Bear River Wind Power Project
Project Description

Prepared for

Humboldt County Community Development Services, Planning Department

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Prepared by

Shell WindEnergy, Inc.

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ACRONYMS and ABBREVIATIONS

Applicant	Shell WindEnergy Inc.
BMP	Best Management Practices
CBC	California Building Code
CDFG	California Department of Fish and Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CPUC	California Public Utility Commission
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
IOU	Investor Owned Utilities
kV	kilovolt
kW	kilowatt
m	meter
met	meteorological
MRB	Mad River Biologists
MW	megawatt
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory

O&M	operation and maintenance
PCBs	polychlorinated biphenyls
PG&E	Pacific Gas & Electric
Project	Bear River Wind Power Project
ROW	right of way
RPS	Renewable Portfolio Standard
SCADA	supervisory control and data acquisition
SHPO	State Historic Preservation Office
SWE	Shell WindEnergy, Inc.
SWPPP	Storm Water Pollution Prevention Plan
TES	threatened and endangered species
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
ZVI	Zone of Visual Impact

1.0 Introduction

Shell WindEnergy, Inc. (SWE or Applicant) proposes to construct the Bear River Wind Power Project (Project) in Humboldt County, California. It will consist of up to 25 electricity-generating wind turbines with an aggregate nominal nameplate generating capacity of 50 to 75 megawatts (MW) of electricity. The Project will also include an offsite operation and maintenance (O&M) building, an onsite interconnecting road system, onsite underground collector lines and offsite overhead electrical transmission lines, offsite upgrades to facilities owned by Pacific Gas & Electric Company (PG&E), and an onsite collector substation.

To construct and operate the Project, SWE will need to comply with a number of federal, state, and local environmental regulatory requirements and conduct an environmental analysis under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). CEQA review is triggered by the requirement that the applicant secure a Use Permit prior to the development of the project. NEPA analysis is triggered by the Project's need for a take permit from the US Fish and Wildlife Service for potential take of Marbled Murrelet (*Brachyramphus marmoratus*), a bird species federally listed as threatened. It has been determined that consultation under Section 10 of the Federal Endangered Species Act (ESA) is required to obtain the take permit. SWE is preparing a Habitat Conservation Plan (HCP) required for compliance with Section 10. The USFWS is the Lead Agency for NEPA compliance and it has been determined that an Environmental Impact Statement (EIS) is the appropriate NEPA compliance document. The County of Humboldt will serve as the lead agency under CEQA. CEQA and NEPA analyses will be combined in one joint environmental document (EIR/EIS).

This Project Description is intended to provide the County of Humboldt , the CEQA Lead Agency (referred to hereafter as the "County" or "Lead Agency"), and USFWS, NEPA Lead

Agency, with information on the scope of the Project and SWE's efforts to determine the environmental consequences associated with the construction and operation of the Project.

1.1 CEQA/NEPA Purpose and Need

The proposed action requires CEQA and NEPA compliance and it has been determined that an EIR is the appropriate CEQA compliance document and an EIS is the appropriate NEPA compliance document. The Council on Environmental Quality (CEQ) regulations implementing NEPA require that an EIS provide a clearly written statement of the purpose and need for a Project. Section 15124(b) of the State CEQA Guidelines requires a statement of project objectives, including the underlying purpose of the Project.

1.2 Purpose and Need of the Bear River Wind Power Project

SWE proposes to construct a wind energy-generation facility in Humboldt County, California. The Project will be powered by wind energy, a renewable resource. No carbon, sulfur, nitrogen, or mercury air emissions will be produced during the operation of this facility. In addition, the Project will not consume water resources in the generation of electricity; nor will it produce waste heat or significant quantities of solid waste.

As a renewable resource, wind energy is a clean, non-polluting source of electricity. In California alone, wind turbines offset the emission of substantial amounts of carbon dioxide and other pollutants annually that would otherwise be produced by oil, gas-fired, or coal-fired electrical power plants. In 2004, California wind turbines generated 4,258 gigawatt-hours of electricity – about 1.5 percent of the state's gross system power, enough output to light a city the size of San Francisco (California Energy Commission, 2007).

In 2002, California enacted a statewide Renewable Portfolio Standard (RPS) that required retail sellers of electricity to purchase 20 percent of their electricity from renewable resources by 2017. The California Energy Commission (CEC) and California Public Utility Commission (CPUC) accelerated this goal of 20% renewables to 2010 and set the state's 2020 goal at 33 percent. CEC and CPUC are currently developing rules that will apply to investor owned utilities (IOUs), and will later develop rules for electric service providers and community choice aggregators. Municipal utilities are ordered by the legislation to implement RPS programs under their own direction.

In keeping with goals stated in the California RPS and offsetting substantial amounts of carbon dioxide and other pollutants, the purpose and need of the Bear River Wind Power Project is to develop a commercially viable facility to serve the public need for a domestically generated clean renewable energy resource. To meet this goal, it is SWE's objective to minimize or avoid negative environmental impacts and to comply with all applicable federal, state, and local standards and regulations.

1.3 Environmental Process

The submittal of this Project Description to the lead agencies is the first step in the preparation and processing of the required environmental documents for the project. The lead agency under the CEQA is the County of Humboldt and the lead agency under the NEPA is the USFWS. There are state responsible or trustee agencies, such as the Regional Water Quality Control Board (RWQCB), California Department of Fish and Game (DFG) and

others, that will also be involved in the environmental review process. In addition, Section 404 authorization under the Clean Water Act will be needed from the U. S. Army Corps of Engineers if the project requires fill of wetlands.

To prepare the EIR/EIS SWE entered enter into a three-party agreement with the County of Humboldt and EDAW AECOM. A Memorandum of Understanding (MOU) with the USFWS for preparation of the EIS is to be signed by the three parties. The scope and timing of the preparation and processing of the EIR/EIS are found within the agreement.

Also provided within the agreement is the general process of document preparation and processing. This information is to be posted to the project and County websites (with updates as needed). The general steps in the process are:

1. Prepare and submit the Project Description
2. Enter the three-party agreement and develop the EIR/EIS Table of Contents
3. Release the Notice of Preparation (NOP) and publish the Notice of Intent (NOI) in the Federal Register
4. Conduct scoping meeting(s)
5. Review existing studies and conduct additional studies based upon the scoping and results of document review
6. Prepare and process the draft environmental document (Draft EIR/EIS)
7. Provide public review of the draft document
8. Prepare final environmental document (Final EIR/EIS)
9. Provide the final document to the regulatory/trustee agencies for approval and certification
10. Issue Notice of Determination (NOD) and Record of Decision (ROD)

The Final EIR/EIS will address comments received on the Draft EIR/EIS. Upon completion of the final documents and project approval by the County and USFWS a CEQA Notice of Determination and NEPA Record of Decision will be issued. This will allow SWE to move forward with final design and permitting of the Project by other agencies with jurisdiction over the project.

1.3.1 Preferred Alternative

The EIR/EIS will analyze a range of alternatives and identify a preferred alternative. The Lead Agencies will select the preferred alternative based on the following criteria:

- Collaboration with and input from the Responsible Agencies
- Findings from the analysis conducted during preparation of the Draft EIR/EIS
- State and federal agency, local government, tribal, and public comments

Following circulation of the Draft EIR/EIS, the Lead Agencies will prepare and certify the Final EIR/EIS and issue a Notice of Determination and Record of Decision, which will identify a “selected alternative.” The selected alternative will then advance to the design and permitting stage.

2.0 Description of the Bear River Wind Power Project

2.1 Project Location

The Bear River Wind Power Project will be located on private property primarily along the Bear River Ridge within the northern Coast Ranges around Cape Mendocino in Humboldt County, California (Figure 1). SWE has obtained long-term agreements (wind leases) with local land owners to develop the property for the wind energy project.

The Project is located approximately 6 miles south of the City of Ferndale, California. It is accessed from Highway 101 by using either State Route 211(Fernbridge to Ferndale) and the Mattole (Wildcat) Road to Bear River Ridge Road or from Rio Dell via Monument Road to Bear River Ridge Road. The Project is located in the township range and sections shown in Table 1.

Table 1
Estimated Project Location by Township and Range
Bear River Wind Energy Project

Township	Range	Section
1 North	1 West	15, 17, 18, 20, 21, 22, 23, 24
1 North	2 West	1, 2, 3, 4, 5, 6, 7, 8, 9, 12
1 North	3 West	1, 2, 11, 12
2 North	2 West	33, 34, 35

The Project area is currently used primarily for agriculture (i.e., cattle production) and timberland management and is identified in Humboldt County Zoning Regulations (Chapter 4, Section A, Section 314-1) as zones:

- U (Unclassified)
- AE-160 (Agriculture Exclusive, Minimum Lot Size 160 Acres)
- TPZ (Timber Production Zone)
- AE (Agriculture Exclusive)

Access to the Project site is allowed under existing agreements with area land owners.

2.2 Project Overview

The Bear River Wind Power Project would consist of up to 25 wind turbines with an anticipated total generating capacity of up to approximately 50 to 75 MW. The wind turbines will be arranged within turbine "strings" and be sited within 500-foot-wide study corridors. The 500-foot study corridors were selected to allow flexibility in the final siting of turbines, roads, and other associated infrastructure. The precise locations within each corridor will be determined by SWE and will be based on the wind turbine model selected and various siting criteria such as optimal wind speed, geotechnical conditions, and consideration of sensitive resources. Figures 2A and 2B show the Project layout for a 25 turbine facility using USGS

topographic and high-resolution photography for the base layer. Close-ups of the turbine string using high resolution photography are provided in Figures 2.1 through 2.5.

The manufacturer, model, size, and total number of the wind turbine generators have not yet been selected for the Project. For the purposes of this Project Description, SWE will base its turbine and tower specifications on the Vestas V80 2MW turbine model (Table 2). The V80 turbines have a capacity of 2.0 MW each and are designed for various average wind speed (high, medium, and low) conditions. The Vestas turbines are largely representative of the types and dimensions of the turbine models that are being considered for the Project. It should be noted that the differences in the various wind generating turbine models are relatively small, and potential impacts associated with each turbine model will be essentially similar.

In addition to the turbines, the Project includes the following improvements:

- Approximately 5 miles of newly constructed onsite access roads, turbine string roads and turn-around areas. Various improvements to offsite public roads are required to enable the delivery of wind turbine components and to provide access for construction equipment.
- Up to three permanent meteorological towers (onsite).
- A site control and data acquisition system (onsite).
- A onsite 34.5-kilovolt (kV) power collection system will deliver power to the onsite substation. The collector cables will be placed in trenches and buried underground between turbine locations. The underground collection system will terminate at the onsite facility substation.
- An onsite Project substation where power from the 34.5-kV collection system will be stepped up to the voltage required for the interconnection to the regional transmission system. (Figure 2A).
- An overhead transmission line. Power from the Project substation will be transmitted via an overhead transmission line, to the Pacific Gas and Electric (PG&E) regional transmission system. The Project will be interconnected to the PG&E regional transmission system at the Rio Dell 60-kV substation located approximately 12 miles east of the Project. It is anticipated that the Rio Dell bus will be upgraded from 60 kV to 115 kV prior to the installation of the interconnection from the Project.
- An O&M facility will be located offsite and will include a main building with offices, spare parts storage, restrooms, a shop area, outdoor parking facilities, a turn-around area for larger vehicles, outdoor lighting, and a gated access with partial or full-perimeter fencing.

Figure 1 Site Vicinity Map

Figure 2A Project Layout Map: High-Resolution

Figure 2B Project Layout Map: High resolution

Figure 2.1 Turbine Locations Close-up Map

Figure 2.2 Turbine Locations Close-up Map

Figure 2.3 Turbine Locations Close-up Map

Figure 2.4 Turbine Locations Close-up Map

Figure 2.5 Turbine Locations Close-up Map

The following sections provide detailed information about Project components, including the wind turbines, roads, electrical system, communication system, substation, network upgrades, O&M facility, meteorological towers, access roads, and laydown areas.

2.2.1 Major Wind Power Project Components

Turbines: Wind turbines consist of two main structures: a tubular tower and the nacelle, which rests on the tower. The nacelle houses equipment such as the gearbox and supports the turbine blades and rotor hub. The wind turbines under consideration for the Project have an approximate tower height of 263 to 306 feet and rotor diameters that range from 263 to 306 feet with a total height of 395 to 416 feet. A diagram of a typical turbine can be found in Figure 3. Note that these dimensions are not specific to the turbines under consideration for the Project.

