation before their plan is approved. 44-16 EIS-10

In summary, this DEIS tells us very little about the true facts, is distorted to make Desert Claim look good, and dismisses us adjoining property owners as if we don't exist. This proves to me that the gentleman I spoke to in California is right. These companies are here to make a profit, they don't give a dang about the people who will have to live with their wind turbines. 44-17 VB-2

Enclosed are some pictures of our view, and the icing conditions which currently exist. These views will all be destroyed if these wind mills go in as proposed. 44-18 ALG-1

Sincerely,

Al & Diane Schwab
P O Box 290
Maple Valley, Wa. 98038
Ellensburg Land Owner

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P.1

Clay White

From: DIANE SCHWAB [buds_pumps@msn.com]
Sent: Thursday, January 22, 2004 12:07 PM
To: Clay White
Cc: Ed
Subject: Desert Claim WPP

JAN 22 2004

Dear Clay,

If you were to look in the dictionary for environmental impact statement, it is defined as follows: a written statement of the likely environmental effects of a proposed development based on a scientific assessment or study.

I don't feel that a scientific study was done. Basically everything included in this DEIS were the results of wind farm proponents studies. It is in no way scientific because if it were, there would be included the information that I have found quite easily on the internet. This would be the information that shadow flicker , blade throws, icing of blades ,constant flashing lights, devaluation of property etc. etc. does occur and can be a real problem for people living next to a wind farm. 45-1 EIS-1

There is no where, at least that I've seen where there a lot of people (such as this site) who live next to wind turbines of this size. However there are places where wind turbines have been erected next to a lone farmer or a single house. These people are living a nightmare. Even the guard at Stateline has to keep his shades closed.

Until I see a real and true analysis done, I can not accept any EIS, and I don't feel the County should either. Anyone can take facts and figures some one gives to them and write a report. I do believe that this is what was done in this instance. 45-2 VB-4

Good meeting tuesday night, I'm glad our Real Estate people finally got on board. Another indication that true facts were not given..

Sincerely,

Diane Schwab

RECEIVED 46 P.1

JAN 3 0 2004

KITTITAS COUNTY
CDS

Clay White, Planner II
411 North Ruby Street Suite 2
Ellensburg WA 98926

RE: Desert Claim Wind Power LLC DEIS

According to the DEIS, the county needs to decide whether this project is detrimental to the character of the surrounding neighborhood.

Page 1-63 states: "Development of the project as proposed would result in significant, unavoidable adverse impacts to the visual environment."

The project includes 47 towers that will have flashing lights 24 hours a day, every day.

The project includes a total of 120 towers that will be about 400 feet tall including rotating blades on top. Some of these towers will be only 1000 feet from homes. All of the towers will create flickering shadows when the sun is shining. 46-1 LU-1

The surrounding neighborhood is residential not industrial. Very large towers that create flickering shadows and flash lights continuously may be all right in an industrial neighborhood. They are not all right in a residential neighborhood.

This project is obviously detrimental to the character of the surrounding neighborhood. 46-2 SO-5

It should not be approved.

Sincerely,

Boyd Rear

Gloria J Sharp

Gloria J. Sharp
Boyd Rear
7731 Reecer Creek Road
Ellensburg WA 98926

47
P.1

Lathrop, Winbauer, Harrel, Slothower & Denison L.L.P.

Attorneys at Law

Post Office Box 1088, 201 West Seventh Avenue, Ellensburg, WA 98926

F. Steven Lathrop, P.S.
John P. Winbauer
Susan K. Harrel
Jeff Slothower
James T. Denison, Jr.

Tel (509) 925-6916
Fax (509) 962-8093

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

January 30, 2004

Mr. Clay White
Kittitas County Planning Department
411 North Ruby, Suite 2
Ellensburg WA 98926

Re: Desert Claim Wind Power Project
DEIS COMMENT LETTER

Dear Clay:

As you know I represent F. Steven Lathrop. Mr. Lathrop is an intervener in the EFSEC process being conducted in association with the Zilkha wind power project. We take this opportunity to comment on the Desert Claim Wind Power Project.

The environmental impact statement for the Desert Claim Wind Power Project must provide sufficient information to Kittitas County to allow the county to comply with all statutory and regulatory review criteria.

Comments critical of the DEIS have been submitted by others, and to avoid repetition, all of these comments are incorporated in this letter by reference.

The DEIS does not fully address the projected demand for electrical power and the role of wind power in meeting the projected demand. There is an inadequate discussion of how much capacity utilities are seeking or how much is currently produced in the state. The DEIS does not provide enough detailed information to assess the market for wind energy in Washington. 47-1 EIS-7

The DEIS fails to discuss the impacts of each site spread over the entire area. The location of each tower should be required to be studied. At the location of each turbine, at a minimum the following questions should be, addressed by the DEIS: 47-2 EIS-1

- What are the number and location of residences, roads and other features and activities within a radius of 1000 feet from every turbine location and every half mile thereafter out

47
P.2

to at least five miles? How can any reasonable setback evaluation be conducted without this information

- What view sheds and sight lines are impacted by each turbine and to what extent?
- Are there no turbine locations that are being recommended to be moved or eliminated due to their impacts?
- The applicant's economic or business interests, such as proximity to the BPA power lines and ease of construction of access roads are not relevant to an environmental analysis and no justification whatever for a particular turbine location.

47-2
Cont.
EIS-1

The DEIS fails to take into consideration the definition of rural lands and the type of activities which are to be encouraged and discouraged on rural lands within Kittitas County.

47-3
LU-6

The no action alternative proposed in Chapter 2 of the EIS is inadequate because it doesn't contain a discussion of alternative electrical generation technologies. That is particularly relevant in this situation because of an abundance of power generating facilities in the State of Washington. There is no analysis as to whether this particular project is necessary, let alone whether this particular type of technology is necessary, to meet Kittitas County energy needs. The no action alternative makes assumptions that there are economic benefits and positive attributes of the project. The no action alternative fails to discuss, at the level of detail that is sufficient, the positive aspects to the environment and Kittitas County of not constructing any wind generation facilities in the County let alone this specific project. The no action alternative does not adequately address the benefits that would be derived by not placing this type of power generation facility on or in a populated area as is proposed by this project.

47-4
ALT-1

In Section 3.10, dealing with visual aspects of the project, there is an attempt made by the writer of the DEIS to develop a "viewer exposure scale" and a "viewer sensitivity scale" (See Table 3.10-2 and 3.10-3). In addition, there is an attempt to develop a "visual quality scale" (Table 3.10-4). These tables and the application of these types of criteria to a specific view shed are clearly subjective. Use of this type of subjective scale is inappropriate in a draft EIS.

47-5
ALG-2

With respect to the visual impact, the USFS, for example, did a study of view impacts its timber sales in Kittitas County and the resulting clear-cut logging would have and determined not to sell timber in certain areas as a result. There does not appear to be any consideration given to how views would be impacted. An 8x10 photograph taken from an unknown distance from any particular turbine site does not assist in the determination of visual impact. How is one to accurately gauge the scale of a turbine from a given distance in relation to common experiences?

47-6
ALG-2

Section 3.16 which deals with the "fiscal conditions" is inadequate. The DEIS does not have a detailed enough discussion of the economic costs of this project arising from the negative impact on land values in and around the project. The negative impact on land values as a result of the project has a corresponding long-term affect on Kittitas County revenues and the general economy of the area. The EIS does not do a sufficient job of discussing these effects and taking into account these effects.

Where is the analysis by a qualified real estate appraiser, familiar with land values and development patterns in this county as to the impact on ***local*** property values?

47-7
NS-1

The multiple requirements for protection of esthetic and scenic resources and the quality of the environment under the statutes and regulations pose heavy burdens on the approval of even a few of the project sites, yet the DEIS gives inadequate guidance as to the areas, maximum number of turbines (whether for this project alone or in combination with the other projects), maximum dimensions, or other possible limitations that might be necessary to adequately mitigate impacts. 47-8 ALG-4

The DEIS makes an inadequate attempt at a cost-benefit analysis of the project.

The discussion of the cumulative impact costs of the project inadequate. 47-9 NS-4

Kittitas County has experienced considerable recent growth in population and commensurate residential growth in the scenic, less populated areas, and these trends are expected to continue. Each turbine site is, in effect, an industrial land use in the Ag 20 and Forest and Range zones yet there is no mention or discussion of GPO 2.109 and GPO 2.109A. What are the land development patterns presently being experienced in the areas within ten miles (or some other reasonable distance) of each turbine site of the project? How will these patterns be impacted by the project? Recognizing that county land use is dynamic, the actual timing of construction could be delayed, how long should the approval of any site last? What are the risks of unforeseen changes in the county and where would it be reasonable to deny any vesting beyond some point in time? 47-10 LU-6

The DEIS fails to address far more than it covers. The construction of one wind turbine in the Kittitas valley will result in numerous other wind turbine projects. 47-11 VB-9 The DEIS simply fails to adequately address the impacts of changing this valley from a rural residential-agricultural area to a giant wind power generation facility. 47-12 LU-1

I reserve the right to comment further as I deem appropriate.

Very truly yours,

Jeff Slothower

deis comment letter

OLEM H STALLOCK
315 LINCOLN ST
ELLENSBURG, WASH

RECEIVED
JAN 2 9 2004
KITTITAS COUNTY
CDS

Attn: Clay White!

Regarding EWXCO Wind farm PROPOSAL I have the same opposition as a tax payer to both State, County & Fed Gov't., As I have with Zilkhas proposal! I am not opposed to a system of Wind Electric energy generation in some area of the Country where power is Costly & in short supply. I lived in Minnesota the 1st 21 yrs of my life. At that time R.E.A. deisel generated power was approx. 10¢ per K.W. hour, and it was only available for 4 to 5 miles out of town. In later years it dropped to about 8¢ per K.W. hour. In those areas today the wind generators are practical as the prevailing wind in winter is from the West & North West most of the time, about 5 to 15 M.P.H. Late spring early summer from the South, southwest & occasionally westerly, these winds are fairly Constant for perhaps 6 to 7 months of the Year Creating those ideal Conditions for wind generators. My observations while working the tower at the E burg airport in 43 44, 45 approx 1 1/2 yrs we don't have but 4 to maybe 5 months of favorable winds. Also they are not lateral, they are variable & turbulant, Changing as much as 25 to 30 M.P.H. in a very short time, less than a minute. Our winds are not ideal or favorable to supply a constant input of power to the Bonneville grid. These winds are mainly during the sun shining daylight hours. My best estimate of the 4 or 5 months of favorable winds, we would have only about 3 months of useful production. This falls pretty much in line with a 25 to 30% yearly generator production. I don't see these wind farms proposals as producing enough revenue to pay the costs related to the project. 48-1 ALT-6

I also Can't see where the County will be deriving income from a tax base, Zilkha has applied for a accerated tax write off, this needs a thurough investigation. So far I understand not much has happened in this Area. I would advise extreme 48-2 FIS-4

(2)

Caution in dealing with both proposals. I have very little faith in the stability of these People to honor their words. I have read about Contracts by Companies doing business here, and then were under foreign Control. When they were sold or transfered to a Parent Company, the existing Contracts were not enforcable, mostly worthless. The foreign parent Company could abandon the operations and in this Case the County which granted the permit is left holding the abandment, fortess & removal. Remember the Projected life of these wind turbines is 25 to 30 yrs Put that against Hydro's 100 to 200 yrs or more. Do you realize it would take 14 to 15 thousand wind Generators just to equal Grand Coulee's dam output. That dam output is 16,500 megawatts of energy. at Present we only have about 5,000 megawatts of wind Power in the entire Country. They talk about this output of wind Power supplying X thousands of homes, but on what basis. More realistically the figure should be ½ of their claims as that is Closer to what is useable Produced. Their only argument is it saved using natural resources, but it also takes lots of natural resources to produce those ~~foant~~ Joints blades and after 5 yrs much more service than Hydro Power is necessary. A number of Hydro's on the Columbia a being retrofitted with more effecient units. this will Create more output with somewhat less water volume, Both Wells & Rocky Reach had been modyfied in recent years, As I told You in my past letter, Bonneville did not have a shortage of energy during the Enron minipulation. Bonneville publicly stated they had a shortage of line Capacity to deliver the available Power. So why do we need wind Power in the Northwest. In Case Your not familiar, their are limits to how far Power Can be delivered without

48-2 Cont. FIS-4

48-3 ENR-2

48-4 ENR-5

(3)

Line resistant Power (VoltAge) loss. Bonneville's Must Convert after some distance to D.C. Called inversion then back to A.C. Converters Which also Creates a Power Loss. In my sources of information Wind Generation is the best used in Area of Close Approximate Consumption. If it were Constant "or on Call" Wind Power would be fine as a line Booster of Voltage. People don't realize how much energy is radiated and loss in line transmission. This is why we have sub-stations to boost Voltage or transfer to a useable Voltage. Perhaps decision makers should be required to be electrical engineers or thoroughly knowledgeable in the Power generating & distribution field before important decisions are made. Consult the experts not the Novices or the emotional. 48-4 Cont. ENR-5 48-5 VB-12

Getting back to wind farms: these roughly 400 ft blades should be out of sight & located where access is available for service. I would recommend the Area if a decision is made for them. They would best be located East of Kittitas between the old Vantage highway & I 90 freeway. Also some Could be North on the Ginko Park side. The winds there are less turbulent, but sometimes reaching 40 M.P.H. The Columbia gorge both North & South experience strong winds However I don't believe you could expect much over a 30% Productive winds. 48-6 ALT-6

I also think the Commissioners should make a Policy decision & stop tormenting the home owners in the Hayward Hill, 97 highway and old 10 areas. This triangle area old #10, 97 & 97A is ideal for those Coast folks who want more leisure living to Place home or Pony farm as I Call them. Also remember the R.O.T.C. training aircraft are small and don't have the lift as more Powerful aircraft possess. These are students just learning to fly. So lets not Place another obstical befor them. (over) 48-7 AT-7

I spent about 1 hr talking to a Pilot with about 3000 log hours of flying time. He's a local man. He felt Experienced Pilots Could adjust to wind towers in the area. However rather than straight out from runway 29 a right or left turn would need to be made. that is in Case this Consentration of wind turbulance Could alter the flight behavior of a small, low powered Aircraft. The other Problem is wind tower a few miles off runway 29 is with unfamiliar Pilots Coming in or leaving the Airport in less than ideal weather. Incidentally pilots landing usually follow down-wind facing & surveying the runway. Departing should never Cross this Path and should turn to the right as they leave. In this Case an aircraft would be directly over those wind blades. No-one knows what turbulance ("or something called -Prop-Wash") that this Consentration of 150 to 200 ft. blades would create. There is no doubt they will alter the Air Currents Aircraft fly into. 48-7 Cont. AT-7

Okay- one mishap or accident resulting in placing those wind farm so close to the Airport would involve the County in legal action. For the County to approve this wind project in this location is a very high risk decision. There will also be law suits with County involvment on land depreciated Values. 48-8 NS-5

anyway the location are wrong the risks are high and Consider the emotional factors of residance in the area. I would not want to live and look out and see my whole horizon revolving. the sycadelic reaction Could make a person ill, similair to sea or motion sickness. In the long run, the County would be better served by homes & ranchettes in those locations. 48-9 VB-3

as Ever Clem B. Stalck

Clay White

From: LINDA WAITS [linlee@inorbit.com]
Sent: Wednesday, January 21, 2004 7:44 PM
To: Clay White
Cc: garrett_ew@netos.com; geoff@geoffsaunders.com
Subject: Concern over wind turbines & their health effects.

