2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action, the No Action Alternative, and alternatives that were considered but eliminated from detailed study. This chapter also discusses the benefits or disadvantages of reserving project approval for a later date, and provides a summary comparison of the alternatives.

The Proposed Action involves responding to requests from the Applicant for approvals of the Whistling Ridge Energy Project. Whistling Ridge Energy LLC is a limited liability corporation operating in the State of Washington that has been formed by S.D.S. Co., LLC, which is an affiliated entity of SDS. Under the Proposed Action, the state of Washington would approve the Applicant's application for a Site Certificate for the proposed Whistling Ridge Energy Project, and BPA would grant interconnection of the proposed project to the FCRTS. Under the No Action Alternative, the state of Washington would deny the Applicant's application for a Site Certificate for the proposed project, and/or BPA would not grant interconnection of the Whistling Ridge Energy Project to the FCRTS.

2.1 PROPOSED ACTION

This section describes the wind project that has been proposed by the Applicant. The information presented in this section is primarily based on information provided by the Applicant in Application for Site Certification Agreement 2009-01.

2.1.1 WIND POWER IN GENERAL

Wind power is a form of renewable energy - energy that is replenished daily by the sun. As the earth is heated by the sun, air rushes to fill the low pressure areas, creating wind power. The wind is slowed dramatically by friction as it brushes the ground and vegetation, so it may not feel very windy at ground level. The kinetic power in the wind, the energy of moving air molecules, may be five times greater at the height of a 40-story building (the height of the blade tip on a utility-scale wind turbine) than the breeze on your face. Meanwhile, the wind may be accelerated by certain types of land forms, so that certain areas of the country may be very windy while other areas are relatively calm.

Wind power is converted to electricity by a wind turbine. In a typical, utility-scale wind turbine, the kinetic energy in the wind is converted to rotational motion by the rotor—typically a three-bladed assembly at the front of the wind turbine. The rotor turns a shaft that transfers the motion into the nacelle (the large housing at the top of a wind turbine tower). Inside the nacelle, the slowly rotating shaft enters a gearbox that greatly increases the rotational shaft speed. The output (high-speed) shaft is connected to a generator that converts the rotational movement into electricity at medium voltage (a few hundred volts). The electricity flows down heavy electric cables inside the tower to a transformer, which increases the voltage of the electric power to distribution-level voltage (a few thousand volts). This distribution-level voltage power flows through underground lines to a collection point where the power may be combined with other wind turbines.

In some cases, the electricity generated by these wind turbines is sent directly to nearby farms, residences and towns where it is used. In most cases, however, the distribution-level voltage power is sent to a substation where the voltage is increased to transmission-level voltage power (a few hundred thousand volts) and sent through transmission lines many miles to distant cities and factories (AWEA 2007).

2.1.2 PROJECT OVERVIEW

The proposed Whistling Ridge Energy Project would be located in south-central Washington on an approximately 1,152-acre site approximately 7 miles northwest of the City of White Salmon in Skamania County, Washington (Figure 1-1). The project would be located on commercial forestland owned by S.D.S. Co., LLC and Broughton Lumber Company in an unincorporated area of Skamania County, outside of the National Scenic Area.

The proposed project would generate up to 75 MW of electricity. The proposed project layout is shown in Figure 2-1. As shown in this figure, project components would include:

- Up to fifty 1.2- to 2.5-MW wind turbines
- Electrical transformers
- 34.5-kV collector lines and systems (primarily underground)
- A project collector substation located adjacent to BPA's proposed substation and to BPA's existing North Bonneville-Midway 230-kV transmission line and
- An interconnection with BPA's existing North Bonneville-Midway 230-kV transmission line
- One Operations and Maintenance facility (to be located at one of two locations, either adjacent to the substation within the project boundary, or along West Pit Road)
- One permanent meteorological tower
- Approximately 2.4 miles of newly-constructed and 7.9 miles of improved roads to provide access to the wind turbine locations during construction and for operations and maintenance

As shown in Figure 2-1, the proposed wind turbines generally would be located on the forested ridges of Saddleback Mountain. The final specific locations of the wind turbines and other related and supporting facilities would be established during the final design process, taking into account micro-siting aspects determined as a result of the EFSEC Site Certification process. As shown in Table 2-1, approximately 384 acres would be developed for the wind turbine foundations, connecting roadways, and overhead and underground transmission lines.