Tower: The tower is a free-standing, painted steel, conical-type (tubular) structure that is manufactured in multiple sections. Towers are delivered to the site and erected in sections. Each section is bolted together via an internal flange. An access door is located at the base of each tower. An internal ladder runs to the top of the tower just below the nacelle. The tower is equipped with interior lighting.

Nacelle: The gearbox, generator, and various control equipment are enclosed within the nacelle, which is the housing of the unit that protects the turbine mechanics and electronics from environmental exposure. A yaw system is mounted between the nacelle and the top of the tower on which the nacelle resides. The yaw system is comprised of a bearing surface for directional rotation of the turbine and a drive system consisting of a drive motor(s) to keep the turbine pointed into the wind to maximize energy capture. A wind vane and anemometer are mounted at the rear of the nacelle to signal the controller with wind speed and direction information.

Rotor: Wind turbines are powered by three composite or fiberglass blades connected to a central rotor hub. Wind creates lift on the blades, causing the rotor hub to spin. The hub is connected to a gearbox which increases the speed of rotation to the speed required for the attached electric generator that is housed in the nacelle. The rotor blades turn slowly, 9-19 revolutions per minute (rpm). The blades are non-metallic and are equipped with a sophisticated lightning suppression system.

Table 2 Potential Turbine Specifications

Turbines	SIEMENS 2.3MW SWT-93 (Largest)	2.0 MW Vestas V80 Turbine
Numbers needed	22	25
Tower Type	Tubular	Tubular
Blade (Rotor) Diameter	306ft (93 m)	263 ft (80 m)
Hub Height	306ft (83 m)	263 ft (80 m)
Total Turbine Height	416 ft (127 m)	395 ft (120 m)
Tower Base	16 ft (diameter)	13 ft (diameter)
Weight (nacelle and tower)	267 US tons	209 US tons[a]

Notes:

All values are approximate.

[a] The weight of the turbine does not include the blades. The total weight of metal in the turbines is not less than 310 U.S. tons

Abbreviations:
ft = feet.

m = meters.

Roads

Access roads and turbine string roads will be located to minimize disturbance, avoid sensitive resources (e.g., erosion into watercourses, or disturbance of raptor nests and cultural resource sites), and maximize transportation efficiency. Each turbine has slightly different equipment transport and crane requirements. These requirements dictate road width and road turn radius. To allow safe passage of the large transport equipment used in construction, all-weather gravel roads will be built with adequate drainage and compaction to handle 15-ton-per-axle loads.

Permanent road widths would range from approximately 16 feet for existing roads providing access to the Project (access roads) to 24 feet for roads directly accessing Project turbines (turbine string roads). Turbine string roads will be 24 feet wide with 16 feet of temporary shoulder (8 feet on each side of the road) to allow for the movement of large construction cranes and turbine equipment transport trucks. The access roads will provide enough room for trucks and equipment to pass areas where turbines are being erected. The need for turnouts will be determined during transportation planning and will be dependent on the condition of the road and safety considerations.

The Project will require the construction of approximately 4.5 miles of new access and turbine string roads. The Project will utilize the existing road system, and approximately 3.4 miles of existing roads will require temporary and permanent improvements. Because existing onsite roads generally range from 15 to 26 feet wide, the additional area needed for improving roads for permanent use and installing temporary shoulders and turn-around areas for the construction period is relatively small. Permanent and temporary disturbance impacts are shown in Table 3.

Offsite Road Improvements

It is anticipated that offsite road improvements will be required. A detailed analysis of these required improvements will be identified in a future transportation study.

Electrical System

Each wind turbine generates electricity at approximately 600 volts. The low voltage from each turbine generator will be increased to the 34.5 kV level required for the medium-voltage collector system via a transformer located at each turbine. The power collection system would consist of medium-voltage, high-density, insulated underground "collector" cables that connect each separate turbine to a substation. These underground collector cables will be buried in parallel trenches. These trenches will be primarily located alongside the roadbed of the turbine string. In some cases, underground cable trenches would need to be located outside of the roadbed. An estimated 1.9 acres of ground disturbance will occur as part of the trenching for underground collector lines. At the substation, voltage will be further increased (stepped up) to 60 kV. The stepped-up power would then be delivered through the overhead transmission interconnect lines to the transmission grid.

Communications/SCADA System

Each wind turbine generator contains electronic devices to continuously monitor turbine performance. A supervisory, control, and data acquisition (SCADA) system installed at the Project site will collect operating and performance data from each wind turbine and the Project as a whole, and provide remote operation of the wind turbines. The SCADA software consists of applications developed by the turbine manufacturer or a third-party SCADA vendor. Underground communication cables will be buried in the same trenches as the medium-voltage electrical system.

Substation

The main functions of the substation are to step-up the voltage from the collection lines (34.5 kV) to the transmission level (60 kV) and to provide fault protection. The basic components of the step-up substation facilities are a control house, a bank of one or two main transformers, outdoor breakers, capacitor banks, relaying equipment, high-voltage bus work, steel support structures, an underground grounding grid, and overhead lightning suppression conductors. All of the main outdoor electrical equipment and control house will be installed on concrete foundations. The exact footprint of the substation would depend largely on the utility requirements, the number of turbines used, and the resulting nameplate capacity, which would determine the number of 34.5 kV feeder breakers. The substation would consist of a graveled footprint area of approximately 1 acre; a 12-foot, chain-link perimeter fence with appropriate signage; and an outdoor lighting system.

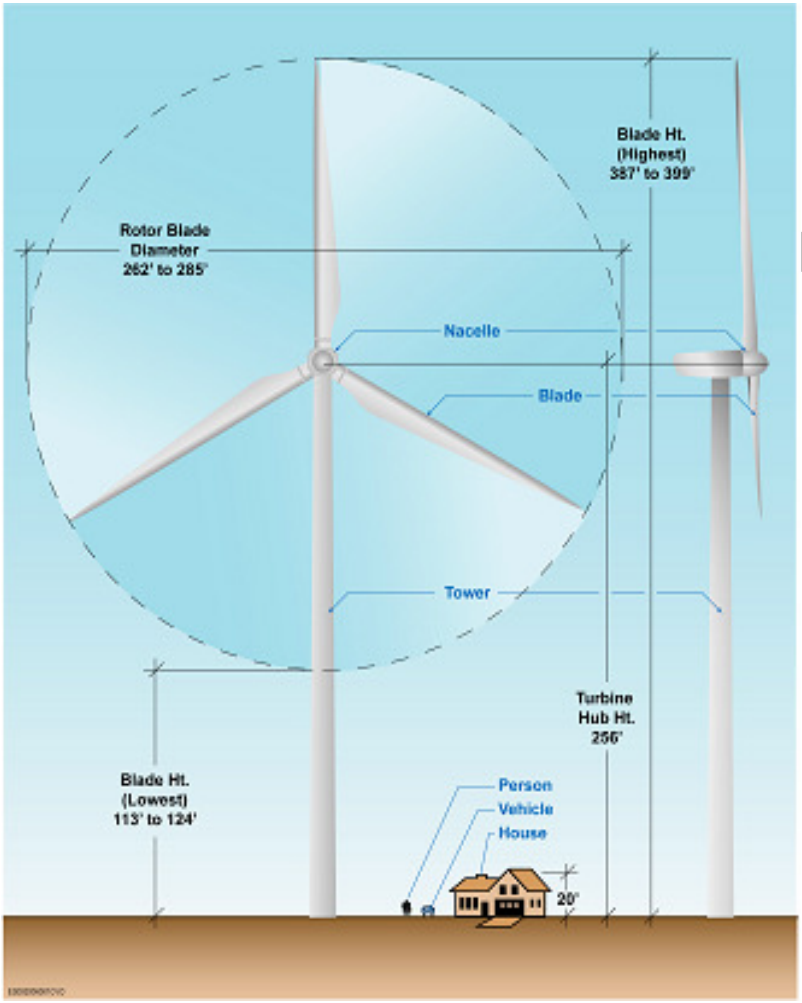


Figure 3 Diagram of a Typical Wind Turbine

Transmission Interconnect Line

The substation(s) would connect the Project to existing transmission grid via an aboveground 60 kV transmission interconnect line. The transmission interconnect line will be hung from a monopole structure approximately 60 to 65 feet tall (Figure 4a) or from similar structures selected by the Project's engineer. Responsibility for maintenance and ownership of the line is still under review, however, construction of the line will be to PG&E standards.

Electric and magnetic fields (EMF) are produced by high voltage distribution and transmission lines. Magnetic fields associated with powerlines depend on the line voltage and on the amount of current flowing along the line. The typical EMF field strength produced by an electrical power transmission line is 20 Milligauss, at grade directly below the line. This strength is equivalent to the EMF production of common household items, such as an electric blanket or hair dryer.

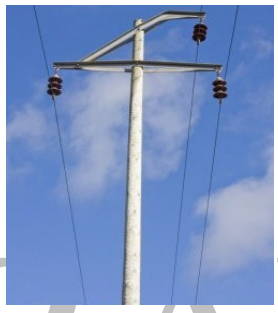


Figure 4a. Typical Monopole Transmission Interconnect Line Support Structure

The routing for the 60 kV transmission interconnect line has yet to be finalized. A preferred alternative has been identified in Figure 4b as Alternative A. Route alternatives include a combination of using Bear River Ridge Road, Monument Road, or individual landowner's property adjacent to these roads. These alternative routes have been illustrated in Figure 4b. In addition to routing corridors, the report addresses constructability, environmental and permitting considerations for the transmission interconnect line.

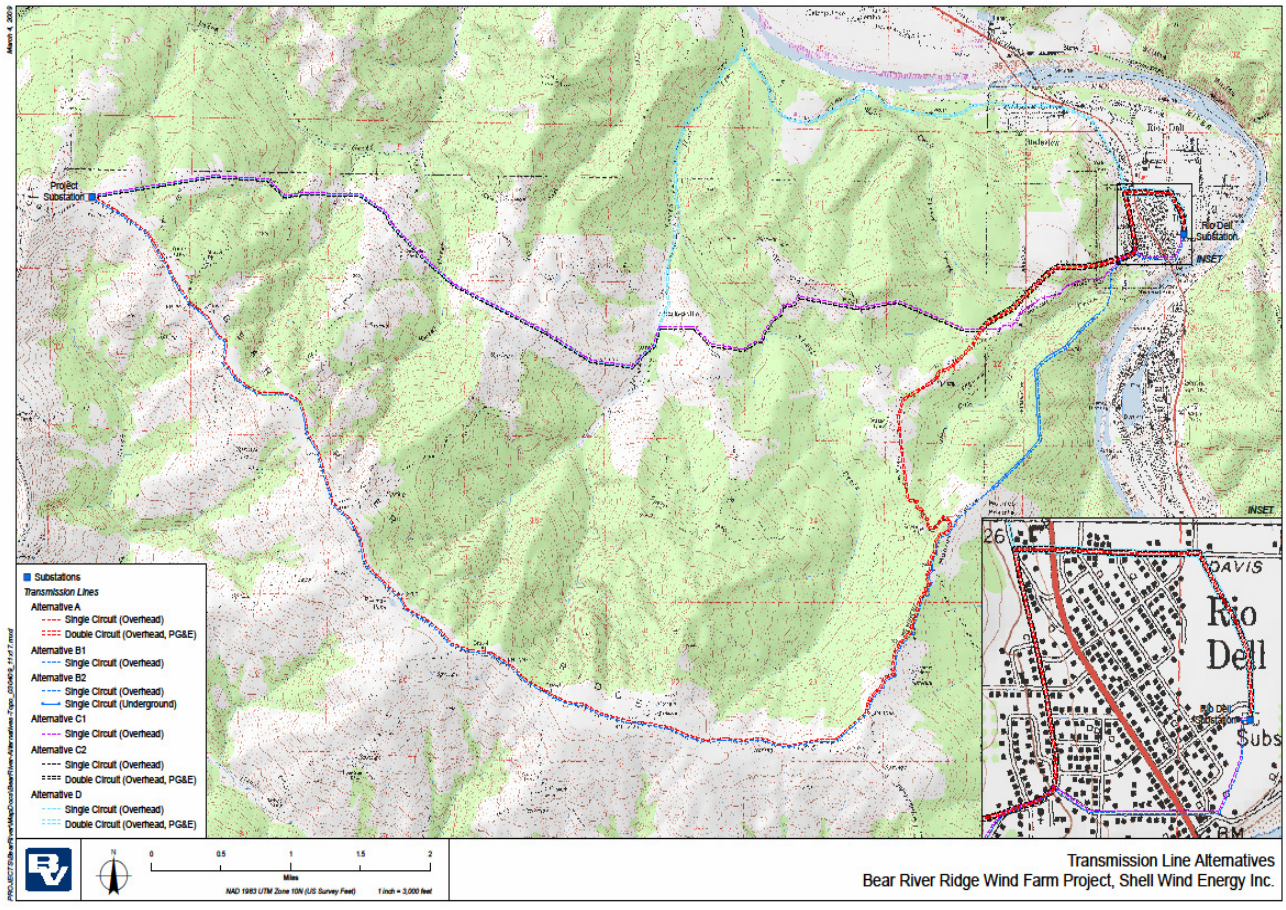


Figure 4b. Transmission Line Alternatives

Network Upgrades

An evaluation of the transmission network in Humboldt County determined that upgrades to the existing network will be required for the Project. The work scope includes the reconductoring of the following overloaded transmission lines by PG&E:

