# Desert Claim Wind Power

# Revised
# Project Description

## January 2009

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# 1. INTRODUCTION

This revised Project Description is part of the Revised Application for Site Certification (Revised Application) for the reconfigured Desert Claim Wind Power Project (the Project). The Project is a renewable wind energy generation facility that will consist of up to 95 wind turbines and have a nameplate capacity of up to 190 megawatts (MW). The Project will be located in unincorporated Kittitas County, approximately 8 miles northwest of Ellensburg, Washington **(Figure 1)**.

Desert Claim Wind Power LLC (Desert Claim or the Applicant) originally applied to Kittitas County for the land use approvals and permits necessary to construct and operate an earlier version of the Project. Kittitas County evaluated the environmental impacts associated with the original project proposal in a Final Environmental Impact Statement published in August 2004 (County FEIS). The Kittitas County Board of County Commissioners ultimately denied Desert Claim's application. Following the County's decision, Desert Claim made significant modifications to the Project to further reduce potential impacts and to respond to feedback from Kittitas County and its residents. These modifications were reflected in the original Application for Site Certification filed with EFSEC in November 2006. Since then, Desert Claim has obtained development rights to additional property and has made further modifications to the Project to significantly reduce impacts to nearby non-participating residences.

This Project Description includes the following sections. **Section 2** identifies the Project site and describes the existing conditions at that site. **Section 3** describes the facilities that will comprise the completed Project. **Section 4** addresses the construction process. **Section 5** addresses operation and maintenance. **Section 6** summarizes mitigation measures that have been incorporated in the Project. **Section 7** addresses provisions for future decommissioning of the Project. **Section 8** contains a list of cited references. All figures are grouped together at the end of the Project Description.

Many of the topics addressed in this Project Description are discussed in greater detail in the County FEIS, an electronic copy of which was provided with the November 2006 Application. This Project Description highlights the revisions that have been made in the Project since it was considered by Kittitas County from 2003 to 2005. The following are the most significant of those changes:

- The Project Area has been consolidated from four separate parcels to one contiguous area. The Project Area now consists of approximately 5,200 acres, of which approximately 3,671 acres are privately owned and approximately 1,529 acres are owned by the Washington Department of Natural Resources (WDNR).

- The number of turbines has been reduced by 20%, from 120 to 95.

- The turbine model has changed from the 1.5 MW General Electric Wind Energy 1.5sl turbine to the 2.0 MW REpower MM92 turbine.

- The turbine configuration has been revised so that there are now only 7 non-participating residences located within 2,500 feet of a proposed turbine. All non-participating residences are located more than 1,640 feet (four times the turbine tip height) from a proposed turbine, with the closest residence located 1,687 feet from a proposed turbine.

- Sound from the Project will be 50 dBA or less at the boundary with non-participating residential properties.

- Shadow flicker at adjacent non-participating residences has been substantially reduced, if not avoided altogether. For those residences (if any) that are still affected by perceptible shadow flicker, Desert Claim will stop the blades of the wind turbine causing the flicker during those times and conditions when shadow flicker occurs, or offer a voluntary waiver agreement to the landowners in lieu of stopping the turbine.

- The Project will not result in any temporary or permanent impacts to wetlands, streams or specified buffers.

- Daytime white strobe lighting has been eliminated and nighttime red lighting has been reduced to forty-one of the Project turbines.

## 2. EXISTING PROJECT SITE CONDITIONS

The revised Project Area is shown in **Figure 2**. It contains a total of approximately 5,200 acres. Approximately 3,671 acres are owned by five private landowners and 1,529 acres are owned by WDNR, all of whom have signed agreements authorizing the Applicant 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 4.0 miles from west to east and up to 3.5 miles in a north-to-south direction. The southwestern corner of the Project Area is ½ mile 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.

### 2.1 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 Lookout Mountain and the Yakima Canyon. Unlike many wind projects that consist of turbine strings located along high ridgelines, the Desert Claim Project is generally spread out over the rising valley floor. The terrain within the Project Area is relatively flat and open, with a gradual south-to-north rise in elevation totaling approximately 400 feet over a distance of approximately three and a half 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). The highest elevations and steepest slopes in the Project Area are in Township 19N, Range 18E, Section 9.

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 Wind Resource

The climate of the Kittitas Valley is strongly influenced by surrounding mountainous terrain and air masses traveling to the 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) (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 3** illustrates prevailing wind patterns for the 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 currently considered to be the minimum requirement for economic utility-scale wind power plants (AWEA 2003). 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 mph at least 30 percent of the time annually. However, these thresholds being lowered as utilities and the public continue to desire more renewable wind power.

The Applicant collected meteorological (met) data at multiple sites within Kittitas County beginning in 2001, as part of its resource exploration studies. Six temporary 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 met data collected over the past seven years confirm that there is a sufficient commercial wind resource for power generation in the proposed Project Area.

## 2.3 Land Ownership and Use

### 2.3.1 Land Ownership

The Project Area consists of all or portions of the following sections in Township 19N, Range 18E, Sections 9, 16, 17, 18, 19, 20, 21, 22, 27, 29 and 30 along with the NW corner of Township 19N, Range 17E, Section 25.

Of the 5,200 acres of land within the Project Area, 2,551 acres will be leased from four private landowners, 1,529 acres will be leased from WDNR and 1,120 will be owned by an enXco affiliate. The following rights-of-way easements cross the Project Area:

- Bonneville Power Administration (BPA) maintains five electrical transmission lines that cross the Project Area;
- Puget Sound Energy (PSE) maintains one transmission line that crosses the Project Area;
- 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.

### 2.3.2 Land Use

The Project Area is in a rural, relatively lightly populated area of Kittitas County and is characterized primarily by agricultural uses. Much of the land within and surrounding the Project Area is cultivated for feed crop production or pasture. Extensive areas of rangeland are 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.

There are nine residences located within 2,500 feet of a proposed turbine. Of these, two are residences of participating property owners. **Table 1** indicates the distance from each of the non-participating residences to the nearest proposed turbine. **Figure 4** shows the locations of these residences.

**Table 1**
**Nearby Non-Participating Residences**
**and Distances from Nearest Proposed Turbine**

| Residence Number (See Figure 4) | Distance to Nearest Proposed Turbine |
|---|---|
| 1 | 1,778 feet |
| 2 | 2,241 feet |
| 3 | 1,687 feet |
| 4 | 1,694 feet |
| 5 | 1,915 feet |
| 6 | 1,789 feet |
| 7 | 1,856 feet |

The Project Area is within a major cross-state electrical transmission corridor that links hydroelectric dams on the Columbia River with the large power consumer market of western Washington. Six high-voltage transmission lines cross the Project Area; five are owned and operated by BPA and one by PSE. A BPA regional substation is located on a 133-acre parcel two and a half miles east of the Project Area.