JAN 21 2004

Dear Clay,

We have received so much information about the deleterious effects of wind turbines on the people who live nearby. In other applications, the harmful effects on neighbors is enough to get the project refused. It seems abundantly clear that wind turbines cause many, severe negative health effects in those who must live nearby, within sight and hearing of them.

It seems abundantly clear that these things HURT people who are forced to live near them. How can you even consider approving something so harmful to humans, let alone animals and birds. 49-1 VB-3

It seems clear that these will hurt people. Are people not important anymore? Is MONEY the only thing that matters anymore? Please, say it isn't so. Please deny these things. Electricity from windmills is NOT enough to justify the harm they will do to all of us.

Linda Waits
40 Cove Lane
Ellensburg, WA 98926
925-6252
linlee@inorbit.com

--

Lathrop, Winbauer, Harrel, Slothower & Denison L.L.P.

Attorneys at Law

Post Office Box 1088, 201 West Seventh Avenue, Ellensburg, WA 98926

F. Steven Lathrop, P.S.
John P. Winbauer
Susan K. Harrel
Jeff Slothower
James T. Denison, Jr.

Tel (509) 925-6916
Fax (509) 962-8093

January 30, 2004

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

HAND DELIVERED
Mr. Clay White
Planner II
K.C. Community Development Services
411 North Ruby Street, Suite 2
Ellensburg, Washington 98926

RE: Desert Claim Wind Power LLC
Application for Wind Resource Development Permit Z-2003-01
Comments on Draft EIS

Dear Mr. White:

This letter is in comment to the draft EIS in the above matter. Attached hereto and incorporated herein by reference are my prior letters of comment of March 4, 2003 and May 20, 2003. All of the concerns I have addressed in those prior letters are also relevant to my discussion of the draft EIS.

Our property is located at 6181 Smithson Road, on the northeast corner of the intersection of Reecer Creek and Smithson roads. This is located in the Visual Assessment area 1E of the Northwest Valley Visual Assessment Unit. The Draft EIS reads as follows on page 218:

> The views showing the greatest degree of visual impact were 1A and 1E in the Northwest Valley Visual Assessment Unit. Both of these views have foothills of the Wenatchee Mountains as their background, have the turbines near the foreground of the view (approximately ¼ mile from the nearest turbine), and look out over relatively flat terrain. Under these circumstances, the turbines' color contracts sharply with the browns, greens, and blues of the foothills and sky, and the turbines' size is such that the turbines break the skyline and dominate the view. The arrangement of the turbines appears scattered, unbounded, and overwhelming because it is unrelated to a topographic or geometric order, lacks a clear edge, and includes turbines in a continuous cluster (Gipe, 2002). Rural residents of this unit would be the viewers most affected by this change in visual

50-1
ALG-4

quality, because their proximity suggests a moderate exposure rating and their activity and landscape appreciation suggest a high sensitivity rating. 50-1 Cont. ALG-4

The mitigation measures suggested in 3.10.5 do not include the planting of screening vegetation for impacted properties (although this was mentioned briefly elsewhere in the EIS). In addition, the mitigation measures do not include the obvious issue of compensation to the property owners who are most effected by the impact of the wind farm. This should include a consideration of diminution in property values and a plan for compensation to the impacted property owners. A determination of impacted property values needs to be an impartial study of the specific properties involved and not an extrapolation from other wind farms in other areas or even from properties in the surrounding areas. The final EIS needs to examine the impact to the value of each property in, at a minimum, Visual Impact Areas 1A and 1E in the Northwest Valley Visual Assessment Unit. Any diminution in value of a property caused by the project should be required to be promptly compensated or the project be denied as injurious to the surrounding area. 50-2 NS-1

I must also reiterate my strong concerns regarding the power collection system as depicted in the draft EIS. Once again, the depiction is of an overhead cable system on the east side of Reecer Creek Road and the north side of Smithson Road. An overhead cable system as depicted in the draft EIS would traverse the entire westerly property line of our property, turn at the southwest corner of our property and then traverse the entire southerly boundary of our property. Again, the draft EIS continues to be vague as to whether this would be an underground line or an overhead line on the poles depicted. The final EIS needs to be <u>specific</u> as to whether it is an overhead line or an underground line and must be specific as to the route of this proposed power collection system. 50-3 PD-8 As has been stated in prior correspondence, an overhead system as depicted in the documents submitted to date would have a severe adverse impact on our property and we are vehemently opposed to any such collection system. 50-4 LU-10

I also disagree with the draft EIS in its claim that "medium" levels of "tonal noise" from the turbines is determined to be not a significant impact. As I stated in prior correspondence, I have visited the State Line project and I have heard for myself the "tonal noise" that can be expected from this turbines. It will, in fact, be an adverse impact on any property within a one mile radius of these turbines. The final EIS must recognize this negative impact and propose specific mitigations, including payment to land owners whose land value will be impacted by such "tonal noise". 50-5 NOI-1

Sincerely,

John P. Winbauer
Homeowner
6181 Smithson Road

Woody Woodcock
6202 Smithson Road
Ellensburg, WA 98926
January 29, 2004

RECEIVED
JAN 3 0 2004
KITTITAS COUNTY
CDS

Clay White
Kittitas County Community Development Services
411 North Ruby
Suite 2
Ellensburg, WA 98926

Clay:

Please consider these comments regarding Enxco's Desert Claim Draft Environmental Impact Statement. First and foremost, the entire project does not meet the county's criteria stated in 1.4 Kittitas County Objectives. This reads that " The project is not detrimental or injurious to the public health, peace, or safety, or do the character of the surrounding neighborhood." For the bulk of a year we have heard both through the public testimony and through the Daily Record that the project will be detrimental or injurious to the peace and character of the surrounding neighborhood. Passionate testimony affirming this degradation has been given by numerous residents and neighbors in contrast to the tepid "objective" opinions offered by paid consultants who live and work in overly populated locales. As the lead agency is your job to promote this project or to protect neighborhood residents, county citizens? Is there a county agency where people are paid to protect citizen's rights and if so, where are they mentioned in this document? 51-1 EIS-4

The DEIS does a pitiful job of expressing the neighborhood discontent expressed over the last year. It is summed up in a few paragraphs and minimized by such sayings that "with considerable effects... the visual impact could be dramatically reduced" (Chapter 1, Summary). I never saw terms like 'industrial viewshed' or 'visual 51-2 VB-4 pollution.' In fact I think the DEIS appears to have been carefully constructed so as to support this project. Hundreds and hundreds of pages of entwined words and numbers citing industry standards and referring to vague mitigation procedures which one can attempt to analyze and cross reference for discrepancies from a CD, one page at a time, unless you want to pay $60.00 for the right to fight for your home. If Enxco wanted a level playing field, why didn't they insist on footing the bill and ensuring all interested parties receive a copy of the DEIS free of cost. This is a LIMITED LIABLILITY OPPORATION. At the very least, Kittitas County must retain a clause or contact to invoke decommissioning should unforeseen situations arise if this project gets rammed through.

51-2 Cont. VB-4

51-3 EIS-13

51-4 PD-3

It is frustrating to have to wade through this draft labyrinth but please consider the following. (Excuse the cited page numbers because the CD printouts are different then the printed document in some cases...)

- Table 1- 1, Chapter 1, Summary, pg. 1-10?
  "Turbine operation would not increase the normal dispersion of dust and pollen and would not result in dust-related impacts for residents near the project area"
  This is a false statement when considering Mr. Lind's testimony (at your public hearing) describing the brownouts he witnessed at the Stateline Project in the summer of 2003.

51-5 AQ-1

- Table 1-1, chapter 1 Summary, pg. 1-20?
  " The distance threshold for shadow flicker impacts is approximately 2000 feet..."
  This should determine the absolute minimum set back from adjoining property lines not from existing residences.

51-6 HS-4

- Table 1-1, Chapter 1 Summary, pg. 1-21
  "Predicted operational noise levels...would meet applicable noise limits...project noise impacts...would not be significant." Didn't Zilka recommend or at least discuss a 1-mile buffer for operational funds in their Sagebrush EIS? I realize there were different consultants used for noise by each company but what do we believe? We meaning residents who are fighting to retain the peace and character of the surrounding neighborhood. Maybe

51-7 NOI-2

Zilka's referred to1-mile distance should become the minimal setback from non-leased property lines rather than the 2000 ft. shadow flicker distance I recommended earlier. 51-7 Cont. NOI-2

- 1-7 Cumulative Impacts.
  I don't see any mention of expanding the size of this project and the impacts, which would result as this project encroaches upon Ellensburg or across the north side of the valley. Enxco's application leaves the door for expansion if they can find receptive landowners, but nothing is mentioned in the DEIS. 51-8 EIS-8

- Aesthetics, Light and Glare has been glossed over. The number of lights has at last been stated, but their impact is minimized. View degradation isn't mentioned in the Recreation section. Didn't Enxco mention that their turbines would be Earth Tones, while Zilka offers gray as the most aesthetically blending and pleasing color? How can 'industry giants' come up with different noninvasive colors ? If Enxco is recommending Earth Tones, why are the visual simulations all white? 51-9 ALG-2

- The assumption that property values won't suffer is pathetically backed up with incomparable studies. There are no mitigation procedures offered to non-receptive, neighboring landowners. Enxco or the County should purchase parcels at a fair market value form landowners that want away from this whole mess. If property values won't be affected, as both the County and Enxco attest, these 2 entities could look at their newly purchased holdings as sound investments. 51-10 NS-1

- There should be a full 30-year depreciated tax base analysis offered rather then a first year dollar amount. It seems that a company which oversees thousands of turbines around the world, could estimate some kind of depreciation schedule. 51-11 FIS-2

- Word searches should be done on this entire document to find uses of words like "promptly" (like 'promptly repair'), "continually" (like 'continually monitored'), "regularly" (like 'regularly patrolled'), and "might" (like 'some or all of the following mitigation measures might also be warranted'). Once the word search turns up these word use situations, the document (DEIS) should be changed by 51-12 EIS-10 replacing vague uses with specific, time-line linked words with consequences if there is not compliance by Enxco. 51-12 Cont. EIS-10

These are a few suggestions to tighten up this Draft. It seems ludicrous to me that a Final Environmental Impact Statement could be generated by using this vague DEIS document as a foundation with such little opportunity for public input. What certainty does the public have that their comments are even taken seriously? I hope that the public comments are not considered as a mere venting formality. What is the rush? The wind will be here. The time is now for Kittitas County to proceed with caution. 51-13 EIS-1

Sincerely,

Woody Woodcock.

To: Kittitas County Board of Commissioners
205 W. 5th Room 108
Ellensburg, WA 98926

RECEIVED

JAN 2 2 2004

KITTITAS COUNTY
CDS

52
P.1

We, the undersigned, being property owners, residents and taxpayers of Kittitas County, hereby petition the Board of Commissioners to oppose the placing of wind turbines in Kittitas County. 52-1 SO-5

Wind generated electricity has been shown to be of no benefit to our county. Rather, these bird killing abominations with their flashing lights and whirling blades will be a blight on the countryside, destroying property values and the quality of life we have come to appreciate in our beautiful county. The only benefit will be the enormous tax subsidies to the corporations that wish to force these ugly, towering monstrosities upon us. 52-2 VB-3

Upon signing this petition, We give Mr. Jack Boyovich authority to act in our behalf and to represent us to the Board of Commissioners in the matter of wind turbines.

Signed, this 31 day of Dec, 2003

Name: Kathleen [signature]
Kathleen Littlemston

Address: 18571 Reecer Crk
Ellensburg WA.
98926

Telephone: 509-962-3529

Letters 52 through 78 are form letters with the identical substance in the body of the letter, but different signatures.

The marked versions of Letter 53 through 78 are not reproduced for inclusion in this appendix, but those comments are noted in the table of DEIS issues.

DESERT CLAIM WIND POWER PROJECT EIS
DRAFT EIS PUBLIC MEETING
JANUARY 20, 2004
Kittitas County Fairgrounds, Home Arts Building

[Kittitas County Community Development Services recorded the proceedings of the Draft EIS public meeting on audio tape. In preparing a transcript of the meeting, it became apparent that the tape did not clearly and successfully record 100 percent of the discussion at the meeting. Even though the tape was sent to a specialist for enhancement, brief portions of a substantial number of statements remain inaudible, as is noted in the transcript. Kittitas County Community Development Services regrets the incomplete nature of the recording, but notes that the transcript is complete enough to allow identification of the nature of individual comments on the Draft EIS.]

<u>Clay White:</u> It's about 6:40 and we're going to get started tonight. Good to see everyone here. Just for the record, my name is Clay White and I'm a land use planner for Kittitas County Community Development Services. Just so you know who's up here, to my right is Lorna Kenny from our office. To my left is Richard Weinman from Huckell/Weinman Associates. His group was hired by the County to put together the Draft Environmental Impact Statement. I'd like to thank everyone for attending tonight. There's a lot of familiar faces, we've all seen each other a lot in the last several months. We thought we would take a bit of time at the meeting tonight for you to provide us with comments.

The proposed action consists of development of a 180-megawatt wind energy facility by Desert Claim Wind Power, LLC on 5,237 acres of privately owned land in unincorporated Kittitas County. Approval to implement the proposed development would require four related actions by Kittitas County, as detailed in Kittitas County Code 17.61A. These include: number one, adopting a site-specific amendment to the Comprehensive Plan land use map designation; rezoning the site; issuing a wind farm resource development permit for the proposed project; and executing a development agreement stating our standards and conditions for development, including mitigation measures. Desert Claim Wind Power LLC, a Washington limited-liability company wholly owned and managed by enXco, Inc. submitted an application that's dated January 28, 2003 to Kittitas County Community Development Services. The proposed project would consist of up to 120 individual wind turbines. Construction of the project would also require construction and placement of access roads, the control and power collection cables, one or more substations, transmission interconnection, and an operation and maintenance facility. The operating life of the proposed facility would be approximately 30 years.

Kittitas County Community Development Services Department did hold a scoping meeting in May 2003 where public comments were taken on the scope of the Draft Environmental Impact Statement to be prepared by Kittitas County. Based upon the comments received during the comment period ending on May 8th, the EIS was prepared in accordance with the SEPA rules and regulations. On December 15, 2003 Kittitas County issued the draft EIS that was prepared for the Desert Claim Wind Power Project with a 45-day comment period ending on January 30th, 2004. Comments may be submitted to myself at the planning office by 5:00 p.m. on January 30th. Our address is 411 North Ruby, Ellensburg, Washington. The purpose of tonight's hearing is to accept all the comments related to the draft environmental impact statement. We are hopeful that we will receive comments on items or issues which you, the public, believe were overlooked on the last (inaudible) or comments relating to specific issues that you think were addressed. We will prepare a response to comments for the Final EIS. Comments citing specific sections and page numbers will help Kittitas County prepare those responses.

Due to the anticipated number of people wishing to provide comments, I'll limit each person's time to 3 minutes. I have handmade signs to keep everybody on notice about the time limit. Please be specific and if someone else covers your concerns first, indicate… (inaudible). Tonight's hearing is being mechanically recorded, so we ask that when you testify you state your name and address for the record and sign the attendance sheet. I'm just going to read the people that are signed up that wish to testify tonight, barring enough time, which I'm sure that we'll have. If you really did want to testify and didn't sign up, at the end of the evening, I'll certainly ask if anyone else wishes to speak. We have a box over by the front door, you can drop comments in there, as stated previously. We have until January 30th to provide comments so we still have another ten days. If you have any other questions please call me; I'm always available for you. With that we'll get started. Phyllis Whitbeck.