- Humboldt Bay - Rio Dell Jct 60 kV (Newburg - Rio Dell Jct)
  4.75 miles with 954 al or equivalent conductors
- Rio Dell 60 kV Tap Line
  2 miles with 477 aluminum or equivalent conductors
- Humboldt Bay - Eureka 60 kV Line
  2 miles with 477 ACSR or equivalent conductors
- Humboldt Bay - Rio Dell Jct 60 kV Line (Humboldt Bay - Eel River - Newburg)
  13 miles with 954 aluminum or equivalent conductors
- Humboldt - Eureka 60 kV Line (Harriss - Harris Tap - Eureka)
  3.6 miles with 477 aluminum or equivalent conductors
- Humboldt - Humboldt Bay #2 60 kV Line
  6.5 miles with 954 aluminum or equivalent conductors

A map of the of the lines to be reconductored can be found in Figure 17.1.

In addition to the above transmission line upgrades, the Project will also upgrade the existing Rio Dell Substation with a four-breaker ring bus configuration. The amount of additional footage required is currently being determined by PG&E.

Operations and Maintenance Facility

As previously discussed, the O&M facility will be located offsite in Ferndale, Rio Dell, or another town/area zoned for this type of facility. It is anticipated that a final location will be identified in the near future. The O&M facility will be sited in an appropriately zoned area and would include a main building with offices, spare parts storage, restrooms, a shop area, outdoor parking facilities, a turn-around area for larger vehicles, outdoor lighting, and a gated access with partial or full-perimeter fencing. The O&M building will have a foundation footprint of about 50 by 100 feet. The projected permanent footprint of the O&M facility (including parking area) will be about 2 acres. The building will be painted a neutral color to match the surrounding area and will be landscaped with vegetation grasses and shrubs. An image of a typical O&M building can be found in Figure 4c.

Figure 4c. Typical Operations and Maintenance Building

Meteorological Towers

Up to three permanent meteorological (met) towers will be placed in the Project area for the collection of meteorological data. All permanent meteorological towers will be free-standing (unguyed) structures. The towers will be approximately 165 ft high (50 m) with an equilateral triangle base, each side of which will be roughly 25 ft (8 m) long.

The Project currently includes five guyed temporary (permitted) met towers. Two of the five temporaraty met towers will likely be replaced with an unguyed tower in their present locations as permanent met towers. A figure showing the proposed permanent met tower locations and roads to the met towers is provided in Figure 1, 2A and 2B. Temporary and permanent disturbance area calculations for roads to the met towers are provided in Table 3.

2.3 Project Construction, Operation, and Safety

The Project would use standard construction and operation procedures typically used for wind power projects in the western United States. These procedures, with minor modification to allow for site-specific circumstances and differences between turbine manufacturers, are summarized below.

2.3.1 Construction Practices

Staging/Equipment Laydown Areas

To facilitate the construction of the Project, a staging area will be needed. The staging area will be located onsite, will be approximately 10 acres in size and will be used for the temporary storage of turbine components, construction equipment, and other supplies. Should a temporary batch plant be needed for completion of the Project, an additional 5 acres will be required. The purpose and details of the batch plant are addressed below. SWE is currently conducting a study to determine if facility batch plant will be required Project construction.

Road Construction

To obtain preliminary roadway footprints, profiles and sections will be developed for the Project roads. Two-foot contour data will be used to develop a digital terrain model that represents the existing ground. A horizontal alignment will be created and overlaid on the digital terrain model. This alignment will meet the requirements for the type and size of equipment that will be delivering materials and constructing the Project. The roadway alignment generally requires the following design features:

- The site access roads (24 feet wide) and improved or newly constructed access roads (16 feet wide) will have gravel surfaces, with less than 2 percent crown or inslope with ditch and culverts as required on uphill side.
- Approximate maximum grade is 10 percent.
- Approximate maximum allowable dip is 6 inches in 50 feet. Maximum allowable bump is 6 inches in 50 feet.

- On turns, the approximate minimum inside radius is 82 feet. The minimum outside radius is 115 feet (so at the apex of a 180-degree turn, the road is 33 feet wide).

A profile will be developed from the digital terrain model along the horizontal alignment, and a vertical alignment will be developed along the profile that meets the requirements. A typical section will be developed that meets the requirements and will be placed every 20 feet along the horizontal and vertical alignment. Cut-and-fill lines will be developed on the digital terrain model at the 20-foot interval and interpolated between the 20-foot placements.

The numbers generated for area along with cut-and-fill volumes for the Project roadways will be based on general assumptions and approximate locations of the Project features. These numbers will be for analysis purposes only. Final location of the road and the cut-and-fill volumes will be based on grading, construction and environmental permitting requirements, topography, and sound engineering principles. A cross-section of a typical site access road is shown in Figure 5. A cross-section of a typical site access road in cut and fill is shown in Figure 6.

Fill or road base material in excess of that generated from road cut activities will be obtained from a licensed offsite private source or onsite borrow areas approved under Project permits. Topsoil removed during road construction will be stockpiled at Project staging areas. The stockpiled topsoil will be spread again on cut-and-fill slopes, and then re-vegetated as soon possible following road construction, as described in the Construction Storm Water Pollution Prevention and Erosion Control section below.

Turbine Pads

At each turbine pad, a 26,000 square-foot (for 2.3MW turbines) or 21,400 square-foot (for 2.0MW turbines) laydown area will be required for off-loading and storage of the tower sections, nacelle, rotor hub, and blades. In addition, this area would include a crane pad (constructed adjacent to the turbine access road) to allow a large track-mounted crane to access the turbine foundations. In level or near-level terrain, this laydown area would not need to be graded or cleared of vegetation. The crane pad will be nearly flat to allow the crane to lift the turbine components safely. The crane pad will be constructed using standard cut-and-fill road construction procedures (Figure 7).

Construction access to this area will be limited to wheeled and track vehicles. Crushing of vegetation and soil compaction will be expected to occur. Following construction, temporarily disturbed areas will be recontoured and seeded (Figure 8).

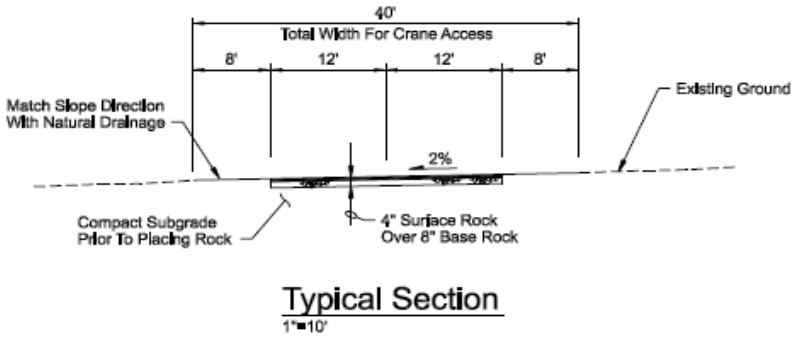


Figure 5. Typical Cross-Section for Site Access Roads

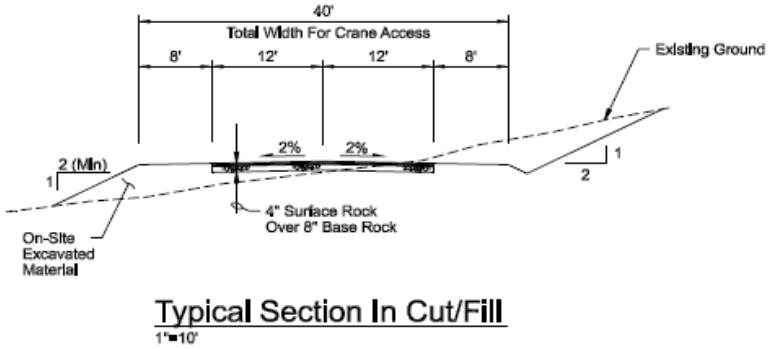


Figure 6. Typical Cross-Section for Site Access Roads in Cut and Fill

Turbine Foundations

A Preliminary Geotechnical and Geologic Hazards Report prepared for the project concluded that either the inverted "T" spread foundation (wide and shallow design) or proprietary Patrick & Henderson pier or rock anchor (socket) foundation are suited to support the large wind turbine structures for the expected shallow soil over the variably hard rock conditions at the project site." The exact type of foundation will not be determined until more detailed engineering and geotechnical work is done in the construction planning stages, however, for the purpose of addressing the potential environmental impact resulting from the foundation footprint, Applicant has assumed a foundation resulting in the maximum disturbed area. Final selection on foundation type will not be determined for another year or more. The rock anchor or socket foundation is detailed below as an example of what the installation of a typical foundation could entail.

Rock socket foundations for the turbines involve making a roughly circular excavation approximately 16 feet in diameter and 25 to 30 feet deep. Prior to the excavation of ground, soil borings will be taken at each turbine site to determine groundwater depth. Should groundwater be encountered, a Geotech engineer will design a sub-foundation drainage

system which would allow for groundwater to be drained down the slope of the foundation. Boreholes about 3 inches in diameter are drilled to a depth of 2 feet below the foundation depth (i.e., 27 to 32 feet deep).

Packets of explosives about the size of soda cans (each containing about 2 pounds of explosive) are lowered into the boreholes (one packet per each foot of depth) and the remaining space is filled with sand. Rock within the excavation area is first fractured by delayed detonation blasting in interior and perimeter bore holes (Figure 9). The majority of the energy released by the detonation is consumed in fracturing rock within a conical zone a maximum of twice the depth of the foundation (i.e., 48 to 56 feet). The remaining energy is transferred away from the blast in ring waves as elastic vibration in the rock (no permanent deformation of the rock) and air vibration. Rock vibrations should dissipate within less than 200 feet from the foundation site. The fractured rock is subsequently removed from the excavation area (Figure 10).

Two sections of concentric steel conduit forms are lowered into the excavation (Figure 11). Concrete slurry is pumped between the outside of the larger diameter conduit and the perimeter of the excavation. Spoils from the excavation are used to fill the inside of the smaller diameter conduit. A bolt structure is lowered into the area between the two conduits (Figure 12) and concreted into place (Figure 13a). The wind turbine tower is connected to the protruding bolts.

To ground the turbines adequately to prevent damage from electrical storms, 3-inch-diameter, 30-foot-deep holes may be required for placement of turbine grounding rods as needed. These holes will be located adjacent to the turbine foundations within the 90-foot diameter area that is cleared for foundation construction. Following placement of the grounding rods, the holes will be backfilled and capped with concrete.