The Kittitas Reclamation District North Branch Canal, which provides 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 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 are not open to general public use. Some low-intensity outdoor recreational uses, including hunting, horseback riding, snowmobiling and off-road vehicle use, occur with the permission of individual landowners.

Under the Kittitas County Code, the land within the Project Area is zoned either Ag-20 (agricultural use, with a 20-acre minimum parcel size) or Forest & Range (allowing residential development with a minimum of 20 acres per dwelling). The entire Project Area and the adjacent lands are within a large area designated as Rural in the Kittitas County Comprehensive Plan.

# 3. PROJECT FACILITIES

Wind energy projects consist of several types of facilities, including the wind turbines themselves, power collection, substation and transmission facilities, access roads, and an operations and maintenance facility. Each component is described below, based on the Project planning information available at this stage.

## 3.1 Wind Turbines

The revised Project includes a maximum of 95 wind turbines. The term "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 discussed below. **Figure 5** is a photograph of typical wind turbines currently in use.

The Applicant proposes to use the REpower MM92 turbine in this Project. The REpower MM92 has a 2.0 MW nameplate generation capacity. It has a total height from the ground to the blade tip point straight up of 410 feet (124.8 meters). Each tower (measured to the rotor hub) is 258 feet (78.5 meters) tall, and the rotor blades have a 304 feet (92.5 meters) diameter and will be 106 feet (32.3 meters) above the ground when pointing straight down. This model of turbine is slightly taller than the General Electric turbines proposed for this Project during the County permitting process. **Figure 6** illustrates the typical turbine that will be used for the Project.

### 3.1.1 Towers

Tubular steel towers will 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). Each tower will be a maximum of 258 feet (78.5 meters) in turbine hub height. The tower will have a diameter of approximately 14 feet at the base, tapering at the top of the structure. When fully assembled, each tower will weigh approximately 160 tons. The heavy, rolled steel forming the tower structure will have a smooth exterior surface. The turbine towers will be painted a neutral color as directed by the FAA.

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

### 3.1.2 Foundations

The freestanding, tubular towers will 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 used in the Project. These are depicted in **Figures 7A** and **7B**.

**Figure 7A** illustrates an inverted T foundation, which employs a relatively shallow concrete base with a relatively large diameter. The maximum depth of the base will be about 8 feet below the ground surface and the diameter will be up to 80 feet. The turbine tower will be anchored to the foundation base by a base plate ring consisting of long, steel bolts extending nearly to the bottom of the concrete base.

The second type of foundation is a pile foundation. **Figure 7B** provides a cross-section view. A cylindrical culvert is used to anchor the tower base. Inner and outer sections of culvert pipe of slightly different diameter are sunk into an excavation that will 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 registered engineer will select the appropriate foundation design for each turbine location based on site-specific information of geotechnical conditions present, advice on load-bearing capacities from a geotechnical engineer, and the design engineer's recommendations. The foundation designs will conform to State and County requirements and standard industry practices. A Washington registered engineer will review and approve all foundation designs.

### 3.1.3 Nacelle and Rotors

The nacelle is the rectangular housing that covers the operating mechanism of the turbine. Each nacelle will be approximately 35 feet long, 10 feet wide and 13 feet high. The exterior surface will be constructed of fiberglass lined with sound-absorbing foam. The generator, gear box and associated control equipment for the turbine will be housed inside the shell of the nacelle (see **Figure 8**). The nacelle will be accessed internally through the tower, and most servicing of the machinery will be conducted within the nacelle in order to protect the equipment and the workers from the elements.

The rotor assembly for each turbine will include three blades, and will be attached to the front of the nacelle at the hub. The Project will use an upwind turbine design, in which the nacelle is turned into the wind to place the generator and tower behind the blades. The blades will be composed of laminated fiberglass or a fiberglass composite, and will have a smooth outer surface. Each blade will be fabricated offsite in one piece, transported to the Project site, and then bolted to the rotor hub, raised into position by crane and connected to the nacelle.

The equipment inside the nacelle will 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 will be controlled by a computer that will 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 54 mph, the blades will be rotated into a feathered position and the braking system will stop the rotor from turning. After 10 minutes and when the wind speed reduces to below 54 mph, the blades will rotate their pitch into the wind and start turning again.

The control system can be programmed to stop the blades of a specific turbine during those times and conditions (if any) when that turbine causes perceptible shadow flicker at a nearby residence. The owners of the affected residence may elect to execute a voluntary waiver agreement with the Applicant in lieu of stopping the turbine affecting their residence.

### 3.1.4 Turbine Locations

A maximum of 95 turbines will be installed within the Project Area, distributed across the Project site as shown in **Figure 4**. The turbine placement plan was determined using computerized modeling software that incorporated the field-verified residence data, stream setbacks and wetland buffers, 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 such as stream setbacks, wetland buffers, and the State noise standards. 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). Turbines may be micro-sited (re-located by up to 300 feet) at each location during the pre-construction detailed site design to maintain stipulated siting requirements, and/or during construction to avoid cultural resources or environmental features that become apparent during construction activities.

The distribution of turbines for the Project differs from what is often seen at wind energy projects. Many wind projects locate turbines in long strings along high ridge tops. Unlike many locations where winds are strongest along ridge tops, winds in the Project vicinity 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. The Project will locate turbines over a broad plain in response to this wind pattern.

The turbine layout incorporates a minimum 625-foot safety zone setback from all buildings, Project Area boundaries,[1] public roads and utility transmission corridors. This safety setback is designed to ensure protection against potential mechanical failures and hazards, such as blade throw, ice throw and tower collapse (KPFF Consulting Engineers 2006). The previous application to Kittitas County that was analyzed in the County FEIS used a 487-foot safety setback because the proposed turbine model was smaller.

[1] There is one exception to this general rule. In the southwest portion of the Project Area, turbines may be located closer than 625 feet from the Project Area boundary, but the adjacent participating property owner has agreed to maintain the safety setback from all buildings.

## 3.2 Project Electrical System

The electrical system for the Project will consist of three primary components: the power collection system, a Project substation and an interconnection to the regional power transmission grid. The function of the electrical system will be to collect the electricity produced by the Project turbines and convert it to higher-voltage electricity to be fed into the regional power system.

### 3.2.1 Power Collection System

The power collection system has been configured to avoid sensitive environmental features, especially streams and wetlands. Power collection cables have been placed underground or on road water crossing structures except, in limited cases, where it is not reasonably feasible to do so.