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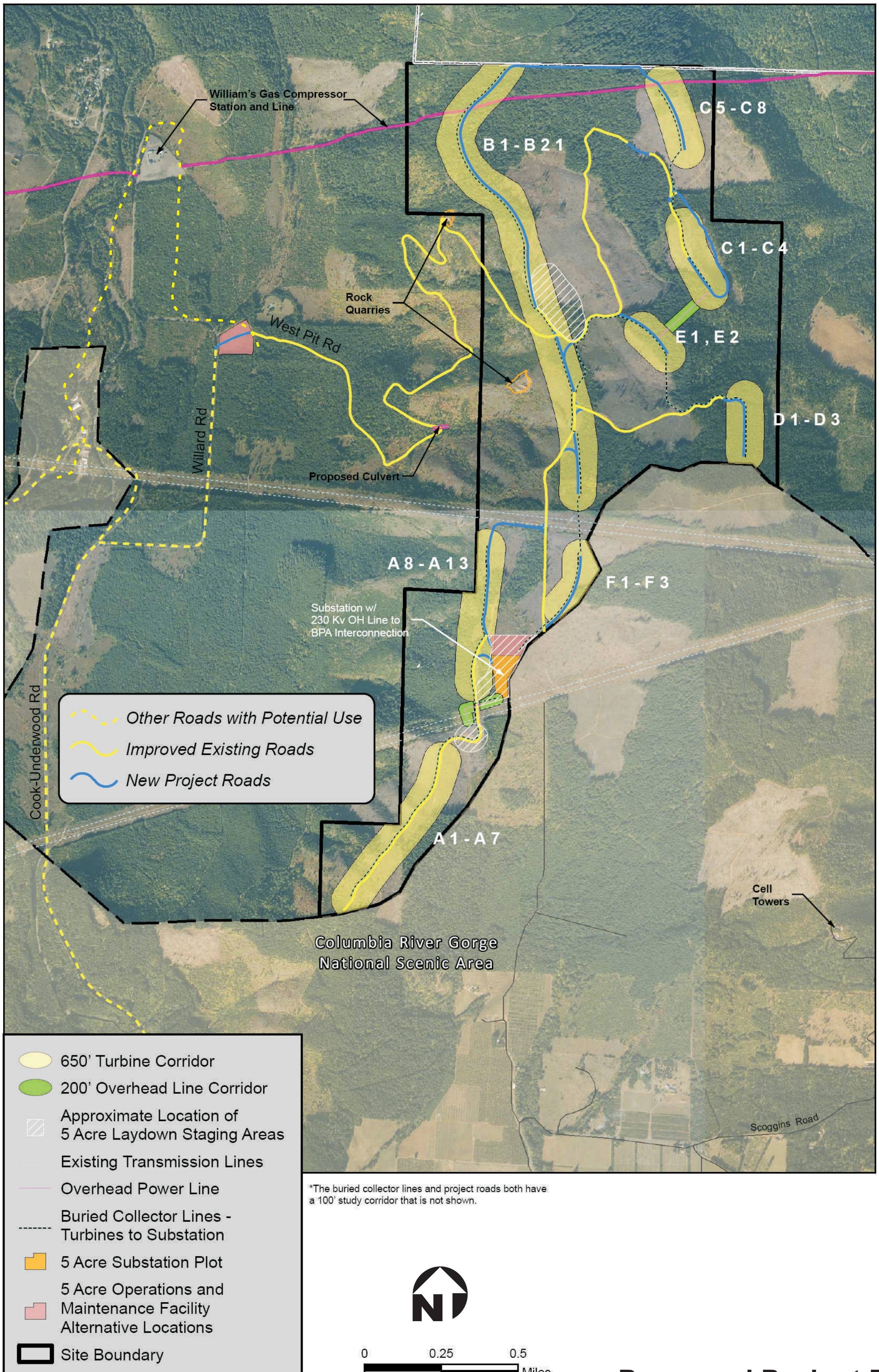

*The buried collector lines and project roads both have a 100' study corridor that is not shown.

Source: GeoDataScape.

Figure 2-1

Proposed Project Elements

URS

Whistling Ridge Energy Project
Skamania County, Washington

Table 2-1
Area of Development
(acres)

Project Element	Area Proposed for EFSEC Certification and Micrositing	Impacts		
		Permanent	Temporary	Total
Project Site[a]	1,152			
Area to be Developed				
Windfarm Footprint[b]	384	NA	NA	NA
Turbine String Corridor[c]	318	25.4	36.4	61.8
Roadway Corridor within Project Site[d]	48.4	15.2	13.3	28.5
Overhead Transmission Line Corridor within Project Site[e]	6.9	3.45	0	3.45
Underground Transmission Line Corridor within Project Site[e]	8.9	0.0	2.4	2.4
Operation and Maintenance Yard & Storage Area[f]	5.0	5.0	0.0	5.0
Substation Plot & Study Area[g]	7.1	7.1	0.0	7.1
Total Area to be Developed Within Project Site	NA	56.15	52.1	108.25
Impact Area Outside of Project Area				
Roadway Corridor Outside Project Site[h] (based on 2.5 miles of improved road)	0	5.22	1.74	6.96