Figure 7 Typical Turbine Pad Layout

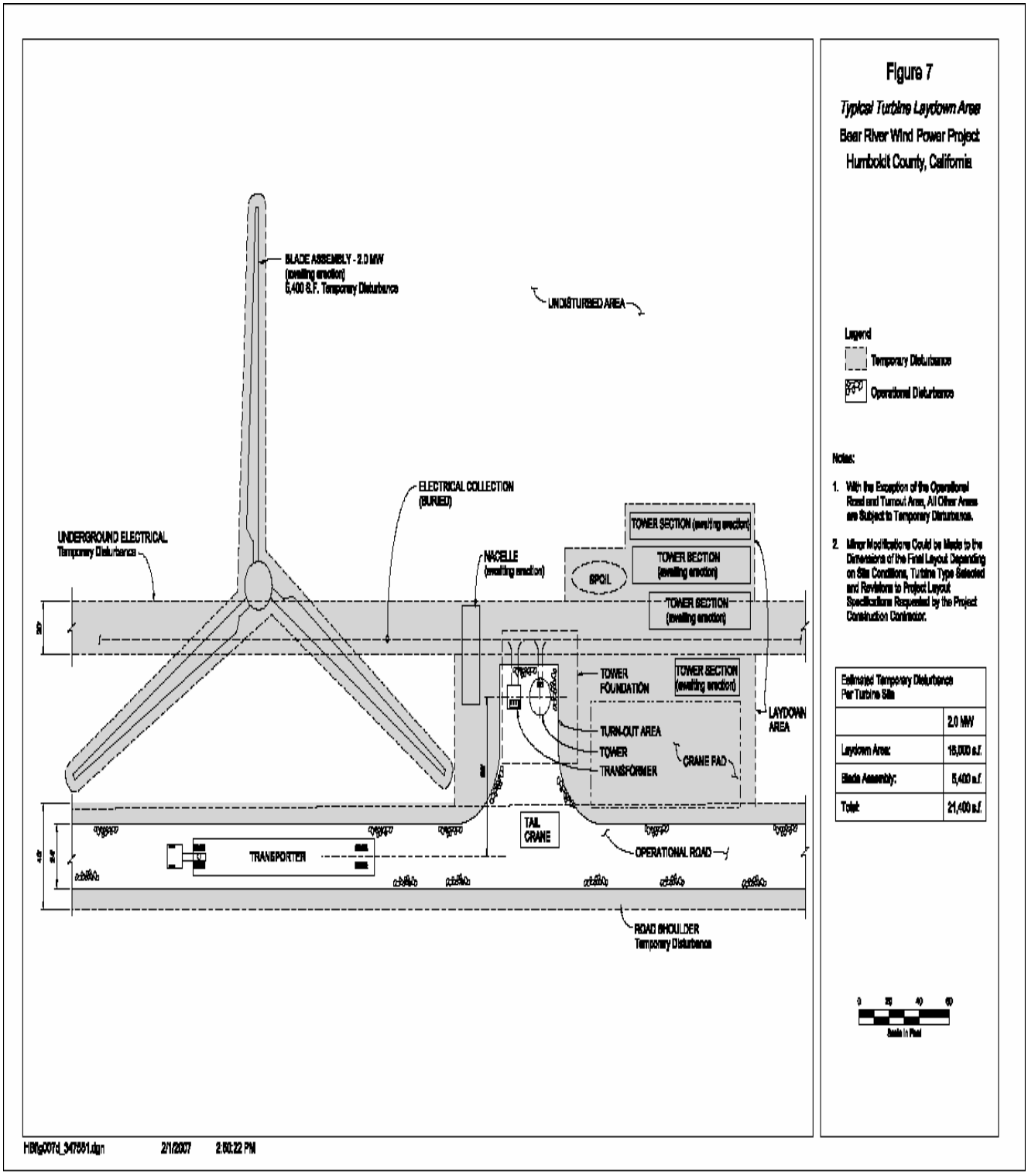
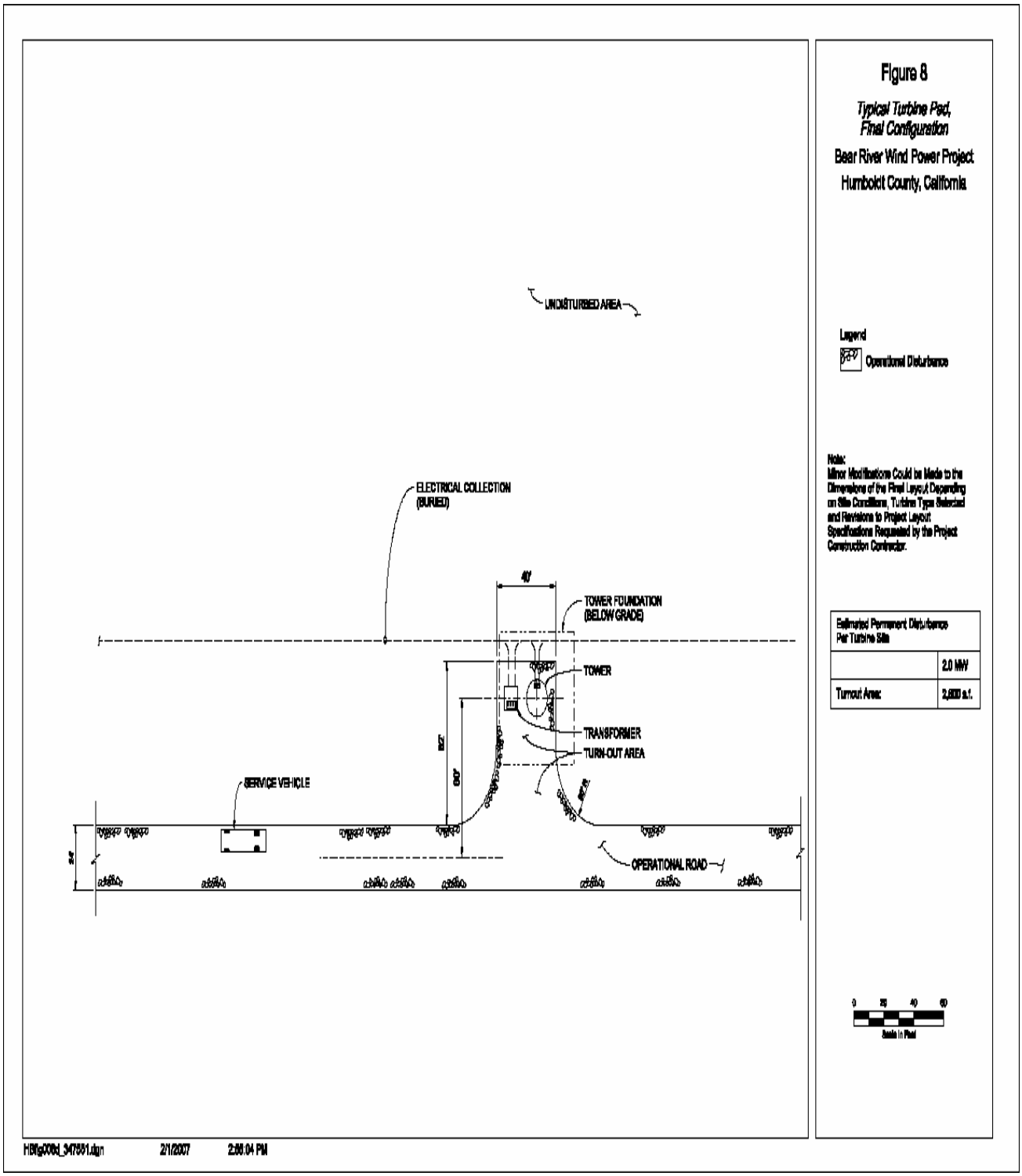


Figure 8 Typical Turbine Pad Final Configuration



Tower Erection

Two cranes, or one with a spreader bar, will be used to offload tower sections. Base and lower mid tower sections will be erected using a crane and a cherry picker as a tailing crane (or other small crane). The upper mid and top tower sections will be lifted with the large erection crane and a tailing crane. Blades will be attached to the hub on the ground and then lifted with the large erection crane and a tailing crane. The nacelle will be erected with the large erection crane only.

Underground Communication and Electrical Cables

Trenching equipment will be used to excavate trenches near the access roadbed to bury the insulated underground cables connecting the turbines to the Project substation. Large conductor cables will be placed (and packed in sand or native materials depending on the soil properties at the Project site) within the trenches and covered to protect the cables from damage or possible contact. Optical fiber communication links will be placed in the same trenches as the conductor cables. The depth and number of trenches will be determined by the size and number of the cables required and the thermal conductivity of the soil or rock surrounding the trench.

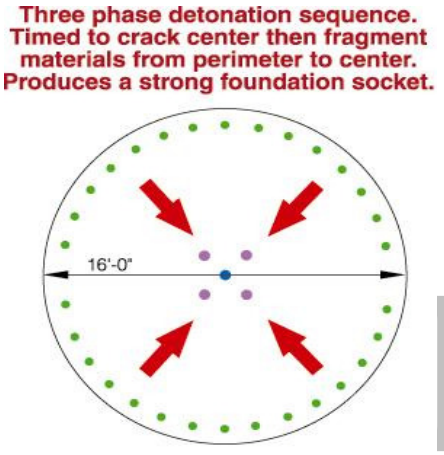


Figure 9. Detonation Sequence for Tower Foundation Blasting


Figure 10. Excavation of Tower Foundation Hole Following Blasting


Figure 11. Two Steel Conduit Foundation Forms


Figure 12. Bolt Structure for Tower Foundation


Figure 13a. Foundation Bolts Ready for Concrete Pour

Transmission Interconnect Line Construction

Transmission interconnect line construction would use standard industry procedures including surveying, right-of-way (ROW) preparation, materials hauling, structure assembly and erection, ground wire, conductor stringing, cleanup, and restoration. All transmission lines and structures will be designed to minimize the perching of raptors and other birds according to industry standards as outlined by the Avian Power Line Interaction Committee (APLIC 2006). Construction procedures described below will be the same for both transmission line routes.

The overhead 60 kV transmission interconnect lines will be constructed on wooden or metal monopole structures. The structure holes will be approximately 3 feet in diameter and 10 feet deep. They will be auger drilled unless consolidated rock is encountered. Then structure holes will be advanced using dynamite. All blasting will be conducted by a permitted contractor and will be in compliance with state and federal regulations. Structures will be assembled onsite. Aboveground pole height would range from 60 to 65 feet. The disturbed surface area at each structure location would average 50 feet x 50 feet. Structure erection and conductor stringing would occur sequentially along the transmission interconnect line corridor.

Existing public and private roads along with roads constructed or improved for the Project will be used to transport materials and equipment from staging areas to ingress points along the transmission interconnect line using the shortest distance feasible. The interconnect line would require the installation of a temporary construction ROW. The construction ROW will be a 12-foot-wide area, which is cleared of large boulders to allow high ground clearance vehicles to pass. The trail will be installed to allow access to support the construction of the interconnect lines. Clearing of vegetation and minor grading may be necessary at some of the transmission interconnect line structures to facilitate their construction. After construction is complete, the trail will be used approximately twice a year for inspection and maintenance. Native vegetation will be allowed to re-establish over the trails to the extent that four-wheel-drive vehicle travel remains practical. Barriers will be placed where the interconnect line intersects roads to prevent unauthorized traffic onto the transmission line corridor.

Batch Plant

The Project will require up to 11,000 cubic yards of concrete for construction of the wind tower and substation foundations. Depending on weather conditions, concrete typically needs to be poured within 90 minutes of its mixing with water. Delivery time to pour locations may exceed 90 minutes from existing concrete suppliers in the vicinity of the Project area or from potential offsite staging areas. Therefore, a temporary concrete batch plant may need to be constructed within the Project area to keep within the delivery time needed. SWE is currently conducting a study to determine if using existing concrete suppliers in the vicinity is a viable option.

If determined necessary, the temporary concrete batch plant would be located onsite at a central location within the confines of the staging area and would require an area

approximately 5 acres in size. Vegetation would be cleared and the ground leveled, and a 1-foot-high earth berm or other appropriate erosion control devices, such as silt fences and straw bales, would be installed around the area to contain water runoff. Diversion ditches would be installed as necessary to prevent stormwater from running onto the site from surrounding areas. The batch plant would operate during Project construction hours for approximately 2 to 3 months of the 8-month construction period. The batch plant would require a stand-alone generator approximately 250 kilowatts (kW) in size. The generator would draw fuel from an approximately 500-gallon aboveground storage tank with secondary storage for spill prevention. It is estimated that the batch plant would consume from 10,000 to 15,000 gallons of water per day. At a minimum, a 10,000-gallon water tank would be required onsite and would be replenished as needed.