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

Electricity will 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 will connect the 95 turbines to the Project substation. Junction boxes that merge multiple incoming cables into one outgoing line will be installed at various locations within the Project Area to facilitate the collection of power from turbines. **Figure 9** illustrates the expected layout of the power collection system.

Power collection cables will be placed underground except where it is not reasonable to do so based on site-specific physical conditions (i.e., where it will 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 will be installed in trenches or plowed-in at a depth of 4 feet below the ground surface. At stream crossings, the cables may be located on the road bridge or structure. In certain areas, the underground cables may be encased in concrete to provide additional protection and stability in the ground.

Overall, the collection system is estimated to contain approximately 27 lineal miles of underground cable, of which approximately 25.5 miles will be laid as part of the Project road system to reduce impacts to the land surface. Power collection lines will be located within the properties that comprise the Project Area except for those portions that will be bored or trenched under County roads to connect parcels on either side of the County road.

### 3.2.2 Substation

An electrical substation will be needed to provide a further increase or step-up in voltage for the power collected from the Project turbines. Two alternative substation locations are shown on **Figure 9.** The first is located near the southwestern corner of Section 16, Township 19N, Range 18E, approximately 1 mile north of Reecer Creek Road. This location abuts the PSE Rocky Reach-Cascade 230 kV transmission line that crosses the Project Area. The alternative substation is located on the western portion of Section 19, Township 19N, Range 18E along the BPA transmission lines. The final selection of the substation location will be made after the interconnection point has been determined with the transmission system owner and the utility purchasing the power generated by the Project.

One or more large power transformers located within the Project substation will step-up or raise the voltage of the electricity flowing from the Project power collection system to meet the higher voltage of the receiving electrical transmission line. Substation equipment will include power transformer(s), disconnect switches, and metering relays. The substation will include a small building that will house the power generation control and relaying equipment, station batteries, and the supervisory control and data acquisition (SCADA) system. The entire substation area will be cleared, graded and covered with gravel, and will be surrounded by a chain-link fence. The completed substation will occupy approximately 2 acres. The substation will be designed to meet the standards of the National Electric Safety Code and the requirements of the entity operating the receiving transmission line.

### 3.2.3 Transmission Interconnection

An overhead transmission line will connect the Project substation with one of the high-voltage electrical transmission lines that cross the Project Area. The Applicant has not yet negotiated a power sale agreement or completed an interconnection agreement, but has identified options for interconnecting the Project to the regional transmission network. Existing regional transmission lines located on the Project Area include the following:

- BPA 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 Area.

- PSE's Rocky Reach-Cascade 230 kV line follows a generally east-to-west path through the Project Area north of the BPA lines.

The interconnection line would be no longer than approximately 100 to 200 feet for a connection to the PSE line or BPA lines within the Project Area.

### 3.3 Meteorological Towers

Four temporary met towers are currently installed in the Project Area. Project development typically involves the use of temporary met towers during the exploration and 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.

Permanent met towers are standard features of utility-scale wind power projects. These towers will be self-supporting steel structures with concrete foundations. **Figure 10** is a drawing of a typical permanent met tower. The towers will have multiple anemometers to measure wind speed and direction at different elevations, and will be placed at strategic locations that best support automated control of the turbine operations. The Applicant proposes to construct up to four permanent met towers. They will be approximately 212 feet (65 meters) tall, free-standing rather than secured by guy wires, and set on concrete bases.

### 3.4 Access Roads

Road access to the Project Area is currently provided by a number of existing public roads. Kittitas County roads that cross or pass adjacent to parcels within the Project Area include Smithson Road, Reecer Creek Road, Pheasant Lane and Lower Green Canyon Road.

The Project will include a system of Project roads providing access to all 95 turbines, the substation and other key facilities. The proposed access road system is approximately 27 miles in length and is shown in **Figure 11**. The Project roads will connect with the existing public road system at a number of locations including six points along various sections of Reecer Creek Road; and three points on Pheasant Lane.

The Project access roads will be single-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 will have a compacted gravel surface. **Figure 12** shows a typical cross-section for the access roads. Stream crossing structures are incorporated into the Project access road system to allow for crossing of wetlands and streams, including any buffers.

Detailed plans for the Project road system and the connections to county roads will be prepared following micro-siting of the turbines. Project access road connections to county roads will be designed pursuant to County road ingress and egress standards.

### 3.5 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 will 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 5,000 square feet, and the overall footprint, including parking and outside storage, will be up to 2 acres.

The O&M facility will be located one mile north of the intersection of Reecer Creek Road and Pheasant Lane. Domestic water for the O&M facility at this location will either be acquired from the landowner or obtained by developing an exempt well. Water consumption will be considerably less than 5,000 gallons per day. Restroom and kitchen facilities will drain into an on-site septic system. The O&M facility will be surrounded by a fenced enclosure with a locked gate.

### 3.6 Safety and Control Systems

The Project will include a communication system for monitoring and controlling the turbines. The communication system will use either copper lines, similar to telephone lines, or fiber-optic lines. Communication lines typically run to each turbine, parallel to the low- and medium-voltage power collection lines. The communication lines will 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 will be a key component of the Project safety systems.

Aircraft safety lighting will be installed on the exterior of some nacelles, to comply with Federal Aviation Administration (FAA) rules for structure lighting. Specific requirements for the Project will be developed in conjunction with the FAA, based on the turbine heights and site-specific conditions. Under the Project's lighting plan, 41 of the total 95 turbines will be equipped with synchronized low-intensity flashing red lights (L-864) for nighttime use. Experience with FAA reviews of prior lighting plans indicates this configuration should meet the FAA requirements (Chavkin 2008).

Each wind turbine, including the rotor blades, will be equipped with a lightning protection system, which will be connected to an underground grounding arrangement to facilitate lightning flow safely to the ground. All equipment, cables, and structures comprising the wind turbines will be connected to a metallic, Project-wide grounding network.

Turbine towers will be locked, and the substation will be fenced and locked to prevent unauthorized entry.

### 3.7 Visitor Facilities

Desert Claim is willing to develop visitor facilities to accommodate public interest in the Project if EFSEC believes these facilities would be desirable. If so, the facilities would likely consist of a roadside turnout adjacent to a County road at a location providing a suitable view of Project wind turbines, with an information kiosk and appropriate signage. A tentative site for the visitor facilities is shown on **Figure 4**, near the junction of Reecer Creek Road and Lower Green Canyon Road within the Project Area.

# 4. CONSTRUCTION PROCESS

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

## 4.1 Schedule and General Sequence

The construction process will be completed over an approximately 9-month period. The primary tasks in the construction process are:

- 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 or PSE 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.