Phyllis Whitbeck: Well, my name is Phyllis Whitbeck. I live at 7440 Robins Road, PO Box 1175, Ellensburg, WA 98926. And my husband and I both are Sun East property owners. We have spent all of our big millions to buy a few little lots there. And it's an absolutely gorgeous (inaudible). What I wanted to talk about was the blinking lights. Because we live approximately the same height as the windmill lights will be shining. So we'll be looking straight at them south and we'll be looking straight at them west and we'll have blinking night lights all night long, which don't seem to be as bad

T1

T1-1
ALG-1

because the white lights are on in the day time. One little cell tower, you don't really see it. But when it's at night time you see that little red blinking light quite readily, even across the whole entire valley. While these, I understand, will have one light approximately every 4 wind towers. And that, I understand, will have red lights blinking all night long out there east and west of our property. Anyway we won't be able to watch night fall anymore, because we'll look out at the valley and see all these blinking red strobe lights. (Inaudible) We'll have a living room full of blinking, strobing red lights all night long. That's about all I have to say. Thank you.

T1-1
ALG-1
Cont.

Clay White: Thank you very much. Ginger Morrison.

T2

Ginger Morrison: Good evening. I'm Ginger Morrison, I reside at 1607 West Dolarway Road in Ellensburg. I have a few comments regarding the property tax …(inaudible)… in Kittitas County. The Draft Environmental Impact statement indicates that the Desert Claim Wind Project will increase the total county assessed tax base by 5 percent. This project will pay millions of dollars in property taxes to the county in the years to come. Because of the property tax collection limits imposed by us with the approval of the Initiative 747, every property tax payer in our county will likely receive a 5-percent reduction in the amount of taxes that they pay. My husband, his brother, their parents and grandparents, as well as our two children have attended school in Kittitas County. My children and funding for schools have always been an issue here. However, I would like each of us to consider another possibility. My children are now grown and no longer attend school here, but many of you have children in the school systems. Consider the possibility that every business and individual in the county received a tax reduction. We approved a county-wide special levy so all the property tax funds generated by the wind project are dedicated to our children's education for now and in future years. With the approval of this project, we have the opportunity to do this at no additional cost to the taxpayers. Five percent might not seem like a lot of revenue, but as an example, Fred Meyer, a local business, has an assessed value of $15 million, according to public record, which pays approximately $177,000 a year in Kittitas County taxes. That would equate to $8,850 at 5 percent. Now a local homeowner who has an assessed value of $200,000 would be paying $2,360 a year in taxes. But at 5 percent, that would be $118. Now consider multiplying 5 percent by the total tax base in Kittitas County. That would be substantial revenue for our schools, without having the special bond issues and levies each year to meet the growing needs of our growing schools. I ask our county officials to look at this opportunity and tell us how we can provide tax revenues to the county for this project. Thank you.

T2-1
FIS-1

Clay White: Thank you Ms. Morrison. Arthur DePalma.

T3

Arthur DePalma: I live at 6991 Manastash Road in Ellensburg. And although I don't live near the project and we've lived across the valley …(inaudible), I'm against building these turbines for two reasons. I think that it's outrageously unfair for the people who live nearby. And I'm also opposed because this particular project proposes to build these huge towers just 8 miles outside Ellensburg and near the pristine area of Table Mountain and Lion Rock. And even the Zilkha project's just a simple warm up …(inaudible). As I see it there's 3 groups of people who support these wind farms. One is the energy companies. And they talk about green energy and clean energy, but if they weren't getting hundreds of millions of dollars in federal subsidies, the tax dollars, there wouldn't be any project because wind farms by themselves are not economically viable. They need fossil fuels to keep the turbines going. And once subsidies are done, the turbines just are there and they just sort of rust. The second group, land owners in the project area contracted with these companies are getting paid a lot of money and that's the mitigating factor I think. That's the one and only mitigating factor that can change minds if you have property here in the area of wind farms. Actually if it weren't for money, somebody last week said that it's not energy it's money. If it weren't for the money, neither of these two groups would be interested in wind farms at all. And another group is conservationists that think that it's great to have wind energy and free natural resource, but they seem to be unswayed by the facts that wind farms produce very little energy and also need fossil fuel, when the winds aren't blowing. They also seem to be unconcerned by those …(inaudible)… towers and …(inaudible). And I think it's, you know, it's easy for those that don't think that they're going to be affected by it, these towers, to go up and support wind farms. I think the group would have more credibility if they themselves lived in the area and were affected by the turbines. I think the people that make these decisions whether this wind farm's going to be built, need to think what it would be like if wind farms were going to be built around your property. Imagine what you'd feel and imagine what you'd feel about your property values in spite of what the studies say. I'd just like to close with four points: number one, the visual effect is going to ruin the views and it's gonna lower property values. And it's gonna actually be seen from a large part of town and the problem is that it's going to be built on elevated land that's higher than the town of Ellensburg. I think that if people realize how it's going to affect the value of their land …(muffled). And the other thing, which …(inaudible) already mentioned, which is light flicker, which is going to be going on all day long and the red beacons at night. You can't live near these, you just can't. It's going to be visible for miles …(inaudible). And it's easy to ruin other people's quality of life …(inaudible) people return. These industrial towers should not be built near homes.

T3-1 SO-5

T3-2 VB-5

T3-3 ALG-1

T3-4 NS-1

T3-5 NS-2

The feelings and judgment of the residents who are impacted should have priority in the decision. So in closing I'd just like to encourage you to make your recommendations as you would if these huge towers were proposed to be built around your homes and properties. T3-6 VB-6

Clay White: Thank you very much. Dwight Lee Bates

T4

Dwight Lee Bates: I'm Dwight Lee Bates and the last name is spelled B-a-t-e-s, 1509 Brick Road, Ellensburg, Washington 98926 and I represent myself. I'm against these wind farms. T4-1 SO-5 A decommissioning plan was not shown in Chapter 4. This DEIS is incomplete. The decommissioning plan should be in the DEIS. Where is the information on the bond Desert Claim should post so we can tear down the turbines when they result in being eyesores and inefficient and a waste of taxpayers money. I think Desert Claim will be long gone having sold the wind farm and we'll have to pay to tear it down. T4-2 PD-3

What I'm trying to say to you, I disagree with the DEIS statement on page 4-21 that the turbines would not present conflicts or adverse impacts on the air transportation resulting from these projects. I am a private pilot who flies the Kittitas Valley and these monstrosity turbines are in the way. They are too close to the Flying Rock Ranch grass airstrip near Reecer Creek, which I land on. This aviation program at Bowers Field trains CWU students to fly in the valley. These turbines are dangerous and (inaudible) for these students. The very fact that the FAA, the Federal Aviation Agency, requires lights as shown on page 3.10-16 of the Sage Brush Power Partners DEIS shows that these monstrosity turbines are hazards to flight. T4-3 AT-7

The DEIS on page 1-59 states "Consequently a change to a right-hand VFR flight traffic pattern for runway 7 and 11 would likely cause a negligible shift in aircraft operating patterns and an imperceptible change in noise experienced in the community. This is not a normal departure and causes a great deal of inconvenience and it puts more noise in the community. There are approximately 120 flight students from the CWU flight technology program who utilize the Bowers Field Airport. With 19 airplanes and each student scheduled for 3 flights per week, I estimate the average number of operations to be in excess of 300 per week, with many of these operations entailing practice take-offs and landings. T4-4 AT-2 I estimate the number of take-offs and landings to be about 1,000 per week by the college students alone. Any aircraft that has left the traffic pattern needs to reenter it in an orderly fashion. This state has instituted a procedure to allow for an orderly flow of traffic into the pattern. These procedures have been approved by the Spokane Federal Aviation League. They include that in addition to the normally accepted 45 degree reentry to the downwind leg, the procedures for entering the pattern from the upwind side is, the practice is to enter on the 45 to the upwind and cross the airport on the crosswind leg to enter the downwind. In this manner, aircraft can enter the pattern on the opposite side. If the proposed changes are made to accommodate the wind farm, it will impact the flight safety. I strongly object to the proposal to change the traffic patterns. T4-4 AT-2 Cont.

The DEIS Chapter 4 did not address setbacks. The setback should be 2,000 feet from roads and residences due to shadow flicker, flashing lights, noise, ice throw and blade throw to ensure safety. T4-6 HS-4

Property values. The DEIS Chapter 4 does not state there will be a reduction of property values due to the wind farms. Regardless of what was printed in the local Daily Record, a newspaper, that property values would not be affected, the results of the Lincoln Township, Wisconsin survey showed that turbines within 1 mile lowered property values by 26 percent and 74 percent of the people would not buy within a quarter mile of turbines. Real estate people of Kittitas County have stated that wind farms will affect property values. T4-7 NS-1

The DEIS on page 1-35 states "Some nearby residential users might seek to relocate if they felt that wind facilities, individually or collectively, conflicted with elements of their lifestyles." This made me and other residents very mad. We were here first. How can you invade our beautiful valley and tell us to move. Who would want to live next to these monstrosity turbines? Where is the impact on the Kittitas County property values stated in the DEIS? T4-8 LU-3

Clay White: Thank you Mr. Bates. Ed Garrett.

T5

Ed Garrett: My name is Ed Garrett and I reside at 19205 67th Avenue SE, Snohomish, Washington. I represent myself and my wife Rosemary. In reviewing this DEIS I'd like to make the following comments. First I'd like to comment on the lack of property value effects on the wind power projects. The summary of literature prepared by Huckell/Weinman Associates, groups who promoted the agenda for the Woodinville …(inaudible). The report says "one scoping comment for Desert Claim specifically suggest that a certified real estate appraiser familiar with the local market conditions be engaged in identifying the effects the wind turbines on property values." However, it goes without stating, this request was not pursued, because it's not an environmental issue. Because of the absence of data, the actual sales before and after construction …(inaudible). I believe this to be an important, pertinent part of the EIS. The project area proposed includes 31 non-participating residences and landowners either in as close as 1,000 feet of the boundary and many more non-resident land owners within 250 feet of the property line. T5-1 NS-1

Second, I'd like to comment on the wildlife study prepared be WEST, Inc. This was a limited 1-year study performed by several 30-minute flight count surveys and all during the daytime. The Kittitas County Audubon has already stated in previous public meetings that this is inaccurate. I won't incur any other comments on this issue (inaudible). T5-2 PA-1

Third, photographic views and visual simulations are not accurate. Most of the simulations were taken at a significant distance from the project area to minimize its overall impacts. I would like to see visual simulations for each of the 31 non-participating residents within and out to 1,000 feet from the project boundary as well as (inaudible). T5-3 ALG-2

Lastly, I have great concerns about building this wind project within such close proximity to nesting bald eagles along the Yakima. The proposed project is among the hunting and roosting grounds of bald eagles and other important mammals. WEST, Inc. attempts to minimize the issue by stating repeatedly "at this time there have been no documented bald eagle fatalities at any wind facility within the United States." I find this statement very irresponsible, very unsubstantiated. I would submit that the bald eagles, just like the golden eagles at Altamont Pass California, are being killed occasionally, but are swept under the carpet because bad publicity …(inaudible)… as well as being a federal crime violating the Bald Eagle Protection Act. WEST, Inc. …(inaudible)… their observation (inaudible) that frequent observation of bald eagles within this project area. On page C1-20 of Appendix C …(inaudible)… problems state "Due to the turbines in the vicinity of important roosting and foraging areas bald eagles …(inaudible)… plant, decreasing their exposure. Page C1-16 states that bald eagles were observed in this zone, but within the zone of risk. They propose to mitigate the risk to eagles by establishing and enforcing reasonable driving speed limits within the wind plant to minimize the potential for road killed wildlife or livestock that may attract foraging bald eagles. Number two, remove and dispose of all carcasses of livestock, big game, and other wildlife from within the wind plant that may attract foraging bald eagles. Number three, ensure that livestock calving areas of participating landowners remain outside the wind plant. But what about all the non-participating landowners with livestock? And I would like to add one more main mitigation issue. How 'bout you just don't build these giant industrial Cuisinarts in the sky and no (inaudible) habitat who are inhabited by innocent human beings? Thank you. T5-4 PA-12

Clay White: Thank you Mr. Garrett. Jeff Howard.

T 6

Jeff Howard: My name is Jeff Howard. I have a home at 21 Fawn Road in Cle Elum. And since my experience in real estate does not qualify me to comment accurately on environmental issues, I have to confer with (inaudible) Mr. Garrett and a couple of the others here, as far as that goes. My main and well-known concerns regarding property values and corporate welfare are not within the scope of the Draft Environmental Impact Statement. I would like to note that, to date, few if any large wind turbine installations have been placed in areas as heavily populated communities as this one. And I feel the Kittitas Valley should not be allowed to become a national Petri dish for experiments with huge wind farm installations, in an area already populated with residents and businesses and the tourists who would love this place exactly for what it already is. Thank you very much.

T6-1
SO-6

Clay White: Thank you very much Mr. Howard. Bertha Morrison.

T7

Bertha Morrison: My name is Bertha Morrison, I live at 9131 Naneum Road. I'm 85 years old, and my family's lived here for over 100 years. As most of you know, I have spoken in favor of the wind farms in the past. And you can say I am biased if you want to. I won't deny it. I would like to see each of you, pros or cons, join me in thanking our County officials, and Huckell/Weinman, the firm they chose to prepare the Environmental Impact Study, we are here to discuss. Like each of you here tonight, I wanted to …(inaudible)… and educated professional in environmental …(inaudible)… studies. But I can personally guarantee to the time and detail of some of the workers. I never imagined the number of visitors or the detail they would go to. At one time, they had a group of people walk every foot of the project area. I thought at first that maybe they were doing a detailed study of some of the projects and assumed the rest of the projects would be similar. Ask any of the property owners and they tell you the same detail was used throughout. They examined all the plants, animals, wetlands, and every old bottle, or pieces of bottles, anything else they found. And in closing, I would like to say I'm pleased to see that our local officials have shown how capable and professional they are. Thank you.

T7-1
EIS-1

Clay White: Thank you Ms. Morrison. Sandy?

Sandy (Sandall): I'll pass. I concur with what Mr. Bates said …(inaudible).

Clay White: Thank you. Is it Chris Burtchett?

T8

Chris Burtchett: My name is Chris Burtchett. I live at 12611 Reecer Creek Road in the middle of this project area. I've read and reviewed the content of your Environmental Impact Statement. I may not have understood it all, but one thing is crystal clear. Many of the determinations should have been evaluated …(inaudible). It's filled with statements such as that cumulatively insignificant, open mitigation, minimal effect, not measurable, and temporary disruptions. Those of us who live in the project

T8-1
EIS-1

area do not deem any disruptions minimal and we resent the suggestion that the destruction of our way of life is cumulatively insignificant. T8-1 Cont.