Stockpiles of sand and aggregate would be located at the batch plant in a manner that would minimize exposure to wind. Cement would be discharged via screw conveyor directly into an elevated storage silo without outdoor storage. Construction managers and crew would use good housekeeping practices to keep the plant, storage, and stockpiles clean and to minimize the buildup of fine materials. Cement trucks would be cleaned and washed at the batch plant. Cement residue would be washed from the cement delivery trucks into an aboveground settling pond. Cement residue would be collected from the settling pond and trucked offsite for disposal, as needed.

Following completion of construction activities, the Applicant's contractor would rehabilitate the temporary batch plant area. The area would be re-contoured, stockpiled topsoil would be replaced, and the area would be re-seeded with a designated mixture of native grasses, forbs, and shrubs.

Water Use

During construction, a total of approximately 3 million gallons of water will be required for road compaction, underground collection line installation, dust suppression, and concrete mixing. Approximately half the water consumption will be for dust control and the other half for all other construction activities. These usage rates are based on water consumption rates for similar wind energy construction projects in the western United States. Daily usage for facility construction will vary, depending on the timing of construction and the weather, because the need for dust control will be greater during the summer than at other times of the year.

No new wells would be drilled or springs developed for the proposed Facility. Water needed for the construction activities would be provided through a nearby water source with a permitted water right issued through the State of California, State Water Resources Control Board (SWRCB) Division of Water Rights.

SWE could obtain water from the permitted water right under a Petition For Temporary Transfer of Water/Water Rights (Water Code 1725) permitted through the SWRCB, Division of Water Rights.

Portable Rock Crusher

To construct the Project's roads, a rock crusher will be required to provide appropriately sized aggregate for fill and road base. The rock crusher would have an average capacity of approximately 20,000 tons per day. The crusher would operate during Project construction hours for approximately 4 to 5 months of the 8-month construction period. In accordance with BMPs, the rock-crushing area will be sprayed by a water truck to suppress dust. The crusher contains several dust-suppression features including screens and water spray. Dust-control measures will be used at all emission points during operation, including start-up and shutdown periods, as required.

Trailer Pad

Contractors constructing the Project would require onsite mobile trailers to provide for management of and communication to the workforce. The mobile trailers would also house a first aid station, emergency shelter, portable restrooms, and hand-tool storage area for the construction workforce. The trailer pad will be located at the southern end of the center turbine string. Vegetation will be cleared and the ground leveled over an area of about 200 by 500 feet. The ground surface will be graveled to limit dust and mud within the area.

Total Land Area of Bear River Wind Project Related or Supporting Facilities

The approximate land area of the related or supporting facilities is estimated in Table 3.

Table 3
Estimated and Approximate Area of the Energy Facility and Related or Supporting Facilities
Bear River Wind Energy Project, Shell Wind Energy

Facilities	Units of Measurement	Approx. Unit Area	Approx. No. of Units	Approx. Total Area in Acres
Permanent Facilities				
Turbine Pads/Towers [a]	Square feet per tower	2,800	25	1.61
Substation/Alternative Substation	Acres	1	1	1
Met Towers [b]	Square feet	312	3	<0.02
O&M Facility (Building) [c]	Square feet	5,000	1	<0.11
Access Road to Met Tower	Square feet disturbed area per linear foot of road	24	1,829	1.01
O&M Facility Site, (includes parking and O&M building)	Acres	1	1	1
Rio Dell Substation	Square feet disturbed area	tbd	tbd	tbd
Roads, New [d]	Square feet disturbed area per linear foot of road	24	26,239	14.46
Roads, Improved [d]	Square feet disturbed area per linear foot of road	24	8,612	4.74
Turn-around Areas	Square feet	7,854	4	0.72
Total Permanent Facilities				24.67
Temporary Facilities				
Roads, Construction [e]	Square feet disturbed area per linear foot of road	16	34,850	12.80
Staging Area	Acres per area	10	1	10

Table 3
Estimated and Approximate Area of the Energy Facility and Related or Supporting Facilities
Bear River Wind Energy Project, Shell Wind Energy

Facilities	Units of Measurement	Approx. Unit Area	Approx. No. of Units	Approx. Total Area in Acres
Turbine Laydown Areas (2.0MW x 25 is used for worst-case)	Square feet per laydown area	21,400	25	12.28
Temporary Access for Overhead Line Construction	Square feet disturbed area per linear foot of road	20	TBD	TBD
Underground Collector Cable Disturbed Area [f]	Square feet of disturbed area per linear foot of trench	20	73,781	33.88
Total Temporary Facilities				68.96

[a] Based on 25 turbines.

[b] Meteorological tower impact will not include guy wire; the footprint of the base is approximately 312 square feet.

[c] The O&M building area is included in the offsite (1 acre) O&M facility area. The facility area will be located in Ferndale, Rio Dell, or some other town/area zoned for this purpose.

[d] Does not include existing roads. Unit equals linear feet. Total area equals square feet of disturbed area multiplied by linear foot of road converted to acres.

[e] Temporary construction shoulder will be 16 feet for all turbine string roads. Actual total temporary disturbance is based on linear feet of both new roads and existing roads needing improvement. Some existing roads are > 24 feet wide and may require less shoulder area.

[f] Disturbance from underground electric collection system is based on 20 square feet per lineal foot of trench for first circuit, plus 12 square feet per lineal foot of trench for each additional paralleling circuit.

Construction Storm Water Pollution Prevention and Erosion Control

A National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (Construction General Permit) Water Quality Order 99-08-DWQ will be obtained from the California State Water Resources Control Board (SWRCB) - Division of Water Quality (DWQ) prior to construction. A Storm Water Pollution Prevention Plan (SWPPP) that includes erosion control measures will be generated and implemented onsite for the project. The SWPPP will include the elements described in Section A of the Construction General Permit including a site map(s), which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP will also list Best Management Practices (BMPs), including erosion control BMPs that will be used to protect storm water runoff and the placement of those BMPs and will include a description of required monitoring programs.

The SWPPP will be based on the Environmental Protection Agency (EPA) document entitled “Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices.” Guidance from other documents, such as the Caltrans publications “The Construction Site Best Management Practices (BMPs) Manual" and the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution

Control Program (WPCP) Preparation Manual," may also be included in the SWPPP. The SWPPP will be developed with the civil design of the project.

Erosion and sediment control measures that are to be taken into consideration will be:

- Erosion control measures include earthen berms, silt fences, straw bales, sedimentation ponds, and rainfall diversion ditches. The conditions under which each of these erosion control measures are implemented are found in CalTrans manuals, such as "The Construction Site Best Management Practices Manual" and the "SWPPP and Water Pollution Control Program Preparation Manual."

- Restoration will occur at all disturbed areas, and will include re-contouring the areas, stockpiling and then re-applying topsoil, and re-seeding the area with a mixture of native grasses, forbs, and shrubs. Seed mixes for mulching and revegetation will be designed to include native plants and plants that are desirable for livestock grazing; seed mixes will exclude those plants that are poor forage and grazing plants.

- Ridge routes will be used for new and existing roads with the intent to avoid the design and construction of new water crossings.

- Clearing width for new roads will depend on slope (organic debris should not be incorporated into the fill), but will be designed for minimal impact.

- Turnouts will be located such that excavation, and soil and vegetation disturbance, is minimal.

- Straw bale check dams or silt fences will be installed at road drainage outlets, if the distance between a drainage outlet and a watercourse is less than 100 feet.

- Any slash, debris, or excess soil that is generated during road construction will be placed such that it cannot reach water courses.

Erosion and sediment control measures specific to construction of temporary project components are:

- Except for the trail used to construct the overhead transmission line towers, all temporary areas will be constructed to minimize disturbed area.

- At any temporary project site that requires vegetation to be cleared and the ground leveled, and a 1-foot-high earth berm and other appropriate erosion control devices, such as silt fences and straw bales, will be installed around the area to contain water runoff. Diversion ditches will be installed as necessary to prevent stormwater from running onto the site from surrounding areas.

- Dust suppression will be through periodic spraying with a water truck, however, a water source has not yet been identified. It is anticipated that water will be obtained from a municipal or industrial source.

- Temporarily disturbed areas will be restored. Restoration includes re-contouring the areas, stockpiling and then re-applying topsoil, and re-seeding the area with a mixture of native grasses, forbs, and shrubs. Seed mixes for mulching and revegetation will be designed to include native plants and plants that are desirable for livestock grazing; seed mixes will exclude those plants that are poor forage and grazing plants.

Construction Traffic

Construction of the Project's roads, facilities, and electrical/communication lines would occur at about the same time, using individual vehicles for multiple tasks. Based on data provided for typical wind energy projects of similar size, it is anticipated that during the construction period, there will be approximately 60 daily round trips by vehicles transporting construction personnel to the site. Over the entire construction period, there will be over 1,100 trips of large trucks delivering the turbine components and related equipment to the Project. In addition, there will be over 2,500 truck trips by dump trucks, concrete trucks, water trucks, cranes, and other construction and trade vehicles (Table 4). After construction, O&M of the Project would require approximately three round trips per day using pickups or other light-duty trucks.

Construction traffic will be routed from Humboldt Bay along state and county roads, ultimately accessing the Project through Ferndale and/or Rio Dell. An analysis of all routing alternatives is currently being conducted.

Table 4
Estimated Vehicle Round-Trips to Construction Site of the Project
Bear River Wind Energy Project, Shell Wind Energy

Turbine Component Types	Number of Components Required per Turbine	Number of Components per Truck Load	Number of Truck Loads per Turbine
Tower Sections	4.0	1.0	4.0
Blades	3.0	2.0	1.5
Nacelle	1.0	1.0	1.0
Rotor Hub	1.0	2.0	0.5
Foundation Components	2.5	1.0	2.5
Foundation Concrete *	350cy	10.0	35
Total Truck Loads per Turbine			44.5
Purpose for Truck Load			**Number of Truck Loads**

Deliver Turbine Components (Assumes25 Turbines)	1,112.5
Road and Turbine Foundation Construction	2,500.0
Crane Delivery and Removal	40.0
Deliver Substation and Other Electrical Components	50.0
Total Large Truck Loads	3,702.5

** If a batch plant is utilized on-site, the number of round-trips will be reduced by 875*

Project Construction Cleanup

Final cleanup and restoration of the Project area would occur immediately following construction. Waste materials will be removed from the area and recycled or disposed of at approved facilities. All construction-related waste will be properly handled in accordance with state and federal regulations and permit requirements. The waste will be removed to a permitted disposal facility. This waste may include trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials.

Excess material (soil, rocks, vegetation) developed during the construction of the Project will be disposed of at an offsite location. The offsite disposal area will be a private facility licensed to accept such material.

Construction Workforce

Based on data provided for typical wind energy projects of similar size, it is anticipated that approximately 125 to 130 workers per day will be required for peak construction of the Project. The beginning and end of the construction period would involve a slightly lower number of workers when compared to the middle months. The breakdown of the construction workforce by type is shown in Table 5. Construction of the Project will be completed over an approximate 8-month period within a calendar year.

Table 5
Estimated Workforce for the Project
Bear River Wind Energy Project

Type of Worker	Average Number Required Throughout the Construction Period
Carpenter/Form Setter	7
Cement Finisher	3
Cement, Rebar	4
Electrician Helper	17
Electrician, Industrial	11
Electrician, Master	2
Laborer	43
Structural Steel Worker	9

Backhoe Operator	5
Cherry Picker Operator	7
Cable Crane Operator	5
Dozer Operator	2
Power Shovel Operator	3
Road Roller Operator	2
Truck Operators	7
Estimated Daily Total	**127***

** If a batch plant is required, the Estimated Daily Total will be 130*

The Applicant will contract with a county or state-approved local sanitation company to provide and maintain appropriate sanitation facilities. The sanitation facilities will be located at each of the crane assembly areas, the batch plant, the substation, and the trailer pad area, and when necessary additional facilities will be placed at specific construction locations.

2.3.2 Public Access and Safety

Public Access

Some public access across portions of the Project area may be allowed by private property owners. However, during construction of specific Project features (blasting, tower erection, transmission interconnect line stringing) certain portions of the Project area will be temporarily restricted to the public for safety purposes. Authorized users, such as grazing permittees and communication site personnel, would continue to have access during the construction period.

Project Fencing

The Project substation will be fenced with 12-foot-high, chain-link fence to prevent public and wildlife access to high-voltage equipment. Safety signs will be posted in conformance with applicable state and federal regulations around all towers (where necessary), transformers, and other high-voltage facilities and along roads.