Habitat, sensitive areas and cultural protection areas within the Project Area will be delineated, defined in contracting documents and marked in the field, pursuant to consultations with Washington Department of Fish and Wildlife (WDFW) personnel.

In general, the first few months of construction activity will 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 will be accomplished in phases. As Project access roads and tower foundations are completed, turbines will be erected. Installation of the nacelles, rotors and associated equipment will be the final task of major construction activity for each turbine. The Applicant expects to begin commercial operation within one month after commissioning the first wind turbine.

## 4.2 Construction Equipment and Space Requirements

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

**Table 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 will require temporary disturbance of a larger area than will be occupied by the permanent Project facilities. **Table 3** identifies the estimated area that will be disturbed in construction and within the permanent footprint of the various Project components.

**Table 3**
**Estimated Area of Construction Disturbance and Permanent Facilities**

| Project Feature | Temporary Construction Disturbance (acres) | Permanent Project Footprint (acres) |
|---|---|---|
| Wind Turbine Pads | 98.6 | 10.5 |
| Internal Power Collection System [1] | 3.8 | 0.1 |
| Project Substation | 2.8 | 2.0 |
| Kiosk Area | 1.0 | 0.3 |
| Met Towers | 0.4 | 0.1 |
| Project Access Roads [2] | 188.2 | 71.5 |
| Project O&M Facility | 2.8 | 2.0 |
| Construction Staging/Storage | 19.5 | - |
| Total Area | 317.2 | 86.4 |
| Percent of Project Area | 6.1% | 1.6% |

[1] Power collection system within Project Area (under ground) with 85 percent contained within access road areas.

[2] Area for Project access roads increased 15 percent to include curves and intersections to non-Project roads.

### 4.3 Work Force

Approximately 120 to 165 people will likely be employed at some time during Project construction. Some of these workers will be employees of Desert Claim or enXco, Inc., but most will work for various construction contractors and equipment vendors who will provide construction goods and services to the Project. The size of the construction work force present at any given time will vary with the schedule of tasks in the construction process. Relatively few construction workers will 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.

The Applicant will 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 will 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 testing require more specialized skills that are less likely to be available locally, and therefore, may be performed by non-local firms and workers.

## 4.4 Erosion and Sedimentation Control

Erosion and sedimentation control will be standard practice during active construction and during the restoration and cleanup stage of the construction process. The Applicant will develop and implement of a Temporary Erosion and Sedimentation Control Plan (TESCP). This design-level plan will prescribe the use of Best Management Practices that are standard features of such plans. The Project TESCP will be based on and comply with the Washington Department of Ecology's *Stormwater Management Manual for Eastern Washington.* The TESCP will also address the erosion control and water quality conditions of the National Pollutant Discharge Elimination System (NPDES) construction stormwater discharge general permit.

Based on the applicable standards, the TESCP will 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 will be directed away from cut-and-fill slopes and other disturbed areas, and into ditches that drain to natural drainage features. Exposed areas will be re-vegetated as soon as possible following completion of the corresponding construction task.

Erosion and sedimentation control measures will 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 will also be marked at this time. Provisions for restoration of temporarily disturbed areas will be determined through consultations with WDFW and EFSEC.

## 4.5 Roads and Turbine Pads

Heavy construction activity for the Project will start with clearing and grading for the Project access roads and turbine pads. In some locations, existing private farm roads will be used as segments of the Project access road system. These existing road segments will 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 will be coordinated with the landowners to minimize crop damage and ensure suitable access for the landowners.

New graveled roads will be constructed in areas where existing roads could not be used for access to the turbines. These roads will vary in width; having 15-foot travel surface widths for straight sections and 20-foot travel surface widths for curved sections. Project access roads will have turnouts at the turbine pads and other selected locations. Stream crossing structures will be incorporated into the Project access road system to allow for crossing of wetlands and streams, including any buffers. 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 will also accommodate trenching for Project utility lines and will accommodate access for cranes needed to erect the turbines.

Temporary construction disturbance around the turbine pads is assumed to occupy an area of about 1 acre per turbine.

Topsoil removed during grading for access road and turbine pad construction will be stockpiled onsite adjacent to the disturbed areas. The removed topsoil will be re-spread in cut-and-fill slopes, and these areas will be re-vegetated as soon as possible after road construction was completed. No offsite deposition of excavated material will be needed. 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 will be hauled to the construction site, deposited, graded and compacted as needed. Native materials from the Project Area will 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 will 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 95 turbine locations will be determined based on site-specific geotechnical investigation. These quantities will 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 will be trucked to the construction site via public roads.

### 4.6 Staging Areas

Temporary laydown or staging areas will 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. One or more staging area approximately 10 acres in size will be needed; these temporary facilities will be placed near existing roads and on previously disturbed land (e.g., heavily grazed and/or crop or pasture lands).

### 4.7 Concrete Supply

The Applicant will contract with one or more local construction companies to install the tower foundations and pads and the transformer pads. These facilities will require sizable volumes of concrete. The construction contractor will 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, 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, the contractor would likely 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. Approximately 2 to 3 acres would be required to support a typical temporary batch plant and related facilities. The site would include approximately one 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 one 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.

### 4.8 Turbine Foundations

Once the Project roads are constructed, excavation will begin for turbine foundations. As described in Section 3.1.2, 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 Project's construction process.

The inverted-T foundation requires a circular excavation approximately 8 feet deep and 90 feet in diameter (see **Figure 7A**). 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 will 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 7B**). A cylindrical, corrugated metal form approximately 16 feet in diameter will be inserted in the hole, and another cylindrical corrugated form several feet smaller in diameter will be placed inside the larger form. The space between the two forms will be filled with reinforced concrete

and two rings of anchor bolts, and the space inside the inner metal form will 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.

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

### 4.9 Collection System

The power collection system for the Project will be installed using underground cable, except where it is not feasible to do so and avoid sensitive environmental features. The cable will be located within the disturbance area for construction of the Project road system to the maximum possible extent. At stream crossings, the cables may be located on the road bridge or structure. Underground cable will 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 will be installed without the need to excavate an open trench; instead, the cables will be directly plowed into the ground. In either case, topsoil will be replaced on the surface of the disturbed area and will be reseeded with native plants. In certain areas, the underground cables may be encased in concrete to provide additional protection and stability in the ground.

### 4.10 Transmission Connection

Developing the Project transmission interconnection will 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 will be supported on wood-pole structures approximately 76 feet in height. Standard industry construction practices will be used for this facility, including surveying, right-of-way preparation, materials hauling, structure assembly and erection, ground wire and conductor stringing, and cleanup and restoration.