You, as the Board of County Commissioners, will make the final permit decision on this project. I ask that you adhere to your own criteria requirements. And based on those you will surely deny this …(inaudible)… application. In your criteria you state your decision will be based on three criteria: The project is essential or desirable to the public convenience. The project is not detrimental or injurious to the public health, peace or safety, or to the character of the surrounding area. The project will not be unreasonably detrimental to the economic welfare of the county and will not create excessive …(inaudible)… costs to the public facilities and services. I fail to see how the project is essential or desirable. Wind power is not necessarily environmentally friendly and is undependable, at best. I would hope someone has noticed that the wind hasn't blown here for months. From what I understand, this is normal from November to February, and the wind is mainly present here in the valley in the spring and summer. To me, that means the turbines can sit idle for at least four months of the year unless operated by subsidiary power. How can that be environmentally friendly or beneficial if other power may be needed to operate them. Addressing the other issue in your first statement, I can guarantee you that those of us who live in the middle of your monstrous project do not consider it desirable. You plan on making us live near towers that whir night and day, with blinking white and red lights, and will obscure our view of the foothills and the valley. T8-2 EIS-4

Whether or not the project is injurious or detrimental to the public health remains to be seen. The jury's still out on what the long-term effects on the populace will be on the increased power transmitted by your turbines to the surrounding power grid. As the editorial in the Daily Record stated, we're facing some of that from Bonneville Power Administration's plans to update their transmission lines anyways. We don't need this from you. You of course know that. Because that was another reason you chose our county for your proposal. If there was ever an instance where measurable effects on people's health that power lines are constant, worrying reflection on …(inaudible), then your project qualifies. As to public health and safety, I can only imagine. Your statement again claims that the potential ice throw, blades coming loose, towers collapsing, or vandalism is all minimal, and will have no significant impacts. That's easy to say, but we've been relatively crime free in the upper valley and your rosy outlook of increased travel and tourism make me realize that now I'll have to lock my doors, keep my animals protected, and watch that my land is secure from …(inaudible)… and trash, not to mention looking over my shoulder whenever I venture outside so that I'm not injured by one of your towers. You've banned the public from your project area due to the danger of electrocution. I say that's …(inaudible). The increased fire danger is also described as cumulatively insignificant. As far as I'm concerned, any increase in fire potential is too much. In the past year alone, …(inaudible)… personally …(inaudible)… alone to at least three fires. These spread fast and are extremely hard to control. If your presence increases that hazard, then it is disruptive and injurious to the surrounding area. The impact on peace and quiet in the surrounding area should be self-evident. The towers are taller than anything else in the vicinity and will predominate the landscape. T8-2 EIS-4 Cont.

There's a transformer at the base of each tower. There are power collection conduction cables that cross and crisscross the streams that we depend on for water …(inaudible). It will crisscross 17 streams, many of them more than once, and your evaluation calls it a temporary disruption. If the towers aren't bad enough, you plan on building overhead cables and poles connecting the transmission …(inaudible)… substations and more to connect these to the regional transmission lines. The interconnection line varies in length from approximately 200 feet to miles. That's a considerable variance. Your project …(inaudible)… would provide vehicle access to the base of each tower. They will cross and crisscross 15 streams. You say there will be no noticeable disruption and that it will all go away after the initial construction ends. Who are you kidding? Builders around here know how variable the groundwater is. It lies just below the surface in many areas and goes deep in others. Any disruption of all that groundwater and streams will damage the fragile irrigation system that has been put in place by multiple farms and ranchers and especially to those of use who depend on the natural flow of our land irrigation …(inaudible). My time is up, I have obligations in here that I would like to point out, I will leave them with the county. They need to be said. I am truly against this and I think I would like to point out …(inaudible). Thank you. T8-3 WR-3

Clay White: Appreciate your comments, thank you. Dana Lind.

T9

Dana Lind: Hi. I'm Dana Lind – 9421 Reecer Creek Road. I'm representing myself and my family. I'm against the wind power for lots of reasons. One thing I haven't heard talked about is dust. Recently my daughter and I traveled to Walla Walla to watch my son's soccer game. And all I heard about the wind project, I've never known what it was all about until I saw the towers. My daughter saw the towers first and she said, "My gosh, Dad. They're not going to build those towers by us are they?" So, in a way, it really affected her. …(Inaudible). So we went down and watched the game. We returned the next day, had some car problems. So on the way back, on the return trip, I looked at the paper and the winds the first day were 20 – 25 mph. What really shocked me was when you looked at the towers, to the right, it was clear; the air was T9-1 AQ-1 clear. But to the left, adjacent to the tower, it was, the dust that circulated from the ground all the way to the top of those blades – you know how tall those towers are. It was so dark, and it went on for hundreds of yards. I was just shocked that it generated so much dust and I don't know if …(inaudible). I didn't have a camera, I didn't have a video camera to take a picture of this. I was just amazed to see what really occurs when the wind did blow and where that dust comes from, where that dirt comes from and how …(inaudible). Is there a lot of erosion? Nobody wants that to happen here. Thank you for letting me speak and just say no. T9-1 AQ-1 Cont.

Clay White: David Sager.

T10

David Sager: Hello, my name is David Sager, 290 …(inaudible) Road, PO Box 444, Cle Elum, Washington. I'm here to speak in favor of the wind project because we need electricity and environmentally it's a lot safer than what were doing to the rivers. There's a salmon disaster happening that makes people want to start tearing dams down and taking down generators. You guys will have spent a million dollars for electricity …(inaudible). It's gonna take something to make electricity to run our computers and our MTV, and stuff we want to watch. So I think, environmentally, it's the safest way to produce electricity. And times are changing. Wind power utilizes a natural concept. When my daughter graduated from the University of …(inaudible)… and came back to Cle Elum, there was a speaker and they were speaking highly of wind power. Don't want nuclear power, you think about nuclear power, and what it's done …(inaudible). You think about all the electricity you're getting from the Columbia River. That's not …(inaudible)… and it's just going to escalate. The cost is going to go higher and higher and higher. You want to build a thermal power plant, you're going to fuel it with gas or you're going to fuel it with coal. You can't live without electricity. If you people want to live in the Stone Age, that's fine. Because your land won't be worth a dime if you don't have no power to get water pumped out of your wells. And the other thing is this is a beautiful valley here, if you had a little more water, you could irrigate and make it grow some more apples. Some of that water you're running though those turbines, you could be running right through this valley growing apples. This is a beautiful valley. Sure that it's going to be an eyesore along the creek, but they're going to be located in the hillside where there won't be …(inaudible)… located right down between …(inaudible)… running right along the freeway. So I say you guys wake up and smell the coffee and figure out there's a new world coming and I think it would benefit this county to bring in revenue. You could get responsible contractors to hire local people to do the work and educate and provide medical benefits for them. That will be a hell of a lot easier …(inaudible). It's a change and it's a new way, it's T10-1 SO-5 environmentally safe. And if you all want to turn off all your lights then go ahead. As long as we need electricity, …(inaudible). And this is the new way. T10-1 SO-5 Cont.

Clay White: Thank you very much. Diane Schwab.

T11

Diane Schwab: My name is Diane Schwab. I live (inaudible) south with my husband. Our address is PO Box 290, Maple Valley, Washington. Once again, I'm really disappointed in the results of this DEIS. I think it's full of scare tactics, lies and half-truths. It's far fetched. They give the impression that if these windmills don't go in, they could build as many as 400 homes. Then on page 3-124, they state the housing density consists of one house per 20 acres …(inaudible). All the maps that were included in this report are not legible enough to pinpoint certain areas. And they do not …(inaudible). I want to know where is our property in relation to these windmills. As far as we can determine, we'll be affected by views. We're already (chair squeaking) going to be on the west with the Kittitas Valley Project. Now this one's going to be east-west. T11-1 ALT-1 T11-2 EIS-3

Figure 3.10-3 they're showing viewshed, but it is still not clear. On page 3-225, they claim they can make the project look better, blend in better. How is it possible to hide several hundred foot-tall towers and blades, rotating blades …(inaudible). T11-3 ALG-4

Section 3.5.9.5 claims that although medium noise impacts where identified at several of the agricultural residences, either due to overall sound levels exceeding 50 dBA or due to projected sound level increases, no high (i.e., significant) unavoidable adverse impacts were identified. Do I read this right? Sounds to me like this paragraph …(inaudible). It claims …(inaudible)… levels for equipment …(inaudible), but nowhere, that I find, does it say what the sound level is going to be when they have ten of them at once. And then …(inaudible). T11-4 NOI-1

My other question is who is going to police this company? What about mitigation measures to appease the adjoining property owners? Who's the person going to complain to if the shadow flicker is overwhelming and unbearable? …(inaudible)… I'm not sure where it should be. I've talked to a person in California that lives next to a wind farm and he's had a really hard time. He's complained to the windmill company; he's complained to the county; nobody cares. Sometimes the shadow flicker and the noise is unbearable. Now, keep in mind, he's about as close as some of these turbines are to me. He can't go in the house and watch television because, since they installed the windmills, he has no reception. But nobody cares. After talking to this guy, I get the distinct impression that if us property owners have a problem we're on our own. And I think that this company should step up to the plate before any construction starts and mitigate these issues with the people that have adjoining property. Thank you. T11-5 EIS-10

Clay White: Thank you very much. Jack Boyovich.

T12

<u>Jack Boyovich</u>: My name is David Jack Boyovich, I reside at 18830 Reecer Creek Road, my wife and myself. I'm here on behalf of, besides my wife and myself, 23 families that have entrusted me to speak to you people and, Clay, I've already told you and gave you all the paperwork that I've put together, I've given to you Friday. But, in order to address a couple issues that I have that have been brought up tonight, I need to ask that gentleman a question.

<u>Clay White:</u> I think the best way if you want to do some question and answers we'll have some time after the meeting. I suggest you make specific comments on the draft environmental impact statement.

<u>Jack Boyovich</u>: Yes, anyway, there were a few people up here that said that they were going to tear down dams and electricity is going to go up. I beg to differ with that person. I don't think there's going to be one dam taken out anywhere in these here United States. Number two, in that environmental statement it was stated that there going to be using backhoes, excavators, etc., etc., etc. Not anyplace in that statement as it says, does it say that they're going to have to blast or dynamite some of these holes, because you know and I know that there's an awful lot of rock out there. What happens if you, and by the way if you look on the map you'll see that they're around 360, those things have got me covered all the way around. Sometimes you look at …(inaudible)… of these buggers. Anyway, you blast a couple holes that are above me and it doesn't take one stick of dynamite and my well is gone - history. We have no idea where that water's coming from. I know it's down there. I went down 650 feet to get my water. Let's say you guys blast a couple holes up there and my water goes away, who's going to pay for that? Who's going to make me viable if my well goes dry? Oh, Lord, I got a big …(inaudible).

T12-1
WR-3

T12-2
WR-2

Anyway, and they also, also I should say, they did a study, and I said this the other night. They did a study down in California on the raptor kill down there by Palm Springs, it was a 10 year study, and they estimated that between 22,000 and 30,000 birds were killed by these machines over a 10-year period. That's about 2,200 birds a year. And we do have golden eagles up here as well as bald eagles. We also have lots of red tailed hawks, peregrine falcons. We also have turkey buzzards, which are on the endangered species list. There's an awful lot of animals out there that are going to be wiped out by these …(inaudible). I think I'll just let it go at that Clay and then I'll just turn all that paperwork in to you. I can say it better on paper.

T12-3
PA-13

<u>Clay White:</u> That sounds great. Thank you very much for your comments. Holly Pinkart, please.

Holly Pinkart: My name is Holly Pinkart. I reside at 5900 Robbins Road, I represent myself and my husband. There are a variety of things in the environmental impact statement that need to be addressed. On the part of the fire and emergency medical services, 3.14.2.1, in this case the statement actually …(inaudible)… that there is a …(inaudible)… at the …(inaudible)… site and that a fire protection services contract with Fire District 2 would be required in order to ensure protection for farms and homes in that area. However, it says in the impact statement, in the draft form, Fire District 2 would need some special training for dealing with high-angle rescue. **T13** T13-1 PSU-2

The water supply. Water use and discharge needs to be a lot more detailed. They propose putting in a well in the area that would pump less than 5,000 gallons per day and …(inaudible). T13-2 WR-1

Runoff from the construction, if it ends up in the irrigations around here, as it probably will, also needs to be addressed. …(inaudible) and a variety of other things, that water is contaminated with construction materials, …(inaudible), petroleum products. This really needs to be controlled …(inaudible). Also for the handling of waste disposal. These particular turbines …(inaudible)… will create about 24,000 gallons of waste oil for this project per year. So that really needs to be better described …(inaudible). And of course the energy over 30 years of operation, which is my …(inaudible). T13-3 PD-7

My biggest problem with this particular study, and some of the others, most of you are aware of this …(inaudible)… is the inadequacy of the animal studies. In this case, looking that bird populations, the Audubon Society said that this study was inadequate, it's only a year long, the standard estimates of night birds, I guess those weren't even counted in the study, no bat counts were performed, and in spite of no bat counts being performed they still came up with conclusions that mortality would be insignificant. What goes beyond that, what's lacking is any type of ecological modeling. Beyond that, granted when you don't count animals and you don't count birds the lack of presence or absence is very hard to model, but if you spend a lot of that time counting things like birds and animals, they would be able to model …(inaudible)… population fluctuations over time. T13-4 PA-1

As a micro-paleontologist, my particular concern is the fact that we do have West Nile virus in this state now, mosquitoes carry this. If the turbines pick up some of the populations, such as nighthawks and bats, that eat mosquitoes, we might be in trouble. Another potential outcome for reduced raptor activity and other things is an increase in rodent populations. Here in this county between 10 and 20 percent of rodents carry hantavirus …(inaudible)… and if these populations increase then T13-5 PA-16

…(inaudible). Those statistics on the virus in this county can be obtained at the Centers for Disease Control and the Department of Health for the Washington counties …(inaudible). Additionally, there have been documented problems with rodent increases around wind farms. I've included one of those in my statement here. These are studies done by small …(inaudible)… not cited in this particular environmental impact report. They show increased numbers of rodent …(inaudible)… in and around the wind farms and it was such a problem they ended up trying to …(inaudible)… which in turn …(inaudible). Based on this and a variety of other things which I've included here, my conclusion is that this site is completely inappropriate and way too close to people, because it would be a threat to human health and livelihood …(inaudible). Thank you very much.

T13-5
PA-16
Cont.

T13-6
SO-5

Clay White: William Erickson.

T14

William Erickson: William Erickson, 6980 Wilson Creek Road. I'm going to look at the fire stations mentioned in this statement. It says the Fairview Station is west of Highway 97. The last time I drove past it I think it was on the corner of Fairview and Brick Mill Road. The fire potential, I don't think it's addressed. Wildfire, wind driven wildfire. Only the windy sites have been chosen. When wind blows, foliage dries out. I think you've seen that …(inaudible)… areas, that it's brown most of the time of the year. The experts say that there's no need to worry about fires. They have all the safeguards and …(inaudible)… and everything. The experts say the airplanes aren't supposed to go down and planes aren't supposed to collide, but it happens. Early on generally things work pretty good, but 10 to 20 years down the line, you're looking at maintenance that needs to be done and these wind farms aren't producing the revenue they're supposed to then the cost on …(inaudible)… maintenance. I don't know if you've even been in a wind fire, fire driven wind, but …(inaudible)… small experience …(inaudible). It's scary, it can move mighty quick and if those wind towers are 300 feet tall, or whatever they are, and they …(inaudible)… quite an area. And I don't think you can …(inaudible)… fire history to contain it. …(inaudible) all of the resources they show in the statement, is not going to be able to contain that. Because if it's …(inaudible)… I don't know (inaudible) 6 or 7 years or something like that. …(inaudible) I know there's a lot of damage from fires in southern California last summer.

T14-1
PSU-3

T14-2
HS-1

The area also is not agriculturally viable, if you want to call it that. Not like some of it is in the valley, you get out some places …(inaudible). And so it would be the first to be built on I'm sure …(inaudible)… or homes to go in. You're going to cut down on the possibility of homes going in and create a tax base. Homes create taxes. And I don't think it would be extra special, any more than the wind farms are.