Lighting Requirements

Federal Aviation Administration (FAA) regulations require lighting on structures over 200 feet in height. Through its Notice of Proposed Construction or Alteration (Form 7460.1), the FAA will conduct a review of the Project prior to construction (14 Code of Federal Regulations [CFR] Part 77). SWE will supply FAA turbine determinations as they become available.

The turbines proposed under all the action alternatives will be over 200 feet in height and therefore would require appropriate obstruction lighting. However, the FAA may determine that the absence of marking and/or lighting does not threaten aviation. Recommendations on marking and lighting structures vary depending on terrain; local

weather patterns, geographic location, and, in the case of wind farms, the cumulative number of towers and overall site layout. As a result of its review process, the FAA might recommend that tower markings or aviation safety lighting be installed on all or only a portion of the turbine towers.

Lighting of the wind farm will be in compliance with the FAA Obstruction Marking and Lighting Advisory Circular (AC70/7460-1K). It is anticipated that the probable lighting setup would consist of two medium-intensity, flashing white lights operating during the day and twilight, and two flashing red beacons operating during the night. The intensity of the lights will be based on a level of ambient light, with illumination below 2 foot-candles being normal for the night and illumination of above 5 foot-candles being the standard for the day. It is anticipated the lights would not be mounted on every turbine, but will be located on several strategically selected turbines to mark the extent of the Project adequately. The minimum number of required lights will be used in order to minimize attractants for birds during night migrations (Figure 13b).

Figure 13b Typical Aviation Warning Light

Transportation Study and Safety

Transportation studies (Transportation Review) were prepared for the Project. The studies evaluate the transportation logistics for the turbines and the associated construction equipment. The completion and assessment of a traffic management plan is currently under consideration and will be identified in a future transportation study. This plan would provide recommendations for incorporating measures such as informational signs, traffic cones, and flashing lights to identify any necessary changes.

2.3.3 Operations and Maintenance

Routine maintenance of the turbines will be necessary to maximize performance and detect potential difficulties. Routine activities would consist primarily of daily travel by technicians that would test and maintain the wind facilities. O&M staff would travel in pickup or other light-duty trucks. Most servicing and repair will be performed within the nacelle, without using a crane to remove the turbine from the tower. Occasionally, the use of a crane or equipment transport vehicles may be necessary for cleaning, repairing, adjusting, or replacing the rotors or other components of the turbine. Cranes used for maintenance activities are not as large as the large track-mounted cranes needed to erect the turbine towers and are likely to be contracted at the time of service and not stored at the O&M facility

Monitoring the operations of the Project will be conducted from computers located in the base of each turbine tower and from the O&M building using telecommunication links and computer-based monitoring. Over time, it will be necessary to clean or repaint the blades and towers and periodically exchange lubricants and hydraulic fluids in the mechanisms of the turbines. All lubricants and hydraulic fluids will be stored, used, and disposed of in accordance with applicable laws and regulations. Any necessary repainting will be performed by licensed contractors in compliance with applicable laws and regulations.

Up to 12 employees will work on the Project on a permanent basis, including one office administrator, one foreman, and up to 10 technicians/electricians. Employees will typically work 8-hour shifts, 5 days per week, with the exception of the technicians, who would rotate shifts to cover nights and weekends. The Applicant anticipates that the majority of permanent positions, with the exception of the foreman position, will be filled from the local labor pool. Technician training may be provided to those who have a basic understanding of electrical work. All employees will be based out of the O&M facility, requiring one daily trip to the Project site.

Hazardous Materials and Pollution Prevention

Hazardous materials are those chemicals listed in the Environmental Protection Agency Consolidated List of Chemicals Subject to Reporting under Title III of the Superfund Amendments and Re-authorization Act of 1986. No extremely hazardous materials (as defined by 40 CFR Section 335) are anticipated to be produced, used, stored, transported, or disposed of as a result of this Project. All production, use, storage, transport, and disposal of hazardous materials associated with the Project will be in strict accordance with federal, state, and local government regulations and guidelines. All potentially hazardous materials used in the operation and maintenance of the wind plant will be stored in the O&M building in approved aboveground containers with appropriate spill containment features.

Turbine lubricants used in the turbine gearbox are potentially hazardous. The gearbox will be sealed to prevent lubricant leakage. The gearbox lubricant will be sampled periodically and tested to confirm that it retains adequate lubricating properties. When the

lubricants have degraded to the point where they no longer contain the needed lubricating properties, the gearbox will be drained and new lubricant will be added.

Transformers contain oil for heat dissipation. The transformers are sealed and contain no polychlorinated biphenyls (PCBs) or moving parts. The transformer oil would not be subject to periodic inspection and does not need replacement.

Construction equipment and O&M vehicles will be properly maintained at all times to minimize leaks of motor oils, hydraulic fluids, and fuels. During construction, refueling and maintaining vehicles that are authorized for highway travel will be performed offsite at an appropriate facility. Construction vehicles that are not highway authorized will be serviced on the Project site by a maintenance crew using a specially designed vehicle maintenance truck. During operation, O&M vehicles will be serviced off-site and fueled at the O&M building or at an offsite location. A Spill Prevention, Containment and Countermeasure Plan will be prepared for the Project and would contain information regarding training, equipment inspection and maintenance, and refueling for construction vehicles, with an emphasis on preventing spills.

A Hazardous Materials Management Plan will be developed for the Project. The plan will contain specific information regarding the types and quantities of hazardous materials, as well as their production, use, storage, transport, and disposal. A list of hazardous materials approved for use in California is accessible at http://www.sbcfire.com/hm/forms/bp/rs_ehs.pdf.

2.4 Decommissioning

Decommissioning refers to the dismantling of the Project elements and restoring of the site upon completion of the operating life of the Project. The leases are expected to be a 30-year term, with two 10-year extension options. The anticipated life of the wind plant could be greater than 30 years. Upgrading and replacing equipment can extend the operating life indefinitely, assuming that there will be future demand (after the 30-year term) for the electricity generated by the Project. Therefore, the estimated life of the Project depends primarily on the demand for power, which is expected to increase for the foreseeable future.

Decommissioning would involve removing the turbines, support towers, transformers, substation, and the upper portion of foundations. Generally, wind turbines, electrical components, and towers are either refurbished and resold, or recycled for scrap. All unsalvageable materials will be disposed of at authorized sites in accordance with laws and regulations.

Site reclamation after decommissioning will be based on site-specific requirements and techniques commonly employed at the time the area will be reclaimed. Techniques could include re-grading, spot replacement of topsoil, and revegetation of all disturbed areas with an approved native seed mix. Turbine tower and substation foundations will be removed to a depth as agreed upon with landowners.

3.0 Baseline Resource and Environmental Studies

This section includes brief summaries describing the resource and environmental studies that will be completed in support of the joint CEQA/NEPA EIR/EIS and Project permitting requirements. The summaries include the purpose for the study, its scope, the size of the study area and its anticipated completion date for the corresponding report. It should be noted that a number of studies including geotechnical, avian, terrestrial resources, wetlands, rare plants, cultural resources and transportation studies are either complete or are partially complete, while other studies such as socioeconomic resources, noise, scenic and aesthetic studies are in process.

It is assumed that the Project's resource and environmental studies contain data sufficient to meet the needs of the Project EIR/EIS and permitting requirements and will be complete and available for inclusion in the EIR/EIS and Project permits. Preliminary findings are presented, where available, for those studies that are complete or partially complete. One of the first steps in the preparation of the EIR/EIS is a data sufficiency review of the studies prepared to date. The sufficiency review is expected to reveal any critical data gaps. Any data gaps discovered would then be filled to ensure that the environmental analysis is supported by complete and accurate baseline data.

To provide maximum flexibility for locating turbines, roads and other infrastructure at the Project site, field survey activities will be conducted within defined survey corridors and study areas. By conducting survey activities within these areas, SWE will be able to determine potential constraints and allow for minor modifications (micrositing) to the Project layout to avoid potentially sensitive areas. SWE believes that the geographical extent of the survey corridors and study areas for the resources identified below will be adequate for the Project EIR and permit effort.

3.1 Wetlands, Jurisdictional Waters and Vegetation

The Project applicant retained a consultant to conduct a wetlands and jurisdictional waters determination during the spring and summer of 2007 on Bear River Ridge. Field survey activities were conducted after an office review of available site-specific literature. U.S. Geological Survey (USGS) 7.5-minute quadrangles, National Wetland Inventory (NWI) maps, and a list of hydric soil types for Humboldt County were reviewed to identify potential wetlands and waters within the Project area.

Mad River Biologists (MRB) of Eureka, California, was contracted to conduct the wetlands and jurisdictional waters determination. The study area for the wetlands and jurisdictional waters determination consisted of the following:

- 500-foot-wide corridors centered on the alignments of the wind turbine strings and turbine string roads
- 200-foot-wide corridors centered on the alignments' new Project access roads and in areas that require improvements to increase the width of an existing access road
- 200-foot-wide corridors centered on the alignment of underground collector cables that are buried in areas outside of the turbine string roads or access road corridors.

The field survey was focused on the USGS-mapped intermittent streams and the one NWI-mapped wetland adjacent to the study area. All crossings were examined in the field for indications of potential jurisdictional status under state and federal guidelines for wetlands and waters of the state or United States. Field methods followed the 1987 *US Army Corps of Engineers Wetland Delineation Manual* (United States Army Corps of Engineers [USACE], 1987) the criteria of the California Streambed Alternation permit (as necessary) and other state requirements.

Wetlands or jurisdictional waters were found within areas that may be impacted by the Project. MRB delineated such wetlands or jurisdictional waters using USACE methodology as noted in the Bear River Wind Power Project Botanical and Wetland Study.

Six different Palustrine (freshwater) classifications were identified in the study area; Persistent Emergent Seasonally Flooded/Saturated (PEM1E), Persistent Emergent Saturated (PEM1B), Persistent Emergent Permanently Flooded (PEM1H), Deciduous Scrub-Shrub Temporarily Flooded (PSS1A), Deciduous Scrub-Shrub Seasonally Flooded/Saturated (PSS1E), and Evergreen Forested Seasonally Flooded/Saturated (PFO7E).

Wetlands identified in the project area have not been verified by the USACE. Pending verification of these wetlands by the USACE may not meet the definition of waters of the U.S., and thus would not be subject to regulation under the federal Clean Water Act.

3.2 Plant Species of Special Concern

Mad River Biologists also conducted spring and summer botanical surveys for plant species of special concern in coordination with the wetland and jurisdictional waters determination. The spring Bear River Wind Power Project Botanical and Wetland Study was conducted concurrent with and performed within the same study area as the wetlands and jurisdictional waters determination.

The botanical surveys aimed at the detection of special-status plant populations potentially occurring in the project area. The protocol for the survey was based on *Guidelines for Assessing the Effects of Projects on Rare, Threatened and Endangered Plants and Natural Communities* (CDFG 2000) which is accepted by the California Native Plant Society and regulatory agencies such as the California Department of Fish and Game. Special-status plants that were encountered during the surveys were mapped and flagged. Occurrences were photographed, and information about the occurrences were recorded on California Natural Diversity Database (CNDDB) survey forms.

Three special-status plant species were documented within the project area: Howell's montia (*Monita howellii*), short-leaved evax (*Hesperevax sparsiflora* var *brevifolia*), and Siskiyou checkerbloom (*Sidalcea malviflora* ssp. *patula*). None of these species are state or federally listed. However, they would be considered special-status plants subject to review and analysis in CEQA and NEPA documents. Howell's montia and short-leaved evax are California Native Plant Society (CNPS) list 2 species which means they are considered rare an endangered in California, but more common elsewhere. Siskiyou

checkerbloom is a CNPS list 1 species which means it is considered rare, threatened or endangered in California and elsewhere.

3.3 Wildlife Habitats and Species

3.3.1 Terrestrial Species

SWE hired a MRB to conduct a survey of terrestrial (non-avian) species that could occur in the Project area. The survey included file research to identify wildlife species and habitat within the vicinity of the Project.

Field Surveys

Terrestrial species habitat surveys were conducted within 500 feet from the centerline. This represents 1000 ft. of proposed turbine corridors and within a minimum distance of 500 feet from other facility components, such as roads (including driveways, turn-around areas, and locations where roads will be widened or improved), electrical collection system, overhead transmission lines, staging and laydown areas, and related facilities (i.e., substation) needed for the construction, and operation of the Project.