A licensed surveyor will survey the transmission line route and stake structure locations. Holes for the transmission structures will be drilled or augured, typically to a depth of 4 to 6 feet and a width of 2 feet. Construction materials will be hauled by truck to the route and the structures will be assembled on site. Conductor stringing equipment will be placed at either end of the transmission connection; additional areas might be needed for angle locations along the route. Construction activity will be concentrated at staging areas and around structure locations. Cleanup and restoration of disturbed areas will occur following stringing and testing of the line.

Excess topsoil will be tamped around poles or spread on the right-of-way, and disturbed areas will be reseeded with native plants or agricultural crops, depending on the adjacent use.

### 4.11 Substation and Operation and Maintenance Facility

The Project substation will be constructed while the electrical system components were being installed. Construction activities will include clearing and grading the substation site, which will 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 will be constructed on a two-acre site. It will 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.

### 4.12 Turbine Equipment

Once a sufficient number of tower foundations are in place and finished, the first turbine towers, nacelles and blades will be brought to the Project Area for placement. The turbine components will be transported to the Project Area by truck and trailer. The towers will have three sections, each approximately 70 to 90 feet long. They will be delivered by trailers, each carrying one tower section. Large cranes will lift the multiple tower sections into place. The bottom section will be bolted to the circular ring(s) of anchor bolts on the foundation pedestal, and the upper sections will be sequentially bolted in place.

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

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

### 4.13 Final Grading and Restoration

Final grading of disturbed surfaces within the Project Area will occur following completion of the heavy construction activities, and any additional gravel needed will be placed on the Project access roads. All areas temporarily disturbed by Project construction will be restored to their original condition and reseeded with native vegetation. Areas subject to construction activity will be inspected for the presence of noxious weeds and treated as necessary. Long-term stormwater management and erosion control measures. A final site cleanup will 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 will be restored to their pre-Project condition.

### 4.14 Testing

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

### 4.15 Transportation and Access Management

Management of construction access and traffic will 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. The Applicant will develop a Construction Traffic Management Plan that will address transportation and access concerns during the construction period. The plan will 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.

## 5. OPERATION AND MAINTENANCE

The Applicant intends to operate and maintain the Project once construction is complete and the Project begins commercial operation, though some utilities have shown an interest in purchasing the Project and operating it themselves. Electricity generated by the Project will be sold to power marketing entities, public utilities or investor-owned utilities, and ultimately distributed by utilities to their customers. This section summarizes the activities associated with long-term operation and maintenance of the Project.

### 5.1 Functions

Long-term operation and maintenance activities for the Project will include the following functions:

- round-the-clock monitoring of Project output, the 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 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 noxious weed control plan.

Through the life of the Project, the Applicant will follow an operations and maintenance protocol that will 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 will be conducted approximately every six months on each wind turbine. On average, each turbine will require 40 to 50 hours of scheduled mechanical and electrical maintenance per year.

Most servicing of the turbines will 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 will be needed on an occasional basis. Routine maintenance will include replacing lubricants and hydraulic fluids at specified intervals. The towers will need to be repainted on a periodic basis. All lubricants, hydraulic fluids, paints, solvents and other potential hazardous substances will be carefully stored, used and disposed of in accordance with applicable laws and regulations.

### 5.2 Work Force

The Project will employ 10 to 12 full-time staff for long-term operations and maintenance. This staff will include an 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 is likely to be hired from the local work force.

### 5.3 Access Management

All Project access roads will be posted and maintained as private roads, with locked gates to minimize unauthorized access. Public roads within and adjacent to the Project Area will remain open to public use, as in their current condition.

## 5.4 Safety Measures

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

The turbines will use synthetic oil as a lubricant in the gearboxes and hydraulic fluid for the blade pitch actuators. Each turbine will contain lubricating oil. Turbine oil will be tested regularly and replaced as needed. Waste oil and fluid collected during maintenance will 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. These safety plans will be employed for the Project, with Project-specific modifications as necessary.

## 5.5 Expected Operating Patterns

The Project's wind turbines will 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. The Applicant has collected over 7 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, the Applicant expects the Project to operate approximately 60 percent of the time (approximately 5,300 hours annually), and be idle during the remaining time (approximately 3,500 hours annually). Annual and seasonal variations are expected.

Based on recent historical wind data, the majority of the annual production from the Project will occur from March through October. There are approximately 5,880 hours during this 8-month period. The turbines will likely be in production (i.e., the blades will be turning and producing some electricity) approximately 71 percent of the time during the spring-summer period, or approximately 4,170 hours. The turbines will 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 will 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 will occur during daylight hours. Over the course of the year, two-thirds (67 percent) of the production and operation will likely occur from 7 a.m. to 10 p.m.

## 6. MITIGATION MEASURES

The Applicant will incorporate mitigation measures into the Project consistent with and based upon the analysis contained in the Revised Application, the SEIS or the County FEIS. This section summarizes the mitigation measures outlined in Chapter 3 of the County FEIS, along with updated measures proposed by the Applicant.

### 6.1 Erosion (County FEIS § 3.1)

The Applicant will develop and implement a Construction Stormwater Pollution Prevention Plan (SWPPP) that satisfies the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activities. The SWPPP will include Best Management Practices (BMPs) recommended by Ecology's *Stormwater Management Manual for Eastern Washington.* The Construction SWPPP will include measures for temporary erosion and sedimentation control, and will identify a regular inspection and maintenance schedule for all erosion control structures.

### 6.2 Landslides (County FEIS § 3.1)

To mitigate potential landslide hazards as a result of construction, the Applicant will use setback distances for structures, infiltration systems, and detention ponds, where appropriate and feasible. The setback distances are based on the analysis in the County FEIS, and are more stringent than those recommended in the *Uniform Building Code.* Setback distances could be reduced and/or eliminated depending upon the detailed design plans and additional, site-specific studies of the geological conditions.

The Applicant will generally maintain a minimum setback distance of 125 feet between Project facilities and areas classified as Landslide Hazard Zone 1, and a setback distance of 50 feet between Project facilities and areas classified as Landslide Hazard Zone 2.

In addition to these setbacks, the Applicant will implement the following mitigation measures:

- If construction occurs within areas of the Project Area classified as Landslide Hazard Zones 1 and 2, then stormwater from those construction sites will be collected and tightlined away from the top of such areas.

- No fill, topsoil, or other debris will be placed over the top of areas within Landslide Hazard Zone 1. Any fill planned for slopes steeper than 5H:1V (Horizontal : Vertical) will be benched and compacted into the hillside pursuant to a geotechnical engineer's recommendations.

- The Applicant will not remove any vegetation from areas within Landslide Hazard Zone 1, with the exception of dead or diseased trees, unless approved by a

geotechnical engineer. Vegetation removed from Landslide Hazard Zone 2 areas will be limited to the immediate vicinity of construction.