T14-3
FIS-3

The other thing is liability insurance. These companies are hiding behind a limited liability corporation. That means that they're only liable for the value of the company. If something happens above that value, they're not liable. There's nothing in the statement that says who's going to pay for that. Who's going to pay for the loss of our homes, ranches, infrastructure, and bridges …(inaudible)? There's nothing about that. As far as energy goes, there's other sources of energy that are on the upcome. There's turbines that can placed in the rivers, not in dams. This technology is in Sweden, it's been in place. There's the tide over on the coast, …(inaudible)… and it's not like wind were it's there part of the time and part it's not. There's hydrogen, …(inaudible)… hydrogen has got to be …(unrecorded).

T14-4
VB-2

T14-5
ALT-5

[END OF SIDE 1, TAPE 1]

(Unrecorded)… in an area where there's very few people. And it's continuing to build, it's going north on the northern part of the valley is where a lot of building is going on now of homes. It's just not a wise place to put it.

T14-6
SO-5

Clay White: Thank you Mr. Erickson. Rocky Farrell.

Rocky Farrell: Good evening. My name is Rocky Farrell and I live at 1284 Cascade Road, Cle Elum. I work on turbines, it's what I do for a living. I've been doing it for 18 years. I like the lady's idea on the tax for schools, I'm more like this lady here, I don't consider myself greatly educated, but I see the basic things that we need in life and I've been listening to people talk up here and the gentleman said that we were here first. I'm sure that's what the Indians thought too. The man who talked about the airplanes; I've never flown one but I have flown in them. He said the landing, take off and air and all that stuff, it's a little beyond me but I'm not, I'm not really educated on that but I figure it that it teaches students how to avoid things. It's just common sense. I drive a Geo Metro. If people think that there's not enough wind here they're really mistaken bad because a 3-cylinder really gets pushed around by it. The man talked about he's never heard of dams being taken down in the state. Currently there are two of them being taken down in Washington State. One is the White River Power Project in Pierce County that supplies Lake Tapps with water. Another one I couldn't recall the name off the top of my head but it's out on the coast. So dams are being removed and I see this as a boon for our economy, not only economically but everybody, everybody wants alternate sources of power. And if we're not willing to ante up to our part then we can't expect anybody else to, I mean we don't want more nukes, we don't want more dams, you know the options are coming down real quick. The technology of this is advancing

T15

T15-1
SO-5

all the time. I think we should take advantage of it while we have the chance. Thank you very much. T15-1 SO-5 Cont.

Clay White: Thank you Mr. Farrell. Roger Weaver.

T16

Roger Weaver: I'm Roger Weaver. I'm the broker/owner of Remax Community Realty in Cle Elum. I've sat on the sideline of this issue, particularly as it leads to property values. Most of mine were colorful comments, on what enXco is really …(inaudible). Zilkha in their public relation process, particularly as it relates to property values …(inaudible). I'm here because they think I'm stupid, they keep saying that there's absolutely no effect on property values. That is absolutely incorrect. (inaudible)… there are some places where it won't be. In a lot of places where they're trying to do it, there will be. And then they created this analysis, which is the only substantive analysis that's been presented so far. And call it - you've seen this report. Here's what they're comparing us to. A community where they put only 20 turbines and the median value of the household is $77,000. The highest median value of any single household any place where they put these is $117,000. If we could provide that type of median pricing for our young people in this county I would tell your first born to …(inaudible). That's not gonna happen, we are way past these days. My point to the public is this, if you could buy a home, and we see it everywhere else in the country, you can buy a home for those kind of prices, you'll be living next to a steel mill. And it won't have that kind of effect on your property values. In this county our property value base is geared on three things; residential, agricultural and recreational. I contend they have never brought this kind of equipment into a county where our value of real estate is this high or …(inaudible). T16-1 NS-1

And I want to clarify one other thing. The biggest industry we have and the most viable industry we have in this county is the real estate industry. Because, and that's also where we get our agricultural …(inaudible). You're more experienced with me when I talk about the conversion rate. That conversion goes from 2,000-acre irrigated farm to a 10,000-acre building site. That 10,000-acre building site will not exist most anywhere in the community …(inaudible)… at all. Myself and some of the attorneys in town are prepared, if we have the time, and again it's the same old thing. When we went through the MountainStar project, you remember Mr. White, they were much more of an active, involved in the county, not you personally, but the county is much more involved in the process. The mitigation that MountainStar had to go through, the costs that MountainStar had to go through, and time MountainStar had to go through, it's unfair if this is coming in piecemeal …(inaudible)… and nobody's taking a realistic view of its impacts.

I want to see a ban on every wind company here, with every wind machine …(inaudible). I want to see the …(inaudible). Because we can very easily and scientifically get to the point between values of land. All I have to do is simply go to a farm that's close to this area, highest and best use, if they break the farm up and sell it, what is it worth? What is gonna be worth if the windmills are right next door? That is measurable and that is real. When that happens it's not unlike the government did, if they want to do it and the County wants to allow it, then the people should be compensated like any other entities where you're involved with what we call a taking. If you're taking property and you're affecting somebody's value, they gotta be compensated fair market value for that. It's a different type of process. It's one that needs to be taken. And that's all - there are processes available to do this. And again I want them to show us where they've gone to an area that's like us, the land value base like us, and then tell me that they're not affecting property values. Certainly there are places where this has been done, even in our county. But there are specific places where they can't. Anyway this has been a tough issue for me. You haven't known me as long as some people have, I've spent my whole life fighting for property rights. And this is a hard one for me cause this affects some of my friends and some of my clients that will be affected by this. This may personally cost me some business. [Applause] It's the wrong way to go.

T16-1
NS-1
Cont.

Clay White: Thank you. Eloise Kirchmeyer.

T17

Eloise Kirchmeyer: My name is Eloise Kirchmeyer and I live at 16281 Reecer Creek Road. I'm a newcomer to Kittitas County. I come from King County. You can imagine how far this project would fly in King County. I enjoy this county and I would like it to stay the way it is and I've only been here since April. I bought into …(inaudible)… neighborhood and I don't want to see it become an industrial problem. What's next, a landfill, or a regional prison? I think the windmills don't belong in this valley. There's an abandoned small windmill on the freeway and it sits idle. Is this a sign of things to come? (inaudible)…as far as the new environmental impacts on the area, I'm going to step out my back door and see several windmills towering over my house. (inaudible)… simulated photos I saw last week. I do not see that portrayed. Do you think I'm just saying not in my backyard? [Applause] You betchya. And not in my front yard either. [Applause]

T17-1
SO-6

T17-2
ALG-2

Clay White: Thank you. Michael Gossler

Michael Gossler: Good evening. I don't live on this side of the mountains.

Clay White: Before starting can we get a name and address?

Michael Gossmer: Yes. My name is Michael Gossler. I live at 3212 74th Place SE, Mercer Island, Washington. My office is in downtown Seattle. I own 20 acres of property on …(inaudible). For the last 6, 7 years I've had the pleasure of coming over here on weekends on a regular basis, to enjoy the phenomenal view of the valley, views of the mountains. The views of the sky at night and the stars and the constellations, things that you can't see on the west side. I've invested a fair amount of money developing the property …(inaudible). In the last year there's been a significant turnover of land up in …(inaudible)… for that purpose and I think you'll see property values increase, you'll see a lot of money spent in this county if there's a reason for people like me to come here on weekends for recreation and the quiet and solitude …(inaudible). That's my preamble. And I've reviewed this environmental impact statement. I think it's deficient in a number of respects. I've read your comments, I've read the comments of others, and I'll make a few of my own. **T18**

I think Section 1.10.2 substantially understates the visual impact of the project on the county. It implies if you don't own property that's directly next door, it won't have an impact. I disagree. I think anybody who lives in the county, and certainly in this area, is going to be impacted on a day-to-day basis by looking at it.

Section 3.5.3, I think inadequately discusses the projected consequences. Section 3.5.3 basically says if we don't build this project what might happen. It says, well you might have more residential development. Yeah that's probably true, for what's permitted on a 20-acre lot. But it certainly isn't going to have the type of impact that building a 41-story building, a hundred of them throughout the valley. I look at those all day long, that's because that's where I live, that's why I don't stay there on the weekends and come over here. It's not the kind of impact you want to present to your valley here. I think the flipside of the coin is also not addressed in that section, and that is what does this open the door for. In effect what you're doing is you're, you're, you're permitting industrial development throughout the valley. And once you've opened up 41-story building equivalents, why shouldn't other industrial developers follow? What's there left to preserve? And so on the flipside of the coin of maybe a few more residences …(inaudible), I think is significant additional development of the type you don't want in …(inaudible). T18-1 EIS-16

Section 3.6.1 I think characterizes the valley. It suggests that there's nothing more over here than some cabin and thousands of empty acres. That's not true. This is more characterized by what I would call rural residential and recreational …(inaudible)… than desolate areas where you might appropriately put a wind farm where people are not impacted.

I think Section 3.12 dealing with noise makes good reading if you're an engineer, but to any, any layperson it's almost incomprehensible, there's no point of comparison in terms of what the volume of decibels means in terms of if you were standing next to a freeway or some kind of an industrial use. That should be improved.

There's no adequate discussion, I think, of the economic impact, to adverse economic impacts to the county. As I say, I think a lot of people are buying property here for recreational purposes to develop. That increases the value, that increases the tax base, money is spent by people like me who come over on the weekends, buy groceries, buy ATV's, buy snowmobiles, buy parts and services for those things, that all contributes to the economy you have. T18-1 EIS-16 Cont.

Finally, I don't think it adequately addresses the cost, the cost benefit analysis. What you stand to lose in terms of impact on this area versus what it appears to me that you've got a trivial amount of electricity. One of the speakers here commented that we don't want the valley to go dark. That's true, but I submit that the miniscule amount of electricity that will be generated by these impacts just cannot justify the adverse impact that you're gonna create if this project goes forward. The impact statement should be revised [Applause] as appropriate for these issues. Thank you.

Clay White: Thank you very much. Kirk Diehl

T19

Kirk Diehl: Good evening. My name is Kirk Diehl, 507 South Third, Yakima. I'm a laborer. We build things. But our concern initially with this project was what was the development like? Not all our questions were answered by the draft environmental impact statement so we decided to do some research of our own. It turned out pretty good. After checking out the last project in Iowa built by enXco, it turns out that the contractor paid for family supporting wages, health care, training and pension. That's pretty unusual when you take the average job throughout the country. On that basis, we feel the developer is a responsible developer and will add value to the community in the long run. It's been our experience that when owners will go the extra mile to deal fairly with its workers they will also deal fairly with the rest of the community. We've seen that happen many times. We don't support all power projects 'cause not all projects deal fairly with the community or the environment. We've done our research here and can recommend based on that research that enXco has a track record for dealing fairly with the socioeconomic impacts of the project. That statement, in particular, addressed our concerns from the scoping meeting. T19-1 VB-2

I'd like to go on and address some of the things that I've heard from the other community members here. I've read the draft environmental impact statement with respect to the visual impacts because I know that concerns so many people. I'd like to T19-2 NS-1 comment on the fairness of the five studies. I'm not an expert. I trust that the Planning Department will take a look. Numerous studies have been done and four of the five have indicated the values did not decrease, possibly even increased in value after construction of the wind project. Now I'm sure that's site-specific, but this is a specific site, it has certain characteristics that recommend it. Just putting that into a local perspective. T19-2 NS-1 Cont.

I've observed that there's already development of electrification infrastructure within the project. That is the power lines that parallel the north side of the valley. In addition there's already some natural mitigating view shed screens that exist. Someone mentioned the fact that they're situated just at the base of the, the foothills. It gives it a better aspect visually. I think that …(inaudible)… gray area. An additional item is the ridge that runs west of the project. It serves as another screen from view from the west so that mitigates quite a bit right there. I think that of the projects you've got to deal with here, I think this is one that needs some serious consideration cause I think it will benefit. Thank you sir. T19-3 ALG-1

<u>Clay White:</u> Thank you. David Lee.

T20

<u>David Lee:</u> Good evening, I'm David Lee. I live at 5821 Robbins Road and I'm here with my wife who recently purchased before we were married a piece of property. A place called Sun East. I currently am the president of Sun East Property Owners Association. I'm asked to represent about 170 property owners. I know there's one that doesn't want the wind towers, or who wants it. The other 169, I haven't talked to every one, but I would say at least a hundred of them are in a position opposing the wind farm. You know how hard it is to get at 99 percent of anything when it comes to a public vote. And I speak for the vast, vast, vast majority of people up there and that's probably 168 property owners would say they don't want this thing. T20-1 SO-5

And I can tell you a little story that goes with it. My wife, before we were married bought a 21-acre piece from a realtor in Spokane. And she is prepared to invest $300,000 to a pretty nice cabin or it would actually become a home. Now in my simple studies, I believe that that money before it leaves this county will turn over at least 10 times. Now that represents $3 million and we're one family, one… entity. How many hundreds of times will it be paid for in the next few years? T20-2 FIS-3

A little bit more about Sun East. There property levels run from about 2,000-foot elevation up to about 5,000 feet. We get to look down on just about every one of the beautiful projects, these so-called beautiful projects. And I do not like the fact that across the country where they have built these there are two things gone bad. They stand there and they're ugly. I'd certainly hope that this county has the foresight not to go ahead with this project. If it were that case, I would ask you to look at something similar to Alaska when they ran the pipelines. A lot of those people are on what's called the subsidies every year. Because the oil that flows through those lines, they get compensated for. If that's the case I think every man, woman and child in this county is going to be affected by these towers. Good or bad, and divide up the money or the revenues that's supposed to be generated by them, to those people because we're all gonna be in the same position, not just one. We're all gonna have to deal with them, we're all gonna have to deal and I can say for my wife and myself, if that project, if those towers come, that $300,000 isn't coming either. That will represent millions to this county. And a tax base that would go with it for this county for the next hundred years, as long as we own it, would not. Then we talk about a county being 20 acres or a parcel being 20 acres, I have some property in Tacoma, now they're talking density per acre, used to be 5-acre sites. So now they want more and more density, they want more and more people in the county. And I'm sure Ellensburg with its location is going to profit and benefit with those returns from those people many, many times more than a few wind mills [Applause]. Thank you for your time. T20-2 FIS-3 Cont.

Clay White: Thank you very much. [Applause] Did Leslie White still want to speak tonight?

T21

Leslie White: My name's Leslie White. I live at 15021 28th Avenue SW in Burien, Washington, a suburb of Seattle. My wife and I own two properties up in the Sun East area, one of which has a cabin on it. We come over here as often as possible and absolutely love the area. I am speaking against the wind farms. I am very supporting of renewable resources and I don't oppose that. However, in this instance, I don't feel the overall impact of the wind power is really going to be effective or economical. I've seen wind farms in other areas of the country from my travels and I've never seen one in an area that has the concentration of residences that I see in what's proposed in this area. They're usually much more isolated area. I feel that there is a need for wind power, I feel these should be developed in more isolated areas where it doesn't have the impact on personal residence and the quality of people's life in those areas. Thank you. T21 SO-5

Clay White: Thank you very much. Linda Schantz

T22

Linda Schantz: Hi, my name is Linda Schantz, S-c-h-a-n-t-z. And I live at 4191 Robbins Road, Ellensburg. I'm here representing my husband Charles and my son Michael tonight. And I will turn in my specifics to you later in the week, probably on the very last day. It took me 3 days to go through Zilkha's and I'm sure it will take me more days to through this one. But I did have some comments tonight.