3.3.2 Avian Studies

SWE (along with the avian consultants) met several times with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) to discuss the design of the proposed studies and also to discuss the study findings. Additionally, SWE's avian consultants invited USFWS and CDFG to participate in the studies. A brief discussion of the studies conducted to-date is provided below. Copies of the final study reports along with correspondence with the USFWS and CDFG regarding study plans and results were provided to the Lead Agency and EIR contractor.

Point Count Survey

SWE hired MRB of Eureka, California, to conduct a 2.5-year point count bird and bat study at the Project site. The purpose of the study is to inventory the Project area for flighted animals, especially raptors and bats, and document their spatial distribution in the Project area during the time of study. Methods used included bird surveys, bird survey analysis, bat surveys, and animal strikes.

The first phase (fall season) of the study was conducted from September to November 2004. The second and third phases (spring and fall seasons) were conducted between March and November 2005. A fourth phase was completed by the end of August 2006. A winter survey, which was requested by CDFG, has been completed. The interim results of the bird and bat monitoring study include the following:

- Observation of 128 species of birds, including 14 raptor species. Overall bird abundance was highest during the months of July and November and lowest during March.
- Bat presence was indicated at nearly all locations surveyed, although the methods did not produce quantifiable data, with highest activity near water sources.

The results of the monitoring effort are described in a report titled A Survey of Birds and Bats at a Proposed Wind Energy Site, Bear River Ridge, Humboldt County, California, Draft Report, February 25, 2008.

3.3.3 Threatened and Endangered Species

Federal and state-listed terrestrial, threatened and endangered species (TES) and habitat were surveyed during the terrestrial (non-avian) surveys described above. TES terrestrial surveys were conducted using the same survey corridors (i.e., within 500 feet from the centerline of proposed turbine corridors) as noted above.

Surveys for TES avian species have been conducted at the Project site. A brief description of these surveys is presented below.

Marbled Murrelet

Data provided by the MRB determined that the avian TES of primary concern in the Project area is the marbled murrelet. The marbled murrelet is a seabird that nests in large trees in old-growth coastal forests throughout most of its range in North America (Nelson, 1997). The murrelet is a federally threatened species and a state endangered species. Marbled murrelets are known to be present within the study area. It is possible that murrelets traveling inland between the ocean and nesting sites could fly over ridges within the study area.

SWE hired ABR Inc. of Forest Grove, Oregon, to conduct radar and visual studies of marbled murrelets as well as migratory bird and bat movements at the facility site.

Visual monitoring studies for marbled murrelet were conducted at five locations spread along the proposed turbine string in June and July 2006. The radar locations were agreed to with CDFG and USFWS. The study indicated that a few marbled murrelets may cross the ridge as they fly from the ocean to their nests along the Eel River. A similar study was conducted in June and July 2007.

Migration Studies

The primary objectives of the migration study were to use radar and visual techniques to collect baseline information on flight directions, passage rates, and flight altitudes of nocturnal targets during the peak period of songbird migration; visually estimate the relative proportions of birds and bats in the turbine zone; estimate the numbers of birds and bats that fly at heights within the turbine zone during the study period; and determine the amount of among-night and within-night variation in passage rates and flight altitudes of nocturnal targets.

Fall radar studies were conducted for 45 days over a two month period days from August 15, 2006, through October 15, 2006, and for a period of 10 days from November 1, 2006, through November 10, 2006. At the request of USFWS and CDFG, an additional spring radar study was completed for a period of 55 days from March 25, 2007, through May 20, 2007.

Results of the ABR visual, radar and migration studies conducted to-date are available in the following reports:

- A Radar and Visual Study of Nocturnal Bird and Bat Migration at the Proposed Bear River Windpark, California, Spring 2007
- A Radar Study of Marbled Murrelets at the Proposed Bear River Windpark, California, Summer 2007
- A Radar Study of Marbled Murrelets at the Proposed Bear River Windpark, California, Summer 2006

3.4 Historic, Cultural, and Archaeological Resources

A survey of historic, cultural, and archaeological resources will be completed as part of the three party agreement. The cultural resources survey of the Project site will include file research and a field investigation to identify indications of surface or subsurface cultural resources. The project team will also consult with the State Historic Preservation Office (SHPO) to determine the level of effort (i.e., transect and shovel survey requirements) for field activities prior to the initiation of the study. The environmental document consultant will also consult with tribal authorities regarding the Project site and study activities.

3.5 Scenic and Aesthetic Values

An evaluation of potential impacts of the Project on scenic and aesthetic resources will be completed as part of the three party agreement. This analysis is to include a Zone of Visual Impact (ZVI) analysis. The ZVI analysis will involve the use of a sophisticated software program developed to assist in the planning, design, and environmental assessment of wind power projects. To identify the areas from which the planned turbines might be visible, the ZVI module makes use of a digital height model generated from digital height contour lines. The program calculates lines of sight between each point on the land surface and a defined point on each of the proposed turbines and notes whether there is an unobstructed view toward the turbine. When the analysis is complete, the module produces maps showing the areas from which the turbines might be visible and creates the maps in a way that indicates the numbers of turbines visible from each point in the surrounding landscape on a clear day.

There is currently a NOAA Nexrad weather radar located on Bear River Ridge with an elevation of 2,515' above sea level. All turbines have been sited such that maximum elevation is below the current elevation of the weather radar in order to avoid distrubance with radar operations.

Data from the ZVI analysis (including maps showing the visible influence of the Project) along with a determination of potential impacts to sensitive areas and viewsheds will be provided to the Lead Agency in a CEQA/NEPA-level scenic and aesthetic resources report. It is estimated that the report will be available in 2009.

3.6 Socioeconomic Resources

An evaluation of potential impacts of the Project on socioeconomic resources and public services will be completed as part of the three party agreement. This analysis will include a CEQA/NEPA-level determination of impacts during the Project's construction and

operational phases. The analysis will include an assessment of potential impacts to area housing, schools, public services (police, fire protection), employment, and other economic and demographic areas within a reasonable distance from the Project. It is anticipated that the socioeconomic report will be completed in 2010.

3.7 Noise

SWE will conduct a regulatory review of applicable and available noise laws, ordinances, rules, and standards. SWE will create an acoustical model of a single Project layout based on "worst case" turbine vendor specifications provided (maximum number and size of turbines).

SWE will conduct a CEQA/NEPA level acoustical evaluation. The report will consist of an analysis baseline noise conditions and of the temporary impacts associated with construction noise along with a technical memorandum summarizing the acoustical modeling results (including noise contour maps if requested) and applicable community noise regulations. Noise effects on wildlife, if any, are assumed to be addressed by others in the biological analysis. CEQA/NEPA requires the Project-related increase over ambient noise to be evaluated but does not clearly require ambient noise monitoring. This CEQA/NEPA analysis will be completed without collecting onsite noise-level data.

It is anticipated that the noise study will be completed in 2010.

3.8 Geology and Soils

A preliminary engineering analysis and evaluation of the site geological and seismic conditions were performed by Earth Systems Southwest in June 2006. This evaluation (titled Preliminary Geotechnical & Geologic Hazards Report Bear River Wind Project Humboldt County, California) consisted of a literature review, a limited field reconnaissance of the Project site and geophysical testing at 10 locations. The purpose was to evaluate the severity of potential geologic hazards and to screen out areas that have a high potential for geologic hazards.

This evaluation identified the most significant geologic hazard to the Project to be the potential for severe seismic shaking that may occur during the design life of the Project. The Project is located in a highly seismic Cascadia Subduction Zone, within the influence of several fault systems, and in a Seismic Zone 4 of the 2001 California Building Code (CBC).

Portions of the proposed access roads and some of the turbines may be located near or along steeply sloping terrain with gradients in excess of 33 percent. These areas may be prone to slope instability such as rockfalls and landslides. The Project will require grading that will alter the topography. Grading could create unstable cut-and-fill slopes. Engineered design of graded cut-and-fill slopes can mitigate this hazard.

Surface soils at the Project site are generally granular sands and silts and will provide suitable subgrade support for all-weather, unpaved access roads, but are erodible. These soils are less suitable for subgrade during wet weather and may be prone to rutting with traffic. To mitigate the potential for poor soil compaction and rutting impacts, weak soils will be stabilized with a granular base with possible geotextile underlayment. Engineered

culverts or stream crossings will be developed to avoid or mitigate potential hazards across stream crossings, washes, and areas that may be prone to erosion and flooding. The depth to rock is generally shallow ranging from the surface to about 4 to 23 feet deep. Cuts into the rock will likely require ripping with heavy excavation equipment and possible blasting.

SWE believes that the data provided by the June 2006 Earth Systems Southwest report along with other readily available information is sufficient to complete a CEQA/NEPA-level analysis for assessing potential impacts to area soils and geology and determining potential geologic hazards.

Additional geologic and geotechnical studies will be completed to meet post-EIR/EIS building permit requirements for approval of foundation design and development of best management practices for erosion and sediment control. These studies will include site reconnaissance and investigation to identify potentially unstable slopes and weak subgrade of access roads, evaluate rock conditions, estimate soil corrosiveness, and provide foundation design parameters.

3.9 Land Use and Zoning

As previously noted, the Project area is currently used primarily for agriculture (i.e., cattle production) and timberland management. The majority of the Project area also falls under California Land Conservation (Williamson) Act contracts with Humboldt County. The Project area is identified by Humboldt County in the following General Plan Land Use Designations (Humboldt County General Plan, Volume I, Framework Plan) zones (Humboldt County Zoning Regulations, Chapter 4, Section A, Section 314-1):

General Plan Land Use Designations:
- T (Timber)
- AG (Agriculture Grazing)

Zoning Classifications:
- U (Unclassified)
- AE-160 (Agriculture Exclusive, Minimum Lot Size 160 Acres)
- TPZ (Timber Production Zone)
- AE (Agriculture Exclusive)
- Williamson AG Preserves

A land use map is provided in Figure 14, a zoning map is provided in Figure 15 and assessor parcel maps are provided in Figure 16.1, 16.2 and 16.3.

Figure 14 Land Use Map

Figure 15 Zoning Map

Figure 16.1 Assessor Parcel Number Map

Figure 16.2 Assessor Parcel Number Map

Figure 16.3 Assessor Parcel Number Map

Figure 17.1 Network Upgrades Map

3.10 Recreational Resources

An evaluation of potential impacts of the Project on recreational resources within the Project area and offsite related facilities, as well as city, county, state, or federal designated recreation lands and designated recreational facilities, will be completed in 2010 as part of the three party EIR/EIS.

3.11 Transportation

Black and Veatch provided a review of transportation to the region. The studies include identification of primary and secondary transporter routes. A future study will identify required road improvements, time periods when travel is prohibited, and equipment required for load transport.

Access to the Project area will be provided by a primary transporter/haul route and secondary transporter routes. These routes will be used to bring in equipment, materials, and labor from outside of the analysis area to the Project site and will include state, county, and private roadways.

3.12 Other Areas

SWE will work with the lead and responsible agencies to evaluate the need to conduct studies for other areas of concern such as:

- Construction water use
- Health and safety including:
  - Electromagnetic field effects
  - Lightning strikes
  - Blade throw (disengagement and release of turbine blade)
  - Ice throw
- Air quality effects (dust generation) during construction
- Microwave transmission interference (Fresnel Zone).

Additional reports describing area resources and potential impacts associated with the Project will be forthcoming within the EIR/EIS.

4.0 Plan of Operation

The typical activities necessary to operate and maintain the Bear River Wind Power Project are described in general below. A more detailed O&M plan will be developed for the Project after all equipment has been selected and the Project design completed.

The O&M plan will be a "dynamic document" that will be periodically reviewed and revised as needed to adjust to changing site conditions or applicable requirements. Operators of the Project will work to ensure that compliance with environmental monitoring and mitigation plans are efficient, appropriate, and effective.

4.1 Health, Safety, and Environmental Plan

Prior to the startup and operation of the facilities, a Health, Safety, and Environmental Management plan will be developed as a requirement for O&M of the facility.