- The Applicant will retain a geotechnical engineer licensed in Washington State to review and approve all grading, erosion, and drainage control plans prior to construction to assist in reducing the landslide risks from and to the Project.

### 6.3 Seismic Activity (County FEIS § 3.1)

The Applicant will comply with the building code in effect in Kittitas County when construction commences.

### 6.4 Air Quality (County FEIS § 3.2)

The Applicant will implement the following standard practices to reduce the air emissions from construction activity:

- To reduce emissions from construction equipment and vehicles, the construction contractor will be required to use well-maintained equipment and avoid prolonged periods of vehicle and equipment idling.

- Dust produced by construction will be reduced by spraying water or other dust suppressants over areas of exposed soils such as storage yards and construction roadways. Roads and other areas that might be exposed for prolonged periods will be paved, planted with a vegetation ground cover, or covered with gravel. Subject to receiving approval from appropriate agencies, the Applicant may use dust palliatives, such as calcium chloride, on road surfaces to reduce the amount of dust created by vehicle traffic on unpaved roads. A 25 mph speed limit will be maintained on unpaved roads within the Project Area.

- Truck beds will be covered when transporting dirt/soil outside of the Project Area.

- All stored construction materials that may cause air emissions will be covered.

### 6.5 Surface Water (County FEIS § 3.3; Wetlands and Stream Report – Tab 4)

The revised Project configuration avoids any temporary or permanent impact to streams, wetlands, or their buffers.

Project construction staging areas will not be located within 100 feet of drainages or any other body of water to reduce the potential contamination from spills. The Applicant will use BMPs to control the use and disposal of waste materials during and following Project construction, including implementation of a spill prevention, containment and control plan.

The Applicant will store hazardous materials, such as lubricants, in approved containers and storage facilities. The Applicant will provide on-call spill response services either through a contract with a qualified environmental remediation services firm or with qualified in-house personnel.

### 6.6 Vegetation (County FEIS § 3.4; Vegetation and Wildlife Report – Tab 5)

During project construction, the Applicant will employ BMPs to reduce peripheral impacts to adjacent native vegetation and habitats and to minimize the construction footprint. The Applicant will micro-site Project facilities to minimize impacts from roads and utility crossings to riparian habitat to the greatest extent possible.

The Applicant will incorporate the following mitigation measures to facilitate restoration of temporarily disturbed areas in the Project Area and to avoid, minimize or reduce impacts of noxious weeds:

- Standards for site restoration will be established as part of the Final Construction Plans. The post-construction restoration or reclamation plan for the temporarily disturbed areas will include provisions for continuing active restoration until site stability or the reference standards are achieved.
- Site reclamation and reseeding will occur during the time of year when seed germination and establishment is most likely to be successful.
- The construction contractor will be required to clean construction vehicles prior to bringing them in to the Project Area from outside areas.
- Disturbed areas will be re-vegetated as quickly as possible with native species.
- If the construction contractor uses hay for sediment control or other purposes, it will certify that the hay bales are weed free.
- Noxious weeds that have established themselves as a result of the Project will be actively controlled in consultation with the Kittitas County Weed Control Board.

### 6.7 Wetlands (County FEIS § 3.4; Stream and Wetland Report – Tab 4)

The Project has been designed to avoid temporary or permanent impacts to wetlands, including specified buffers, in the Project Area. Any work adjacent to wetlands will adhere to the applicable laws, including federal and state regulations. If wetlands are inadvertently disturbed during construction, the Applicant will restore the wetlands and re-vegetate them if appropriate.

## 6.8 Wildlife (County FEIS § 3.4; Vegetation & Wildlife Report – Tab 5)

The Applicant will establish a Technical Advisory Committee (TAC) pursuant to the *WDFW Wind Power Guidelines*. The TAC will ensure that monitoring data is considered in a forum in which independent and informed parties can collaborate with the Applicant. The TAC will make recommendations to EFSEC if it concludes that additional studies or mitigation are warranted to address impacts that were either not foreseen in the Application, County FEIS or EFSEC SEIS, or exceed impacts that were projected.

The TAC will have up to nine (9) members. Pursuant to the *Guidelines*, the TAC will be composed of one representative each from U.S. Fish and Wildlife Service, the Washington Department of Fish and Wildlife, the Washington Department of Natural Resources, Kittitas County, and the Project owner/developer, at least one representative from amongst the five private participating landowners, and up to three more members, including local landowners or other concerned interests (e.g., Kittitas Audubon Society). The Applicant will provide meeting space and logistical support for the TAC, but TAC members will not be reimbursed for any time or expenses related to their participation on the TAC.

Pursuant to the Guidelines, the TAC may recommend additional or alternative mitigation measures from those contained in this Application. Any recommendation by the TAC must be approved by a majority of the TAC which majority must include the representatives from WDFW, USFW and WDNR. The Applicant may accept the TAC's recommendation voluntarily. In the event that the Applicant does not accept a TAC recommendation, the TAC may forward the recommendation to EFSEC. EFSEC will then determine whether: (i) the TAC's recommendation is reasonably necessary to mitigate identified adverse impacts of the Project; and (ii) the TAC's recommendation is reasonable and capable of being implemented. If the EFSEC makes such findings, EFSEC will require the Applicant to implement the recommendation.

The Applicant will develop a Post-construction Avian Monitoring Plan in coordination with the TAC. At a minimum, the monitoring plan will include: (i) a 1-year standardized fatality monitoring program involving carcass searches, scavenger removal trials, a searcher efficiency trial; and (ii) a standard procedure for O&M personnel to report incidental bird fatalities and/or bird injuries over the life of the Project. The protocol for the fatality monitoring study will be similar to protocols used at other, newer-generation wind plants in northeastern Oregon and southeastern Washington.

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 Applicant will provide the following mitigation measures to address these impacts:

- The Applicant will identify environmental features such as riparian corridors and raptor nest sites that are not to be disturbed. Those areas will be mapped, flagged, and/or identified to all contractors working on-site as "no disturbance" zones during the construction phase.

- The Applicant will develop a site management plan to, at a minimum, identify Environmental Features and 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 will 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 will be buried underground where feasible.

- All overhead power line poles will be equipped with anti perching devices.

- Permanent met towers on-site will be free-standing to eliminate the potential for avian collisions with guy wires.

### 6.9 Livestock and Hunting

Livestock grazing will not be allowed in those Project areas in which active construction is occurring. Hunting will not be allowed in the Project Area during construction.