One, the first one I want to talk about with air traffic, and as stated in the DEIS, 27 turbines will be over the FAA height restriction for the VFR flight pattern. We also have 185 students at Bowers Field that add 44,000 operations to the airport annually, in addition to 39,000 operations or 85 flights daily. The mitigation suggested was to change the takeoff flight patterns for the VFR to a south turn rather than a north turn. I believe that this will increase noise and traffic over the city of Ellensburg and over the university campus. I also think we should look at the impact and I don't think that the DEIS really addresses the, the impact of sending all of our flights southbound on takeoff. I would think that there would be an increased chance of accidents to the traffic all in one direction. I think it's a better mitigation proposal to consider eliminating the 27 turbines or lowering the tower height in the project for approval. T22-1 AT-2

The lighting pattern required by the FAA …(inaudible)… to the residents that live within the project and to those who live to the east, north, south and west of the area. I think that the residents that are going to be in the middle of this project, I find it unacceptable that it would be anywhere near the airport. T22-2 ALG-1

Secondly, noise. On the graphs, as someone else said it's difficult unless you're an engineer to go through, but I did that to the best of my ability. The decibel bit map 003410 shows the result of the decibel ranges and actually approach our range, our sound range, our noise range approximate to the wind tower and residential locations. My home's in the 45, average 45-decibel range. Based on the Lincoln Township moratorium committee survey, the …(inaudible)… turbines will be placed that put the residences in the 50-decibel zone. They asked for 40, settled for 50. And now that they have bought and bulldozed several residences, they would not have placed any turbines closer to an average 35-decibel rating. There are significant sleep problems and health issues that occur with over 60 percent of the residents that reside near that 22-turbine wind farm. There are also errors in the sound measurement predictions or models. T22-3 NOI-1 A second opinion, I believe, should be added to the EIS to improve the current model and move forward. Other mitigation measures, we need to move turbines far enough from homes that an average 35-decibel rating can occur. But, in essence, moving to a 35-decibel rating, that may allow residents to reasonably live with the turbines, there won't be many turbines to construct. This should tell us that this is not the site to place turbines in the area where people live. T22-4 NOI-2

On 3.7 Land and Shoreline, 3.7.1.2 Environmental Impacts of the Proposed Action, on the Direct Impacts, I quote "The proposed wind turbines would be significantly larger than surrounding structures. While this difference in scale would generate additional impacts, it would not inherently conflict with rural land use patterns. Many T22-5 LU-1 agricultural activities include associated large structures and mechanical/industrial equipment; such appurtenances may be considered to be a characteristic or element of rural character." Are they suggesting that 190-foot tower structures, that spin between 10 and 23 times each minute, have flashing red lights at night and white during the day, will be considered part of a rural element or character. The towers are industrial in nature; make no mistake about that impact. The DEIS should treat them as wind factories. T22-5 LU-1 Cont.

May I also suggest that we should really look at the impact of wind turbines in the larger context that they could have …(inaudible)… uses. If there were only participating farmers in the area, I might agree with that. But there's only eight participating farmers in the area and the rest of us are captives. Wind turbines would be located at least a thousand feet from the existing residences and 200, 250 feet from non-public right-of-way and adjoining non-project property lines. Basically it's gonna affect all of the adjoining properties from using their property to its fullest extent. And from a safety reason we'll want to have a thousand foot setback that will cause 700 feet of our land not to be used to its full extent. T22-6 LU-5

The indirect impacts, the DEIS discusses the impact compatibility and incompatibility for residences and suggests by placing turbines here it will encourage agricultural uses and stop the growth of residential use. I agree completely. Who in their right mind would buy land and build their home, their dreams, …(inaudible). I sure in the hell wouldn't if I would have known they were gonna be around me. They go on to suggest some nearby rural residence uses that …(inaudible)… incompatible could seek to relocate. How dare they. This would be an adverse impact to these property owners. Over 90 percent of the residents in this area are small ranchers with horses, small wheat fields and some cattle. In the DEIS it suggests the possibility of over 90 percent of the residents in the area should relocate is a bust. In essence, they're telling us turbines are not compatible with residential ranch use. And based on this, this application should be pulled and the wind farm resisted. T22-7 LU-2

Property values, I'm skipping over in my notes to property values. In the Lincoln Township, after two years, homes one-half mile away from a turbine lost value of 26 percent. Homes with, within 1 mile of wind factories lost 18 percent. I did not find this addressed in the DEIS as I mentioned, but there needs to be mitigation for homeowners. And my suggestion is that each parcel be valued based on the real estate assessment and a market value analysis to find an appropriate selling price. For those residents where impact is incompatible with their residential lifestyle, enXco will buy up the property. For those who choose to stay and lose value over time they should also be T22-8 NS-1 compensated and enXco would have to post a bond to ensure money was available to the wind factory victims. It seems fair, since enXco is convinced that the wind factories will have no effect on property values that they should [Applause] and this does need to be addressed in the DEIS. Thank you. T22-8 NS-1 Cont.

Clay White: Thank you. Desmond Knudson.

T23

Desmond Knudson: Desmond Knudson, 1661 Vantage Highway, Ellensburg, Washington. I support the draft ESI and will comment on some items of it, but (inaudible). Let's start with 1.10, we have people who want to lease and we have the resource to make this leasable. My number one thing, if it's leased it's going to give economical benefit to this county. It's gonna give instant money, not over 15, 20, 30, 40 years. A lot of these people who are against these things have not ever lived here or lived here a short time. I've lived here over 40 years and the wind blows all the time, it's a resource we have. We want to harvest it. T23-1 VB-3

Safety and health issues. In layman's terms, yeah, I guess if you stand under them and a piece of ice falls on you you're gonna get hurt. We need to make sure the distances are far enough for a reasonable engineer to predict. This is not a flying airplane that will throw ice; these things are sitting still and it's a given how far it will go. They are also safe and not harmful to health because they're on private property, they're not on public property. They're not something you go tour, they're not something you go driving around on. If the private property owner does not want you on their property, please don't go. It's that simple. T23-2 HS-3

They are a positive tax base. In other words, they put money into our tax base and they do not detract from it. In other words, I do not have to hire more deputies, I do not have to hire more police, I do not have to hire more ambulances, I don't have to hire more doctors. You know why? Because these things don't take those things. T23-3 FIS-1

I would like to see the mitigation on the fire side. Let's put 5,000 homes up there, which would be approximately the same amount to drive that economical device, and let's see how many fires you get then. People, kids, animals, bonfires, garbage pails, miscellaneous other cigarette butts. You get the point. T23-4 PSU-2

I see a lot of 'what if' on property values. Well I believe there's a couple of individuals that are very hopeful to all these things and they're not here anymore. You know why, because they sold their property. Anywhere from 3 to 10 times what they paid for it. Public record. Go look at the assessor's office. T23-5 NS-1

Our biggest driving machine in this county happens to be Central Washington University. They are what pay people to live here and those people, most of them live in the city or out in the county …(inaudible). It is not an issue whether they are paying the T23-6 VB-6 rent or not, they are paying, the government pays our way around here. So we need something that is privately owned, not paid for by the government and whether they're getting tax benefits or not, I believe the coal, nuclear and those type of industries have billions of dollars in tax breaks …(inaudible)… our faithful President. So most importantly, the tax issue is, it's positive for this county. Most importantly, these things were based on Forest and Range land and that is where they want to be located. Now, because people have decided to live in their second homes around there and want to deny people who've lived there their whole life the opportunity to make money off their land, I think they need to reexamine their values. [Applause] T23-6 VB-6 Cont.

Clay White: Thank you. We've made it through the sign-up list. Is there anyone else that wishes to speak? I'll certainly have time, you know, just so you understand we want, if people that are gonna come up and speak we want them directly related to the environmental impact statement as closely as possible, for specific information, so that when we do a response document we can, you know, view as much complete information as possible so that we address your specific comments. I'm just gonna go ahead and start on this side of the room and kind of work my way over and if anybody changes their mind we'll give everyone an opportunity to speak tonight. Is there anybody?

T24

Woody Woodcock: My name's Woody Woodcock, 6202 Smithson Road. And I just sort of threw some stuff together here so pardon my rambling on it, but I'd like to start with page 1-4 of the Chapter 1.4 Kittitas County Objectives. "The County's criteria with respect to making a decision on these proposed actions are as follows," blahdy, blahdy, blah, "the project is not detrimental to or injurious to the health, the peace, safety or character of the surrounding neighborhood." Why are we even here? A few people speak up for it, usually attached to the money, and a lot of people whose home or sanctuary happens to be there speak against it. If that's one of your prime objectives, this should be done already, this whole process. T24-1 EIS-4

As far as their footprint, they quote 5,237 acres. But if you look at this it skips around, it's not one footprint. I happen to own the 80 acres in between one of the skips. Come up to my western edge, skip over, take off from the eastern edge. This is multiple footprint and there's a lot more people affected. I think if you go through the addresses there, you'll see that. This thing is sited right below the two largest foothill communities in this valley. It makes no sense. T24-2 PD-9

I agree with Miss Morrison and everybody else that spoke up in terms of us getting more tax money out of it, but a lot of the numbers that are said are the first year of operation. And I was under the impression that this is a 30-year project, which T24-3 FIS-2 depreciates down to 20 percent of its value. I'm not an accountant, I haven't checked into all that. But that would be a lot less as far as the cost analysis goes than those big numbers right now. T24-3 FIS-2

I appreciate Mr. De Palma speaking out with some empathy for the other side of the valley. Right now this is localized but as this unfolds, especially if it gets to the point where power is erected, people are gonna come unglued. Those of us that have lived here long enough remember the Nicholson Boulevard thing where they threw up these power poles and all of a sudden everybody just went ballistic, to the point of getting them rerouted.

Mr. Bates, I think, talked about setbacks and if this were to come to pass, I think the absolute minimum setback should be 2,000 feet of property lines, not the existing residences. And if you go to existing residences, that minimizes or detracts from somebody's property value. Building up close to what the county setback is …(inaudible)… whatever …(inaudible). T24-4 LU-5

The property values, I've got to side with Roger Weaver on that. I mean, I tried selling a piece of ground a few, about a year and a half ago and probably one in three people have called, "Can you see those damn wind farms from there?" "Yeah, but this was the Sagebrush piece. Yeah, they're about 5 miles away," click. To me that's 33 percent of the calls. T24-5 NS-1

Miss Morrison, Bertha Morrison, agreed that it's a pretty impressive impact statement. I see on page v or 5 in the beginning of this stuff, the county says that it's, it calls it the impact statement. I don't know if this automatically becomes the environmental impact statement or if it stays a draft and there's a whole 'nother part of the process that has to receive public comment before it becomes actually final.

<u>Clay White:</u> That's what we're doing tonight.

<u>Woody Woodcock:</u> Okay, so this, what you're taking in tonight will then become grounds for the final impact statement?

<u>Clay White:</u> Correct.

<u>Woody Woodcock:</u> And there's no substantive review needed from that?

<u>Clay White:</u> Well, sir, the County …(inaudible).

<u>Woody Woodcock:</u> But not the public impact?

<u>Clay White:</u> …(inaudible).

<u>Woody Woodcock:</u> This is it, it's not what you finally come up with?

<u>Clay White:</u> There's a whole series of public hearings that will be coming in the next few months. This is the meeting on the Draft Environmental Impact Statement.

Woody Woodcock: Okay. Mr. Lind's comment on the dust I thought was just wonderful, because in here Table 1-1 on page 1-10 says that turbine operation would not increase the normal dispersion of dust and pollen and would not result in dust-related impacts for residences near the project area. T24-6 AQ-1

I see my 1-minute sign is up. I think, at this point, I'm for wind power - it might not sound like it - but this is the wrong place. The county has some wonderful ground where the wind does blow, I agree with Mr. Knudson, not all the time, but often. And this should be sited somewhere or something should be sited so the county could get a good look at it and come up with their own studies. Does the dust blow, what about shadow flicker, what about whirling blades, flashing lights, 400-foot turbines? You could park …(inaudible)… underneath one and it wouldn't even come close to the top of the flag. These things are huge, two-thirds as tall as the Space Needle, almost. And we're gonna have over a hundred of them. Cumulative impact, you're talking just this one may be safe for us, there's a clause in their application that says we'll extend it if we can get landowners to sign on. How come they don't talk about that …(inaudible)… coming closer to town? [Applause] T24-7 SO-6

Clay White: Thank you very much for your comments.

T25

Helen Wise: I'm Helen Wise. I live at 1106 East 3rd Avenue, Ellensburg. I've lived in Ellensburg more than 50 years. I feel it's a wonderful place to be. It's a different place then when I came here 50 years ago and there are lots of things here that have disturbed the pristine …(inaudible). I suspect I was one of those who added we were in Mountain View and that …(inaudible). But back to the DEIS. I plan to refer particularly to …(inaudible)… actually I very much agree with who said this is an incredibly detailed study, a thorough, thorough study and what so impressed me was …(inaudible)… the shadow flicker that we are so concerned about. Of course I, I buy flicker, those little things that hang down outside your window and the sun hits them and they flicker, but that's beside the point. The shadow flicker section in the appendix has 38 pages of very detailed analysis and three pages of summary. What it comes down to is shadow flicker duration is for 9 of the receptors, or people who would see the shadow flicker, for 9 of them it would be 5 hours a year, for 14 it would be 5 to 10. For 13 area places, as I understand it, as I understand it, for 13 of them, 10 to 20 hours a year, for 3 of them, 20 to 30 hours a year. And none of them would affect anything over 30 hours a year. Am I reading this totally wrong? That's what it says, shadow flicker duration …(inaudible). That's what it says, the shadow flicker duration, in hours per year and the number of people or households that would be affected. So I think that's pretty thorough when you go to 38 pages of very detailed observations. T25-1 HS-7

Anyway, it said there is a very small percentage of our electricity that is generated by wind. This is not at all surprising. It's a new form of generation of wind and some places are …(inaudible)… for visual impacts, that's the only, the only real objection to these wind farms. And it will take awhile for us to get a bigger percentage of our electricity produced by wind power. And it will have to come because we can't dam any more places, we are going to be running out of oil and natural gas in a very few decades, we should not be dependent on foreign oil and it's going come to foreign oil …(inaudible). So we're going to have wind power and solar power for …(inaudible)… next. We've got to have those things if we are to survive …(inaudible)… for my self, for my children, for my grandchildren and great grandchildren and for everybody in the community and in our nation in our world. We need to go to a new kind of power generation. [Applause] Thank you. T25-2 SO-3

Clay White: Do we have someone who hasn't spoken before?

T26

Felicia Persson: My name is Felicia Persson, I live at 3561 Robbins Road in Ellensburg and I'm just gonna expand upon a couple of topics that have been hit on. This environmental impact statement is much more comprehensive than is the one provided by Zilkha. I've got a couple of technical corrections I believe. On Table 1-1, the summary in Chapter 1, overall, doesn't adequately describe the adverse impacts that are addressed. The impacts discussed in detail seem to transfer over to that table as insignificant with adequate mitigation. While they're much, the mitigation measures are either lacking or completely inadequate in Chapter 3. Specifically the table reports on page 1-20 I believe that several simple practical options exist for controlling or preventing shadow flicker at the source. This is in direct contradiction and I believe in error to what's been done in this Chapter 3. According to mitigation measures described in Chapter 3 at 3.8.5.3, two potential mitigation measures discussed are mitigation at the source. And the conclusions there are one is not feasible and the other's viability with respect to project cost has not been evaluated. In other words that one might cost too much. The DEIS states that several practical options exist to reset the locations. All of these involve controlling or preventing the flicker from entering residences through windows. It is not practical to assume that residents will or should be inside their homes when light and wind conditions promote shadow flicker. These options are not feasible or practical and they place the responsibility for mitigation of impacts upon the recipients. T26-1 HS-8

Table 1-1 is also contradictory in its comparisons to summary of vegetation, it is apparent that the Wild Horse alternative described there and the Desert Claim are not similar, various percentages of vegetation occurring in each of those areas. And in fact Wild Horse has no wetlands at all and a completely different diversification of vegetation. T26-2 PA-22

But then following that in the bird section and on that same summary table it states that the bird impacts at Wild Horse, at Wild Horse alternative, will be the same due to similar vegetation. T26-2 PA-22 Cont.