4.2 Project Operation and Maintenance Plan

As with all power generation facilities, the Project will require ongoing maintenance work to achieve reliable and safe operation. The Project's operations team will develop a comprehensive O&M plan for this Project when the design is complete. This plan will define specifically how the Project's required O&M activities will be conducted in accordance with the requirements of the equipment vendors, good industry practice, and applicable regulatory requirements.

The Project O&M plan will include descriptions of each of the following major scheduled activities:

- Project Administration and Training (see Section 4.3.1)
- Project Performance Monitoring (see Section 4.3.3)
- Scheduled Wind Turbine Maintenance (see Section 4.4.2)
- Scheduled Balance of Plant Maintenance (see Section 4.4.4)
- Environmental Monitoring (see Section 4.3.4)

Some amount of unscheduled maintenance and repair is expected to be necessary. These activities will be performed per the requirements of the equipment specifications and good industry practice. The O&M plan will also include descriptions of these major unscheduled maintenance and response activities:

- Unscheduled Wind Turbine Maintenance (see Section 4.4.3)
- Balance of Plant Maintenance (see Section 4.4.4)

The site will be maintained and operated in a safe manner compatible with its designated land use and other uses as stipulated under applicable regulatory requirements. During some maintenance or emergency response situations, it will be necessary to control access temporarily to a small portion of the Project site during construction and operations to maintain public safety. Situations requiring potential closure of the Project site will be discussed in the detailed Project O&M plan.

Site road maintenance will be done on an as-needed basis. This could include grading and regraveling of road sections. Such maintenance will be conducted on project site roads currently not being maintained by the County.

4.3 Operation Activities

The activities necessary for the efficient operation of the Project are described below. Maintenance activities are discussed in Section 4.4.

4.3.1 Project Administration

The administration of the Project includes the business activities associated with operating a wind energy project. These include staffing the Project, scheduling and facilitating maintenance, providing for necessary training, monitoring the performance of the Project, and reporting on the results of the environmental monitoring program. Several of these activities are discussed in more detail below.

The O&M facility will be staffed during normal business hours and will include a supervisor and some Project maintenance staff. The O&M facility will likely be located offsite in Ferndale, Rio Dell, or another town/area zoned for this type of facility.

4.3.2 Orientation and Training

Maintenance employees of the Project will require specific training regarding safe work on wind turbines and the specific tasks necessary to provide scheduled and unscheduled wind turbine maintenance. Additionally, it may be necessary to provide orientations to site visitors as to those aspects of environmental management they may impact by their onsite activities. These would likely include general site procedures for:

- Avoidance of wildlife
- Requirements for control of livestock
- Noxious weed control
- Excessive dust avoidance
- Noise requirements
- Motorized access limited to site access roads
- Other procedures as appropriate for their onsite activities

4.3.3 Wind Farm Performance Monitoring

Wind turbines generally operate automatically, without the need for centralized plant operators. The site manager and staff will monitor the performance of the turbines, but initiate manual control only as needed for maintenance and troubleshooting (see Section 4.4).

Periodically, the plant management will analyze the performance trends of the wind turbines and the balance of the Project to ascertain the overall efficiency of operation. This analysis will utilize data collected from the wind turbines and the permanent met towers. It is possible that some scheduled maintenance activities will be added or adjusted to improve the performance of the Project.

4.3.4 Environmental Monitoring

Part of the responsibilities of the Project site manager will be to ensure the proper environmental monitoring activities are being performed, per the requirements of the project HSE manual. The environmental monitoring program will incorporate monitoring observations and additional mitigation measures as needed into standard operating procedures for the project to minimize future environmental impacts. The monitoring activities discussed with each potential environmental impact, as well as those avian monitoring activities in the HCP, will be coordinated into the monitoring section of the HSE manual and will likely include:

- Review field observations submitted by field staff, and devise additional monitoring or mitigation measures as needed.
- Perform periodic inspections in avian fatality monitoring requirements.
- Review noxious weed control measures.
- Perform periodic reviews of dust generation at the site.

The results of the environmental monitoring program will be provided to the Lead Agency.

There are no environmental impacts deemed likely due to environmental monitoring.

4.4 Maintenance Activities

The activities necessary to perform preventative maintenance, as well as equipment repairs as needed, are described in general below.

4.4.1 Project Drive-By Inspections

Through the process of performing the operations activities discussed in Section 4.4.3 and the maintenance activities discussed in this section, Project staff will be driving through the entire Project at least every few days. As staff drive through the Project to perform these activities, they will also be performing a visual inspection of the Project. The purpose of this inspection is to identify any obvious problems with the wind turbines that may require maintenance. If Project personnel identify a turbine that may require maintenance or is operating in potentially unsafe manner, that turbine will be stopped (remotely) until the condition can be fixed. This inspection is a redundant check, as the turbine has many internal sensors to monitor for maintenance problems and potentially unsafe operational conditions.

Along with the turbines, staff will also review the condition of the Project roads and other visible aspects of the plant's infrastructure. This will include reviewing the condition of substation fencing and components, looking for any loose trash on the site, and checking for any vandalism. Conditions found that could impact public safety, wildlife, livestock, or the environment in general that cannot be immediately fixed will be reported to the Project's manager, appropriate regulatory agencies and effected landowners as required by permit conditions and applicable regulatory requirements.

While normal project operations will allow these inspections to occur very frequently, there may be periods during which the site cannot be accessed and these inspections are suspended. Conditions causing such suspensions could include inclement weather (i.e., extremely high winds or very heavy rain). The criteria for conditions in which the site will not be accessible will be described in detail in the Environment Management Plan and will also be subject to the judgment of the Project's manager and maintenance staff.

4.4.2 Scheduled Wind Turbine Maintenance

The Project's O&M plan will include the scheduled minor and major maintenance and inspection activities anticipated during the calendar year. Various inspections will be performed on a daily, weekly, or monthly basis. Results of these inspections will be logged and used to plan future maintenance activities. Visual inspections inside the rotor head, nacelle, and tower bottom will be done on a regularly scheduled basis. Information collected in these inspections may be used to plan future maintenance activities.

Regularly scheduled preventive maintenance activities will also be performed on a daily, weekly, or monthly basis. A list of scheduled preventive maintenance activities will be included in the O&M plan.

Two annual wind turbine maintenance cycles are anticipated. These will likely be planned for the spring and fall of each year. While not currently anticipated, it may be necessary for blade washing to be performed to improve wind turbine performance. Once again, activities will be conducted in accordance with applicable regulatory requirements.

Over the Project's operational period, significant maintenance or repair events are recorded, so that underlying causes can be determined and analyzed. These analyses may lead to modifications to the turbines or Project operation or maintenance practices to improve the efficiency and safety of the Project.

4.4.3 Unscheduled Wind Turbine Maintenance

Wind turbine maintenance and internal inspection activities are normally performed on a scheduled basis. However, when problems occur, unscheduled maintenance will be required to maintain the operating efficiency of the wind energy facility.

A turbine experiencing mechanical difficulties that could result in safety or environmental risks or damage to the equipment will be taken off-line until repairs can be completed. Otherwise, repairs will be planned for the first convenient opportunity.

The three general levels of unscheduled maintenance are discussed below. Potential repair activities will be described in more detail in the manuals for the wind turbine design chosen for the Project.

Minor Repairs and Component Replacement

Making minor repairs to the turbines or replacing faulty internal components are the most common forms of unscheduled turbine maintenance. These repairs could include the following:

- Replacement of wind turbine sensors
- Replacement of small motors (such as those for the yaw drive or fans)
- Replacement of small pumps (such as those for the hydraulic system or cooling system)
- Replacement of gear oil
- Replacement of coolant in response to leaks
- Replacement of hydraulic fluid in response to leaks
- Replacement of seals on generator or gearbox

In general, these repairs can be done using small tools and the turbine's integrated winch system. The Project's pick-up trucks or utility maintenance vehicles would likely be needed for repair activities. These vehicles would stay on the Project roads or at the wind turbine pad.

Major Repairs and Component Replacement

Although far less common, it is possible that major components could need to be replaced during the operational phase of the Project. These types of repairs may be required because of equipment failure. These components could include the following:

- Blades
- Generator
- Gearbox
- Transformer (if in nacelle)

Such a replacement would likely require at least one large crane. Trucks will be needed to bring the crane to the turbine location, where the crane will be assembled. If the crane pad installed for the construction phase of the Project is no longer available, such a pad may be installed. The pad would be removed and the land restored following the completion of the replacement activities.

If a major component required replacement, the turbine will be stopped and placed out-of-service until the component replacement was completed. It is anticipated that component replacement would take less than 5 days after the crane and replacement component arrived onsite and were prepared for service. After the new component was installed, the crane will be removed from the site and the turbine will be returned to service. This activity will be planned to minimize the crane's time on the site.

Wind Turbine Replacement

The replacement of a complete wind turbine at a project is extremely uncommon. It would likely only be necessary if there were problems with the wind turbine tower or foundation, as all other components can be replaced without removing the entire turbine.

The replacement of a wind turbine would require crane assembly as noted above. The components that are removed and not used on the replacement wind turbine will be loaded onto trucks and removed from the site. Replacement components will be transported to the site, off loaded and the wind turbine will be erected using the appropriate combination of original and replacement components. Given the need to remove old components and bring new components to the site after the original wind

turbine was disassembled, the entire wind turbine replacement activity could require the crane to remain on the site for a week or longer.

While the Project would make efforts to replace the turbine as quickly as possible, unanticipated conditions, such as inclement weather or equipment failure, could result in an extended construction period.

4.4.4 Balance of Plant Maintenance

While the wind turbines are the component of the Project expected to require the most maintenance services, some maintenance will be needed for the balance of the plant. Those maintenance services are described below.

Substation Maintenance

The Project substation will be inspected periodically to look for obvious problems or areas of concern. Additionally, the substation will undergo an annual inspection and maintenance cycle to ensure that protection equipment is functioning properly. This generally involves inspection of the breakers and switches to be certain they would operate as needed in a fault or emergency. Electrical connections will also be inspected and tested as needed to ensure that no unsafe situations exist.

Maintenance to the substation's transformer, switchgear, and buswork will require the substation be de-energized. De-energizing the substation would result in Project shutdown. The Project team will attempt to schedule this maintenance during low wind months. In general, most maintenance activities can be performed during a single day each year.

Road Maintenance

Road maintenance will be performed as needed. It is expected that minor amounts of surface dragging, blading, or grading will be required to remove vehicle ruts that may develop due to maintenance traffic or after periods of heavy rainfall. Culverts, drains, or other water management devices will need to be inspected prior to the wet season and after large storms and kept clear to allow effective drainage.

In the wet weather season between Oct 15 and May 1, Project-related use will occur only on roads constructed to "all-weather" specifications. No Project-related use of roads will occur when the use contributes to visibly turbid discharge from the road that could enter ditches or other routes leading to watercourses. Use can resume when the road surface has dried sufficiently such that visibly turbid drainage is no longer occurring. Erosion control measures (including earthen berms, silt fences, straw bales, sedimentation ponds, and rainfall diversion ditches) will be maintained and replaced as necessary. Erosion control equipment, such as straw bales and silt fences, will be stockpiled at locations where they can be readily accessed. Bare areas due to Project operation and maintenance will be revegetated. Seed mixes for mulching and revegetation will be designed to include native plants and plants that are desirable for livestock grazing; seed mixes will exclude those plants that are poor forage and grazing plants. Seeding will occur at 30 lbs/acre and mulch at 2 inch depth, with 90% coverage. In the wet weather season, maintenance includes patch or spot rocking, clearing culvert in/outlets on Monument

Road, clearing any ditches where runoff is poorly draining, and repairing and maintaining water bars. In the wet weather season, wet soil and road surface materials will not be bladed off to allow Project-related use. Blading to maintain roads and shoulders will occur in dry weather but when moisture is still present in the soil and aggregate to minimize dust. When operation or maintenance activities lasting longer than one day could occur that result in soil disturbance that could erode into watercourses, erosion control practices (silt fences, straw bales) will be implemented at the end of the day. A long-range (5 day) forecast of no rain will be obtained before a multiple-day O&M activity begins.

Off-site O&M Building Maintenance

Maintenance requirements for the off-site O&M building are expected to be typical for a building of this type of construction and will be performed as needed. Exterior maintenance will be performed in a timely manner so as to maintain a presentable appearance to the general public. Housekeeping and area cleanup will be done on a regular basis so as to avoid the buildup of litter and other unsightly materials.

5.0 References

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