### 6.10 Habitat Mitigation Parcel

The Applicant will provide a Mitigation Parcel or pay a Mitigation Fee consistent with the *WDFW Wind Power Guidelines.*

### 6.11 Energy and Natural Resources (County FEIS § 3.5)

No significant impacts to energy and natural resources would occur, and therefore, no mitigation measures are proposed.

### 6.12 Cultural Resources (SEIS § 3.3)

The Applicant will address cultural resources in the final design and micro-siting process. Impacts to cultural resources can be avoided or mitigated in several ways.

It may be possible to avoid all or most impacts to significant cultural resources sites by micro-siting wind turbines and other associated facilities in order to maintain a 100-foot (30-meter) buffer area around the recorded boundary of each significant archeological or historical site. In some cases, a turbine may be moved a short distance, allowing straight-line road or transmission line connections between turbines to be moved away form the resources. In other cases, if the turbine is not within the archeological or historic site, the road or electrical connections could be re-routed to avoid the site.

In order to avoid sites in this manner, the boundaries of identified cultural resources (with suitable buffer zones) will be staked in the field and flagged as no-disturbance areas to avoid inadvertent entry or disturbance during construction. To preserve confidentiality of the resource locations, site markings would be removed following construction.

Given other siting constraints, it may not be possible to avoid all significant cultural resources. When sites or their buffers cannot be avoided, mitigation measures will be implemented to retrieve the scientific and historical information that makes the resources significant. Other ways of mitigating adverse effects include maintaining or restoring the integrity of the site to the extent possible, relocating historic structures, and tribal consultation. For significant archeological sites that cannot be avoided, Desert Claim will develop a cultural resources mitigation plan in consultant with the Department of Archeological and Historic Preservation (DAHP) and affected Native American tribes.

Other isolated finds and non-significant archeological sites may be impacted during construction of the Project. It may not be necessary to avoid these sites and isolates given their low or non-existent data potential. However, mitigation measures would be implemented, such as documenting existing conditions and moving the resources out of the direct impact area.

In response to comments from DAHP, the Applicant has also agreed to document the current cultural landscape and develop a landscape history prior to construction.

The Applicant will also develop an unanticipated discovery plan that will provide a protocol for the evaluation and treatment of any archaeological remains or human remains that might be discovered during construction.

### 6.13 Land and Shoreline Use (County FEIS § 3.7)

No significant impacts would occur, and therefore, no mitigation measures were identified.

### 6.14 Mechanical Hazards (County FEIS § 3.8; Hazard Report – Tab 7)

The Applicant intends to use the REpower MM92 turbine for the Project. This turbine is equipped with multiple safety systems as standard equipment, including rotor speed controlled by a redundant pitch control system, an automatic backup disk brake system, multiple temperature sensors and a control system that will shut a turbine down and take it off-line if an overheat or overspeed condition is detected. The turbines also will be equipped with a lightning protection system.

The Applicant will use turbines designed to the requirements of the International Electrotechnical Committee (IEC) 61400-1 Standard, which is sufficient to assure that the static, dynamic and defined-life fatigue stresses in the turbine blade will not be exceeded under the combined load cases expected at the Project Area.

Public access will be restricted and no high-value public facilities will be located within the safety zone established.

### 6.15 Tower Collapse, Blade Throw and Ice Throw (Hazard Report – Tab 7)

The Project configuration includes a 625-foot safety zone setback from the Project boundary[2] and all public roads and existing utility transmission corridors. The setback was calculated for the specific turbine model selected for the Project. The 625-foot safety zone is sufficient to provide adequate and reasonable protection for tower collapse, blade throw and ice throw hazards associated with the Project (KFPP Consulting 2006).

### 6.16 Fire Hazards

The Applicant will provide the following measures intended to prevent fires and minimize the consequences of any fires that might occur:

- During the construction period, all workers will be given fire safety training.
- The Applicant, through its construction contractor, will implement a work plan that minimizes the risk of fire.
- Appropriate fire suppression equipment will be available to designated employees trained in its use.
- The construction contractor will use mufflers and spark arrestors on all construction equipment.
- The Final Construction Plans will provide for required construction shutdowns, and limitations on "hot" work when necessary, as directed above.
- During operation, the Applicant will provide regular turbine maintenance, including review of real-time and stored temperature sensor readings that will be used to highlight developing problems and facilitate prevention of equipment-caused fire.
- The Applicant will use turbines that have a temperature recording and control system that include real-time monitoring, operator alarms and automatic turbine shut-down mechanisms in each nacelle in order to supplement the Project's standard fire prevention measures.
- The Applicant will maintain updated emergency contact information and coordination procedures within the O&M Facility.

[2] As stated above, there is one exception to this general rule. In the southwest portion of the Project Area, turbines may be located closer than 625 feet from the Project Area boundary, but the adjacent participating property owner has agreed to maintain the safety setback from all buildings.

### 6.17 Electrical Hazards (County FEIS § 3.8)

The Applicant will use the following mitigating measures to minimize potential health and safety risks associated with electrical hazards from the Project:

- Prior to starting construction, the construction contractor will prepare and maintain a safety plan in compliance with Washington requirements. This plan will be kept on-site and will detail how to manage hazardous materials such as fuel, and how to respond to emergency situations.

- During construction, the contractors will hold regular crew safety meetings to go over potential safety issues and concerns related to working on electrical facilities.

- At the end of each workday, the contractor and subcontractors will secure the site to protect equipment and the general public.

- Selected employees will 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 will be installed in such a way as to minimize potential health and safety risks to workers.

- Project workers will stay on established Project access roads during routine operation and maintenance activities.

- Vegetation will be trimmed to avoid contact with collection and interconnection lines.

- All new Project power collection system cables and interconnection transmission lines will be constructed and operated to meet the National Electrical Safety Code.

- Installation crews will clearly mark the location of all buried Project Power Collection System cables.

The Applicant will provide the following mitigating measures to address potential telecommunications interference associated with electromagnetic or physical conditions that might result from the Project:

- The Applicant will conduct a study of potential microwave interference prior to final location of turbines, and move or eliminate turbines that will block microwave pathways.

- The Applicant will conduct baseline monitoring of television reception quality within a one-half mile of the Project Area. Means to accomplish this can range

from contracted studies by qualified professionals to sample before-and-after videotaping.

### 6.18 Shadow Flicker (Shadow Flicker Report – Tab 7)

The Applicant has revised the Project configuration to substantially reduce the potential for adjacent residences to experience shadow flicker, if not eliminate it altogether. (GEC 2008b). Shadow flicker is not expected to be noticeable beyond 1,500 feet from a turbine. If non-participating residences experience shadow flicker, the Applicant will stop the blades of the wind turbine that causes the flicker during those hours and conditions when shadow flicker occurs, or offer a voluntary waiver agreement to the landowner in lieu of stopping the turbine.