Also, in general, the alternatives described in this EIS are not realistically representative of the proposed project, and so are really not comparable. We talked about if you looked at the footprint of this project, it looks like a patchwork quilt, it's not like any of the alternatives or the, the Kittitas Valley power project. The project site is identified as 5,237 acres, however the entire collection facility envelops many more. And it actually consists of probably 4 or 5 micro sites that are not connected. That effectively surrounds many unwilling participant landowners. The EIS refers to non-participating landowners, I think that term should be replaced throughout the document with unwilling participants. Or as …(inaudible)… said, captives. Because there are effectively 4 or 5 micro projects the accumulative impacts and mitigation measures should be addressed for those captive properties. The disassociative properties of Desert Claim add a completely different dimension and make it non-comparable [Applause]. Thank you. T26-3 EIS-12

Clay White: Is there anyone who hasn't spoken?

T27

Keith Johnson: I'm Keith Johnson, 3050 Airport Road in Cle Elum. And I'm speaking on behalf of the Kittitas Audubon Society Chapter of Kittitas County. And our mission in the Kittitas Audubon Society is to develop an appreciation for nature through education and conservation of local birds. And on that subject of conservation, we talked about a lot of people have talked tonight about the EIS and power supplies that come from …(inaudible)… whatever. Both in this DEIS and the one for the Kittitas Valley, there wasn't any mention in their statements about a conservation policy, like a national conservation policy or maybe an upgrading of the grid system that would more than offset the need for the power that's going to be generated by this facility, so I think conservation is a big issue on that alternative. T27-1 ALT-5

The section 3.4.3.3 Impacts of Alternatives, I have the same disagreement with (inaudible) on that section. The no action alternative, they summarize that gas-fired power plants will have to be built if this plant or this wind farm isn't built. And again, there's no statement in there about conservation (inaudible) any other policy to offset power from the wind farm. T27-2 ALT-1

On the studies we agreed with other comments tonight, Kittitas Audubon Society believes all of these need 2-year, all-weather studies. None of these studies have indicated any nighttime observation of migrating birds, bats, and I believe there are T27-3 PA-1

…(inaudible)… know it all, going through in the nighttime. And I believe there are technologies, bird whatever technologies to do those studies. T27-3 PA-1 Cont.

The bald eagle kill is classified in this EIS as minimal and maybe one every 6 years, at least one every 2 years at the most. And our Christmas bird count, this is the 26th year we've done it and …(inaudible)… this year we went out on the 20th of December and have spotted 11 bald eagles on that day …(inaudible). Six of those 11 are on the north side of the valley and on the wind power area and west of them. The majority of the bald eagles that we spotted were in that area in most cases. Everybody knows the 20th of December and I wonder …(inaudible)… if they were really this in 2 years or more of a 3-minute timeframe on the point survey. Maybe they would see more bald eagles in that area again if they participated (inaudible). T27-4 PA-13

[END OF SIDE 2, TAPE 1]

Well, we've noticed, we've noted bald eagles from November on into the April timeframe, so I think they're here a lot earlier than in mid February. Um, decommissioning and I'm, I would like to state that we've spent a lot of time - this is a voluntary organization - so we've been spending a lot of time trying to get our comments in on Kittitas Valley and we're just getting going on this one. So, and we hope to get our good and final comments in by the end of this period (inaudible).

And, with decommissioning, I don't see anything of the brief time I've looked at this DEIS, there's nothing to remove or change or stop, particularly turbines or a string of turbines if they are killing birds, bats, eagles or whatever. And I think you know we'd recommend this be included somehow in the decommissioning plan. Some of the things that we did comment to the Kittitas Valley, which I think are specific to here. The specific action should be identified to minimize harm to eagles. And a turbine decommissioning plan should be specified …(inaudible)… bald eagle, which are a threatened species. And let's see, the lack of nighttime assessment and, and I think that's a pretty important one that we specified and we'll do to this EIS also. T27-5 PA-17

KAS urges that all possible and reasonable steps including the no action alternative be taken based on scientifically valid wildlife studies to ensure that the site is safe for the wildlife. And if there is a technical advisory committee set up, if this does become reality, that we be included as a member of the committee. T27-6 PA-4

Clay White: Thank you. Thank you very much. Is there anybody that has not spoken that would like to speak? We're gonna start taking these in the back.

Ron Nelson: Good evening, I'm Ron Nelson, 1140 Thorp Highway North. And I've lived there about 4 years. One of the reasons I moved to this area is because I've **T28** lived in Seattle all my life except for when I was in college and 2 years when I was out of the country. And we, we had a nice, kind of an old stadium down there in the Rainier area called Sicks Stadium, and that's where we had to go for baseball and what not. And we were really encouraged when the Kingdome plan was made and, and, and I really enjoyed having an indoor stadium and one of the reasons I left the area is because of, the people that came in and, and forced the, the demolition of that stadium and the construction of the two that we have now. I mean we voted it down and the State and Paul Allen, with their money and their power, forced our hand. And I came in, in here kind of neutral on the issue with wind power. But I sense this same power struggle taking place here and I'm, I'm beginning to, to oppose now to the Desert Claim project for this reason. And I, I appreciate Helen Wise and others like her that point out that we need to have solar energy and energy alternatives. But I think it could be done in a cooperative and collaborative manner. And when Chris Taylor said just two days ago that we can't wait forever, my reaction was, well then take off. [Applause] T28-1 SO-5

I called Clay White a few days ago, or a few weeks ago and asked him if there was any provision for the decommissioning of these things in the event that they were abandoned, and he assured me that there was going to be money set aside by Zilkha or whoever, that it would be required of them to have money in the, in the agreement for the decommissioning of its towers. And I don't see that that's the case, but this is what I mean by forcing our hand, you know we're being promised anything. And I, I just don't feel that's right, I think that, that there ought to be a way to cooperate and collaborate with all the powers that, that we don't have to, to, to play a power struggle, and I'm not talking about electricity here. I do not understand the Daily Record, they run articles that are against the wind power yet they continue to be supportive of the wind power. They want to compare these towers to the tension lines that we have running across the state and I don't see the comparison. Like he pointed out we have 121 towers that, they're two-thirds the size of the Space Needle, I mean and they want to compare that to the high tension lines that are running across our, our, our land. I think it's possible that Zilkha and the others will be out of it as soon as those things are constructed, they're, they're out of here. And we'll, we'll end up buying these things. He wants to sell those to Puget Sound Energy and as soon as Puget Sound Energy purchases them, we'll be purchasing them with our bill, our electric rates. That's all I have. T28-2 PD-3

Clay White: Thank you. [Applause]

Chris Cole: My name is Chris Cole and I'm representing myself and my companion, Roger Binette. And my name is spelled C-o-l-e. (Inaudible)… at this time when emotions run high on both sides of the wind turbine issue. With the negative side **T29** outweighing any positive good for the sites it should be imperative that other sites and surveys be used as references and resources. Those sites that are already in place at locations around the globe must be heeded as a warning for what is intended here, not including them in any DEIS creates a bias and inadequate survey. The survey such as what was done in Wisconsin resulted in a moratorium on any further construction that should be taken seriously. Studies and surveys in the U.S. as well as in Ireland and England that show wind turbines are being injurious to the population of livestock and wildlife, must be heeded as a warning for what is intended here. EIS sites through …(inaudible)… tunnel vision like your culprit in some cases, but not to use all available resources for the sites intended here is unconscionable.

The fuzzy logic that because we already have population growth …(inaudible)… cell towers and more lights that we should become accustomed to additional structures and let's make them big and amusing but also extremely scary. The additional fuzzy logic is that property values will not sustain any blows because current sales have been profitable is just plain outlandish. Who knows if …(inaudible)… even aware of what is proposed. Bamboozle, snake oil and hypnosis open the mind and we succumb to the power of what to …(inaudible)… susceptible when the promise of economic growth reaches its tentacles and says that embracing …(inaudible)… entangling snare. Dr. Holly Pinkart's testimony on microbiology and the potential drift and the turbines don't seem to be taken seriously because it isn't what is wanted to be heard. However, she does not have a national reputation and large grant monies for the studies she headed on a whim. Obviously, someone cares about our health and safety from threats that appear small and insignificant because the creatures are small but certainly not insignificant. The populace on this side of the Cascades may be small in number compared to Western Washington, but we are not insignificant. Our lifestyle …(inaudible)… and our choice to live in this county is not because we are hicks and insignificant, but because we know how wondrous it is and how fortunate we are. We don't think that an attack on how we and our children live is insignificant to a blatant opinion that doesn't count for much. The group called ROKT (R-O-K-T) and others continue to rebut the flowery claims of greatness for the turbines with documentation that …(inaudible)…but is dismissive of the …(inaudible)…which is ludicrous. Listen to the …(inaudible)… experience where turbines are already in place; these folks have first-hand knowledge of the damage that is occurring. The accounts of the people working in industry of electrical engineering and power companies in order …(inaudible)…were that turbines are a sorry source of economic benefit and don't buy into it, and won't buy into it because they don't buy it and are being ignored. Why? It all comes down to money and

T29-1
EIS-1

federal taxpayer subsidies. How shameful. Should our governing bodies force these issues on us and then leave when their terms are up and move on to other jobs so their legacy of what they have done is in our memories, on our lands and within our sight?

We have a natural corridor for wind, but by the same token a wind tunnel for wildfires. Our fire marshal …(inaudible)… and not take it as insignificant. That is where it comes down to our families or homes and the land and the money and justifiably so. T29-2 HS-1

The eagles and hawks and other birds that fly past our …(inaudible)… that will be level in elevation to the tops of the proposed towers that are not insignificant. Ridgelines, which are perceived as barren by some or …(inaudible)… by others, should not be dismissed as inevitable. There are flight paths for great birds and burrows for their prey. The relationship between the two must be acknowledged, it is their inherent lifestyle and we must allow them to have the same consideration and value that we want for our own lifestyles and ourselves. T29-3 PA-13 Put the turbines along the coastline where the breezes are constant and …(inaudible)… high-rise corporations and the public that they don't feel is significant. The green energy proposed comes with the noise of a rock crushing plant as described by residents in Wisconsin. What once started out as a possible and noble experiment to harness the wind to…(inaudible)… monster is now loose.

On a lighter note and maybe appropriately, and one we haven't even talked about as a very serious one, is a study by Washington State University and the Department of Ecology that features enough livestock waste along with …(inaudible)… byproduct in Eastern Washington to power between 4 in 10 homes in the State. When the actual clean energy is processed the result is a new and recyclable product just from the scooping and cutting. It would require processing and of course several EIS studies and public opinion, the figures …(inaudible)… benefit from ranchers and dairy owners that …(inaudible)… can handle and the reduction of complaints from neighbors nearby. Roads, electrical, and water power already exist and are available for use for plants and buildings. Transport vehicles already exist. What a waste of waste that can be pulverized, palletized and otherwise processed for use. We don't want our farmers and ranchers to suffer the inabilities nor the dairies to be short milk and cheese. Why not reward their exhaustive days with the sweet smell of money well spent on a real renewable and sustainable fuel. Often in …(inaudible)… that four legged rule …(inaudible). T29-4 ALT-5

<u>Clay White:</u> Thank you very much. [Applause]

<u>Chris Cole:</u> Included in that was a 76 page study by the Department of Ecology and WSU.

Clay White: Is there anybody else… who would like to speak?

Dan Quinn: My name is Dan Quinn, 501 Kimberly Lane, here in Ellensburg. I live about 2 miles from these towers and for the record I will see these towers. The EIS in the …(inaudible)… non-significance. When these towers go up they're not gonna cause more fire hazard. The turbines are gonna be turning because of the wind, the wind is going to be blowing the fire. If anything the roads that will be put in zigzagging the property will work as a fire break and at least slow it down, also provide more access for the fire crews. So I can understand the non-significance of that. **T30** T30-1 HS-1

The non-significance of the property values, somebody quoted $10,000 per acre; I live 2 miles from there and 4 years ago I paid $4,000 dollars per acre. And the recession that Enron and other things helped deflect, that affected my property values. There's nothing we can do about that. Property values are an investment. Some are good, some are bad. In 4 years since we lived at our property, the property right down the road, my in-laws have bought for $16,000 less than what it was on the market for when I looked at it. And one reason: the economy. The wind power is not going to change that. T30-2 NS-1

Somebody made the comment about the miniscule amount of electricity. I don't think Zilkha or enXco is gonna invest over $100 million per site for a miniscule amount of electricity. The wind that blows creates the electricity, creates revenue, they're gonna make a profit, it's gonna go into our tax base. It's gonna be a quality effect for our economy around here. The people that are gonna work there and build it, that's, that's money in our pockets, we could earn a living and live close to home. T30-2 VB-3

The EPA, Department of Fisheries, Department of Ecology, they're gonna monitor what these people are doing, they're gonna protect people's wealth, they're gonna monitor the dust and what's going on with the strings, there's agencies in charge of that. Our other choice is gas turbines and nuclear plants. I've worked in oil refineries and co-generation plants, the maintenance and the waste products that come out of those are far more detrimental than us losing our view up there on that valley. These things aren't going to affect my view, but a nuclear plant and a coal-fired plant and a natural gas plant affects my children and my grand children that I'll have some day. Look at what Chernobyl did, look at what Three-Mile Island did, that stuff's in our water system and it's circulating around the world in our atmosphere. There is nothing that these wind turbines are gonna do that's gonna go around the world besides put electricity in the system and help society. I want it to be on record to say I will sacrifice part of my view, and it may cost me some property values, but they're not gonna kill anybody, they're not gonna poison my kids, and it will put a, a revenue into our county. T30-4 SO-3

The subsidy generated by the, somebody mentioned up in Alaska—revenue coming in from that, that's not a bad idea, but it can't be so detrimental that it makes it not worth them to do business here. Other than that I just, I want to be on record saying I don't want to be the person that had a, had an impact on a nuclear plant affecting somebody else's family and somebody else's county. Thank you. [Applause]

T30-4
SO-3
Cont.

Clay White: Is there anyone else who hasn't spoken who wishes to speak tonight? I thank everyone for coming out tonight. If you have a quick comment that's related to the DEIS and not related to other people's comments, you're welcome to come up and, and give a brief comment.

T12 Cont.

Jack Boyovich: My name is David Jack Boyovich, I reside at 18830 Reecer Creek Road. I spoke earlier and one of the things that I wanted to ask this gentlemen over here was resolved by another person that was up here, and it was the tax base. And if I'm reading that EIS correctly, that tax base that Desert Claim EIS put out states that it's paying for $1.1 million in taxes the first year. And that is on a decreasing annual basis. In other words, $1.1 million this year, $1 million next year, $900,000 a year after that, etc., etc. That leads me to believe that the tax base is not gonna be as viable as everybody seems to think in the Kittitas Valley.

T12-4
FIS-2

One of the other things that I wanted to say was I, I'd like to ask anybody in this room, anybody, do they know where this power is gonna go? Who's gonna buy it? Well I know for a fact the PUD's not gonna buy it, I've already talked to them. I don't know about Puget Sound Energy. So if this power goes into the system it's not going here. So if you people think you're gonna get lower, lower rates on, on your lights, forget it, it's not gonna be here. It's either gonna go west, south or east.

T12-5
PD-6

One of the other things that I wanted to say was, I'm not totally opposed to the wind farms, what I'm opposed to is where you guys are putting them. Desert Air needs to start looking at the Wild Horse, Whiskey Dick, Ryegrass area. That has the least amount of impact on the least amount of people. Where you're planning on putting these things, all you're doing is pitting family against family, farmer against farmer, and it's not doing anybody a bit of good. You guys just move those things, you'll probably get a favorable vote out of an awful lot of people that have stood up here and said that they're totally opposed to them. I'd almost bet money on it. [Applause]

T12-6
SO-4

Clay White: Thank you very much for your comments tonight. I appreciate all of you coming. Again, the comment period does not end until January 30th, so any comments that you have may be submitted to the Community Development Services Department. We're gonna recess this meeting till 9:30, we'll officially close the meeting then since we sent a legal notice that it'll be open till 9:30. Thank you very much.

[Recorder off]

Clay White: It is 9:29, seeing that no one else has questions we're gonna close this public meeting. This is Clay White for the record.

[END OF RECODING]

8. DISTRIBUTION LIST

FEDERAL AGENCIES

Bonneville Power Administration
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Federal Aviation Administration
Federal Communications Commission
National Oceanic and Atmospheric Administration, Fisheries
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service

INDIAN TRIBES

Yakama Nation
Colville Confederated Tribes

STATE AGENCIES

Department of Communities, Trade and Economic Development
Department of Ecology
Department of Fish and Wildlife
Department of Health
Department of Natural Resources
Department of Transportation
Energy Facility Site Evaluation Council
Office of Archaeology and Historic Preservation
Office of the Governor
State Parks and Recreation Commission
State Patrol

LOCAL GOVERNMENT AGENCIES

Kittitas County departments/staff:
- Fire Marshal
- Plans Examiner
- Environmental Health
- Communications (KITTCOM)
- Prosecuting Attorney
- Pubic Works
- Sheriff
- Commissioners

LOCAL GOVERNMENT AGENCIES (continued)
City of Cle Elum
Town of South Cle Elum
City of Ellensburg
City of Kittitas
City of Roslyn
Kittitas County Fire District No. 2
Kittitas County Hospital District No. 1
Kittitas County Public Utility District
Kittitas Reclamation District

LEGISLATORS

Senator Joyce Mulliken
Representative Janea Holmquist
Representative Bill Hinkle

LIBRARIES

Carpenter Memorial Library, Cle Elum
Central Washington University Library, Ellensburg
Ellensburg Public Library
Kittitas Public Library
Roslyn Library
Yakima Valley Regional Library, Yakima

NEWSPAPERS

Ellensburg Daily Record
Northern Kittitas County Tribune
Yakama Nation Review
Yakima Herald - Republic
Energy News Data

ORGANIZATIONS
Charter Communications
Dennis G. Kidder Trustees
Desert Claim Wind Power LLC
Development Services of America
Dinavi Corporation
Economic Development Group of Kittitas County
Ellensburg Telephone
Kittitas Audubon Society
Kittitas County Airport Advisory Committee
Lorne & Jeanne Dunning Family Partnership
Northwest SEED
Ozone Investments
Pacific Northwest Regional Council of Carpenters
Puget Sound Energy
Rainier Welding, Inc.
Renewable Northwest Project
Residents Opposed to Kittitas Turbines
Sierra Club Cascade Chapter
Velikanje, Moore & Shore, P.S.

INDIVIDUALS

Abson, Paul
Allen, Loran & Judy
Bates, Lee
Beiter, John
Bowyer, John
Boyovich, Jack David
Brown, Gary & Jan
Brown, Linda
Bruhn, Jonathan
Bugni, Charles
Burdyshaw, Emilia
Burke, Patrick
Burtchett, Lee
Burtchett, Mr. & Mrs Lee
Chance, Roy & Cheryl
Choudary, Alla D
Clark, C. & M. Clark
Cole, Chris
Comella, Jeff
Conklin, Kurt E.
Corey, Judy
Daily, John W. Jr.
Dawson, Shirley A.
de Palma, Art
Diehl, Kirk
Earley, Aniela M.
Erickson, William & Glenda
Farrar, Gail L.
Farrar, Walter L.
Farrell, Rocky
Femrite, Milton M.
Fernandez, Anthony
Finch, Ellen
Fischer, Randy
Foster, Barbara
Freeman, Connie
Gamon, Ralph E.
Garrett, Ed
Glover, Fritz
Gordon, Bill
Gossler, Michael
Grueter, Patricia M.
Grueter, William J.
Haberman, George J.
Hendrickson, Darrell & Kim
Henneke, Mike
Heslip, Edsel B
Hillemann, Werner & Pam
Houplin, Betty Lee
Houser, Neal D.
Howard, Jeffrey S.
Hunt, Carolyn A.
Hunt, Peggy
Hunter, Bill
Jackson, Robert L
Johnson, Eugene R
Johnson, Gene
Kamrowski, Arthur J.
Kinnear, Earl P
Kirchmeyer, Eloise
Knudson, Desmond
Kramer, Lois
Kroeger, William D.
Kuhn, Jill
Larsen, Eric
Larsen, Suzanne M.
Layman, Richard M.
Lee, David G.
Lee, Dwight & Diane Bates
Lee, Janet
Lind, Dana
Lenz, Brian
Lindstrom, Hal & Gloria
Littlefield, Edwin
Manz, Art
Manz, Art & Alice
Martens, Jerry
Marvin, Ross & Sharon
Marvin, Ross B
Mc Laughlin, Donald J.
McCullough, John
Meffert, Mitch & Jennifer
Miller, Jim
Miller, Richard D.
Monaghan, Rosemary P.
Montgomery, Donald G
Moraites, Teri L
Morrison, Bertha
Morrison, Chet
Morrison, Tom
Neiland, Joseph
Nelson, E James
Nelson, Janet
Nelson, Ron
Neumeister, Don W.
Oslund, Steve & Amy
Parsel, Marla
Persson, Felicia
Pinkart, Holly
Poplawski, Judy
Price, Paul R
Quinn, Dan
Reid, George A.
Reuble, Lawrence
Ridenour, Walter R.
Roan, James P
Robertson, Michael & Elizabeth
Ross, Bill & Lori
Sager, David
Salisbury, Jerry & Carol
Sandall, Maren
Sanders, Dan
Sands, Tina
Saunders, Mr. Geoff
Schantz, Linda & Charles
Schwab, Al & Diane
Sharp, Gloria & Boyd Rear
Shelley, Tracey
Sherwood, Jason & Tessa
Shugart, Karla J
Slothower, Jeff
Smets, John
Soutter, Leigh A.
Staloch, Clement A
Stanavich, Mike
Strole, Jeffery A
Thi Bui, Oanh Thuy
Van de Graff, Dick
Wade, Joanne M.
Waits, Linda
Walker, Sandy
Walsh, Dave
Weaver, Paul
Weaver, Roger
Weicht, eunice R.
Welcher, Fred
Whimpey, Lynn L.
Whitaker, Harry
Whitbeck, Phyllis
White, Jack R.

White, Leslie
Wichterman, James
Wilkinson, J. Marilyn
Winbauer, John & Alicia
Winbauer, John P.
Wise, Helen
Witbeck, Mrs. Phyllis
Woodcock, David L.
Woodcock, Woody
Woods Jr., William
Zuppe, Minnie A.

FACT SHEET

Project Title Desert Claim Wind Power Project

Proposed Action The proposed action consists of development of a 180-megawatt (MW) wind energy facility by Desert Claim Wind Power LLC on 5,237 acres of privately-owned land in unincorporated Kittitas County. Approval to implement the proposed development would require four related actions by Kittitas County: (1) adopting a site-specific amendment to the Comprehensive Plan land use map designation (a sub-area plan with an overlay) to designate the project area as a Wind Farm Resource overlay district; (2) rezoning the site, in conformance with the Kittitas County Zoning Code, as a Wind Farm Resource Overlay Zoning District; (3) issuing a Wind Farm Resource development permit for the proposed project; and (4) executing a development agreement setting forth standards and conditions for development, including mitigation measures.

Desert Claim Wind Power LLC, a Washington limited liability company wholly owned and managed by *en*X*co*, Inc., submitted an application dated January 28, 2003 to Kittitas County Community Development Services for permits necessary to construct and operate a wind energy facility. The proposed project would be located on leased lands within a project area of 5,237 acres approximately 8 miles north of the City of Ellensburg, the county seat for Kittitas County.

The applicant's objective is to develop a commercially viable wind energy facility with a nameplate capacity of at least 180 MW that would deliver renewable energy to the Pacific Northwest. The facilities, construction process and operation and maintenance for the proposed project are summarized below.

<u>Facilities</u>

Wind energy production includes five basic functions of electricity generation, energy transfer, power collection, substation and transmission. The specific facilities proposed to accomplish these functions for the Desert Claim project include:

- a maximum of 120 wind turbines, each with a capacity to generate 1.5 megawatts (MW) of electricity, for a total project generation nameplate capacity of 180 MW;
- each turbine would include a freestanding, tubular-steel tower approximately 213 feet high, supporting a nacelle housing the generator, gear box and three-bladed rotor;
- each rotor blade would be approximately 126.5 feet in length, for a maximum total rotor diameter of 253 feet;
- the maximum total height for the turbines would be 340 feet;
- towers would be anchored to steel and concrete foundations extending from 8 to 42 feet below the ground surface;
- the generator in each turbine nacelle would produce electricity at 575

volts;

- a transformer mounted on a concrete pad near the base of each turbine would raise the voltage from 575 volts to 34.5 kilovolts (kV);
- 34.5-kV underground (or above ground where necessary) power collection cables connecting all of the turbines;
- a fenced substation (or possibly two) occupying 1 to 2 acres, with transformers to step the voltage up from 34.5 kV to 115 or 230 kV for transmission;
- several hundred feet or up to several miles of 115- or 230-kV transmission line from the substation to the regional transmission system;
- five free-standing, lattice-steel meteorological towers up to 212 feet in height within the project area;
- a network of project roads, with a graveled travel surface of 15 to 20 feet in width, to provide vehicle access to the base of each tower; and
- an operations, storage, and repair facility occupying about 1 acre located near the project substation or in an area zoned for industrial use within or near Ellensburg.

Construction Process

Construction of the proposed project is estimated to require approximately 9 months. Approximately 120 to 150 workers would likely be employed at the project site at some time during the construction period. A Temporary Erosion and Sedimentation Control Plan would guide ground-disturbing activities and stormwater management during construction, and disturbed areas would be revegetated following construction. A Construction Traffic Management Plan would address transportation and access concerns during the construction period.

Operation and Maintenance

Desert Claim LLC would operate and maintain the wind energy facility throughout its useful life, which is assumed to be 30 years. Electricity generated by the project would be sold to power marketing entities, such as the Bonneville Power Administration; local and regional public utilities, such as the Kittitas County PUD and the Grant County PUD; and/or regional investor-owned utilities, such as Puget Sound Energy and Avista. Power from the project would ultimately be distributed by utilities to their customers. The project would employ approximately 10 full-time staff for operations and maintenance. Long-term operation and maintenance activities would include the following functions:

- round-the-clock monitoring of project output and performance;
- controlling turbine operations as necessary to meet scheduled power deliveries and implement scheduled outages for scheduled turbine maintenance;
- performing periodic, routine testing and maintenance of the turbines;

- on-site equipment repairs in response to malfunctions or regular maintenance;
- patrolling the project area to ensure security and monitor on-site conditions;
- periodic maintenance of project access roads; and
- implementing the project noxious weed control plan.

Alternatives

Three alternatives to the proposal are analyzed in the EIS. ***Alternative 1*** consists of a comparable wind power project development on an alternative site in eastern Kittitas County, termed the Wild Horse site. This alternative is included in the evaluation to provide a benchmark for comparison of the potential levels of environmental impact from wind farm development. The conceptual plan for this alternative is based on the wind energy facility proposed for the site by Zilkha Renewable Energy, which has requested the Washington Energy Facility Site Evaluation Council to evaluate the proposed Wild Horse Wind Power Project. The Wild Horse site is proposed for development by another applicant, and is not available to *enXco*.

Alternative 2 involves the hypothetical development of a comparable wind energy facility at another alternative site in Kittitas County – the Springwood Ranch site (located near Thorp, west of the proposed Desert Claim project). This alternative is also included in the evaluation to provide Kittitas County decision makers with a benchmark for comparing the potential impacts of wind farm development at a different site in the County, and at a different scale of development. The Springwood Ranch site is not available to *enXco* and could not be used to implement the proposed action. The planning process and criteria used to identify the sites for Alternatives 1 and 2 are described in the EIS. Alternative 1 and Alternative 2 do not meet the SEPA definition of a "reasonable alternative" for a variety of reasons discussed in the EIS.

No Action assumes that the proposal would not be implemented, but that the project area for the proposed action would be available for a variety of land uses permitted by the existing zoning. Future uses could include incremental development of relatively large lots for rural residential use.

Location of Proposal

The 5,237-acre project area for the proposed Desert Claim Wind Power Project spans portions of two townships in the north-central area of unincorporated Kittitas County (Township 19 North, Range 18 East and Township 19 North, Range 19 East). The eight non-contiguous properties that comprise the project area generally lie to the north of Smithson Road, to the west of Wilson Creek Road, and to the east of Howard Road. The southeastern parcels of the project area are located south of the Bonneville Power Administration high-voltage transmission line corridor, while the northwestern parcels extend to within one-half mile of the Wenatchee National Forest. The center of the project area lies approximately 8 miles north of the City of Ellensburg.

Proponent Desert Claim Wind Power LLC, 304 South Water Street, Suite 101, Ellensburg, WA 98926

Date of Implementation A decision by the Kittitas County Board of Commissioners on the Desert Claim application is expected in the last quarter of 2004. If approved, construction could start in early spring of 2005.

Lead Agency Kittitas County Community Development Services, Planning Division.

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Required Permits & Approvals

Kittitas County
Comprehensive Plan Amendment/Potential Sub-Area Plan Adoption
Wind Farm Resource Overlay Zoning District Approval
Wind Farm Resource Development Permit
Development Agreement
Critical Areas review
Right-of-Way Use Permits

State of Washington Agencies
Hydraulic Project Approval
Nation Pollutant Discharge Elimination System (NPDES) Permit (for construction stormwater management)
Office of Archaeology and Historic Preservation review (if cultural resources to be disturbed during construction)

Federal Agencies
Section 404/Wetlands Permit

EIS Authors & Principal Contributors

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Type/Timing of Subsequent Environmental Review

No subsequent environmental review would be required for the development addressed in the EIS and the January 2003 development activities application submitted by Desert Claim Wind Power LLC. If the applicant proposed to develop additional phases of project facilities or to replace the turbines in the future, those proposals would be reviewed for consistency with the analysis and conclusions in this EIS to determine if any supplemental environmental review is necessary, pursuant to the SEPA Rules.

Location of Background Information

Kittitas County Community Development Services
411 North Ruby Street, Suite 2
Ellensburg, WA 98926

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Kirkland, WA 98033

Date of FEIS

August 16, 2004

Issuance

Cost of DEIS

Copies of the Final EIS are available for review at the public libraries in Cle Elum, Roslyn, Ellensburg, Kittitas and Yakima, and at the Central Washington University Library in Ellensburg. Copies of the Final EIS may be reviewed or purchased at the Kittitas County Community Development Services office in Ellensburg. The cost for printed (paper) copies of the Final EIS documents is as follows:

Volume 1:	$40.00
Volume 2:	$25.00
Both Volumes:	$65.00

The EIS is also available on Compact Disc free of charge and may be reviewed on Kittitas County's website (www.co.kittitas.wa.us).