### 6.19 Noise (County FEIS § 3.9; Sound Report- Tab 5)

The Applicant has revised the Project layout so that sound levels during Project operation will be 50 dBA or less at the boundary with non-participating residential properties. (GEC 2008a). Sound levels may exceed 50 dBA on an adjoining property to the west and south of the Project Area, but the property is owned by a participating property owner who has agreed to waive the 50 dBA limit.

In order to minimize noise during construction, the Applicant's construction contractor will be required to employ standard management practices, including the following measures:

- require use of properly sized and maintained mufflers, use of engine intake silencers and engine enclosures when the engine is the dominant source of noise, and that idle equipment be turned off when not in use for extended periods of time;
- stationary equipment will be placed as far away from residential receiving locations as possible whenever construction occurs within 100 feet of the project boundary. Where this is infeasible, portable noise barriers will be placed around the equipment with the opening directed away from a receiving property;
- require use of hydraulic or electric models for impact tools -- such as jackhammers, rock drills and pavement breakers – to reduce construction and demolition noise; and
- require operators to lift rather than drag materials wherever feasible.

### 6.20 Aesthetics, Light and Glare (SEIS § 3.4))

In order to minimize aesthetic, light and glare impacts during Project construction, the Applicant will:

- Periodically remove construction debris.

- Replace native vegetation disturbed in non-road surface areas or non-turbine areas as soon as possible.

- Seed or cover temporarily stockpiled materials and disturbed sites that will sit dormant for more than 3 months to keep down dust and prevent soil erosion.

In order to minimize the aesthetic, light and glare impacts of the Project, the Applicant will:

- Maintain high-quality turbine towers, nacelles, and blades, and remove or promptly repair all parts of non-functioning turbines.

To the extent feasible, the Applicant will:

- Construct Project buildings of local materials and in local building styles to maximize their fit in the vernacular landscape.

- Use native shrub-steppe vegetation around buildings and equipment boxes to integrate the structures into surrounding landscape.

- Use existing roads to access turbines.

- Not piggyback advertising, cell antennas, or other clutter on the turbines and not display the logo of the manufacturer prominently on the turbine nacelle.

- Use low-reflectivity, neutral-color finishes for turbines, and other Project facilities. Earth-tone finish will be used on the O&M Facility to better blend it with the surrounding landscape.

- Minimize security lighting at the Project substation, and 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.

### 6.21 Recreation (County FEIS § 3.11)

No significant impacts to recreation were identified, and therefore, no mitigation measures are proposed.

### 6.22 Ground Transportation (County FEIS § 3.12)

The Applicant will mitigate traffic impacts associated with construction of the Project by developing and implementing a Construction Traffic Management Plan.

### 6.23 Air Transportation (County FEIS § 3.13; FAA Lighting Report – Tab 9)

The Applicant will provide to EFSEC copies of the Determination of Non-Hazard certificates issued by the Federal Aviation Administration (FAA) and related information, which demonstrates that the Project will not impact approved flight approaches, flight communications or operations at the Kittitas County Airport (Bowers Field) prior to the start of construction.

The Applicant will equip approximately forty-one turbines with FAA required synchronized flashing red lights for evening/nighttime hours.

### 6.24 Public Services

*Fire Protection and Emergency Medical Services*

The Applicant entered into a Fire Services Agreement with Kittitas County Fire Protection District No. 2 on February 10, 2005. Kittitas Valley Fire & Rescue has replaced the former District No. 2. The Applicant will work with the Kittitas Valley Fire & Rescue District to identify water supplies within the Project Area required for firefighting.

The Applicant will meet implement the following measures to reduce fire risk:

- During construction, power equipment will be equipped with safety features, including spark arrestors and/or approved mufflers, fire extinguishers and shovels.
- Equipment shutdowns will be required during periods of general industrial fire precautions in the local area, and limitations regarding "hot" work with electrical equipment and facilities will be observed.
- In order to prevent fires caused by catalytic converters on vehicles, designated parking areas will be created for workers' vehicles.
- Designated worker smoking areas will be established to reduce the potential for fire.
- The Applicant will develop and implement a worker-oriented fire prevention program to provide additional knowledge of wildfire prevention and control practices to workers.
- The Applicant will provide a "knox box," a fire service access box containing master keys, in all secured areas (i.e., buildings or gates) to facilitate access to the site by fire and emergency medical crews.
- The Applicant will provide fire, emergency medical, police agencies, and KITTCOM with emergency contact and response information relating to the

design of the Project, including the detailed maps of Project access roads, on-site facilities, and Turbines, and an addressing plan.

- The Applicant will institute procedures for rescue operations should an incident occur inside a turbine nacelle (including available on-site emergency rescue equipment).

- The Applicant also will execute an agreement with the appropriate agency addressing training and equipment related to potential high-angle rescue needs at the Project. Alternatively, the Applicant may provide this training and equipment internally through Project resources, in which case, the Applicant will submit a copy of its training regime and equipment list to the EFSEC prior to the start of Project construction.

- During both construction and operation of the Project, the Applicant will locate refuse containers in areas that will reduce the potential for uncontained on-site debris.

- With the exception of natural vegetation, no burning of debris will be allowed without written permits from issuing agencies (DNR and DOE).

- All flammable liquids will be stored according to 1997 Uniform Fire Code and inspected by the responsible agency.

*Law Enforcement*

The Applicant will provide on-site security (including private security patrols as necessary) in order to reduce the potential for Project-related calls to local law enforcement.

### 6.25 Population, Housing and Employment (County FEIS § 3.15)

No significant adverse impacts to population, housing and employment were identified, and therefore, no mitigation measures are necessary.

### 6.26 Fiscal Conditions (County FEIS § 3.16)

The Project will have a significant positive impact on fiscal conditions in Kittitas County. No mitigation measures are proposed.

## 7. DECOMMISSIONING & SITE RESTORATION

The Applicant 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.

At the time the Applicant decides to terminate operation of the Project, the Project will be decommissioned. Decommissioning the Project will 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.

If any turbine generates electricity for fewer than 250 hours during a continuous period of twelve months, it will be decommissioned. However, if a turbine stops generating electricity due to force majeure, mechanical breakdown or malfunction, the Applicant may repair rather than decommission the turbine.

Prior to commencing construction, the Applicant will post a bond or corporate surety in favor of EFSEC, to cover decommissioning costs. The initial amount of the bond or corporate surety will be comparable, on a per turbine basis, to the security required by EFSEC for similar wind projects under its jurisdiction. The bond or corporate surety will name the Project landowners as additional beneficiaries.

## 8. REFERENCES


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