a. Project site is the area shown on Figure 2-1 bordered in black, encompassing approximately 1,152 acres in Sections 5, 6, 7, 8, and 18 of Township 3 North, Range 10 East, and in Section 13 of Township 3 North, Range 9 East.
b. Windfarm footprint is the total area of all corridors and development study areas in the project boundary with overlapping areas removed, in which development potentially will take place.
c. Total area of 650-foot corridor measured on either side of an imaginary line connecting each turbine in a string. Permanent impacts based on turbine clearance zone and permanent infrastructure in corridor but outside of clearance zone. Temporary impacts based on infrastructure in corridor but outside clearance zone.
d. Area encompassed by a 100-foot corridor along all roads within the project area minus any area that overlaps with 650-foot-wide turbine corridor, based on a roadway length of 7.8 miles.
e. Total area encompassed by a 100-foot corridor on the overhead or underground transmission lines minus any area that overlaps with roadway, overhead or turbine string corridors.
f. Area includes the 2-acre Operations and Maintenance site plus a 50-foot area around the perimeter.
g. Area includes the 5-acre substation site plus a 50-foot area around the perimeter.
h. Area based on 40-foot corridor (20-foot roadway: 12-foot existing, widened to 20 feet with 10 feet on either side) from project site boundary to an intersect point with Willard Road, based on a length of 2.5 miles.

County and private logging roads that extend north from SR 14 provide vehicle access to the project site. From SR 14, access would be provided via County roads (Cook-Underwood Road to Willard Road) and then via a new connection to West Pit Road, an existing private logging road. West Pit Road connects to a network of existing private logging roads (Figure 2-1). The private logging roads are on S.D.S. Co., LLC and Broughton Lumber Company property, and provide access to most areas where project facilities would be located.

The construction phase is anticipated to last approximately one year, during which a total of approximately 330 workers would be employed. Eight to nine permanent full- or part-time Operations and Maintenance staff would be required once the project is operational. The Whistling Ridge Energy Project is expected to function for at least 30 years.

2.1.3 PROJECT COMPONENTS

2.1.3.1 Wind Turbines

The project would consist of up to 50 wind turbines generators that likely would range in size from 1.2- to 2.5-MW each. Each wind turbine would consist of four main aboveground components: the turbine tower, the nacelle, the rotor hub, and the blades. Depending on which manufacturer is selected, each turbine would be approximately 221 to 262 feet tall at the turbine hub, and with the nacelle and blades mounted, the total height of each wind turbine (to the turbine blade tip) would be up to approximately 426 feet. The towers would be tapered, hollow tubular structures, approximately 14 feet in diameter at the base and weighing approximately 30 tons each. The towers would likely be painted a flat neutral gray or white color. A controller cabinet would be located at the base inside each tower. Cables and a ladder would ascend to the nacelle to provide access for turbine maintenance. A locked door would provide access to the base of the tower.

Each tower would be mounted on a concrete foundation with a diameter up to approximately 60 feet. Tower foundations would be spread footing or pier-type footings. Some of the towers would be furnished with blinking lights visible to aircraft. The need for turbine lights and the type of lighting would be determined in consultation with the Federal Aviation Administration.

The remaining three turbine components are all mounted at the top of each turbine tower. The nacelle of each wind turbine is encased in fiberglass, and is mounted at the top of the tower to house the gearbox, the generator, and the control system. The rotor hub is attached to the nacelle, and holds the blades in place. Each turbine has three laminated fiberglass blades, each approximately 129 to 164 feet long, depending on which turbine is selected. The diameter of the circle swept by the rotors would be approximately 264 to 320 feet, depending on which turbine is selected. Together, each turbine’s blades, hub, and nacelle would weigh between 95 and 150 tons, depending on the turbine size and model selected.

Wind turbines would be grouped in “strings,” each spaced approximately 350 to 800 feet from the next (or approximately 1.5 to 2.5 times the diameter of the turbine rotor). The electrical output of each string would be connected to the project substation by underground 34.5-kV collector cables, and from there would be directly interconnected with the adjacent BPA transmission system. The project would be monitored and controlled from an Operations and Maintenance building to be located at one of two alternative sites, either next to the substation or adjacent to West Pit Road.

The wind turbines would operate at wind speeds from 9 to 56 mph, with a rotor speed range of 10 to 20 rpm. The turbines operate on a variable pitch principal in which the rotor blades rotate to keep them at the optimum angle to maximize output for all wind speeds. At speeds exceeding 56 mph, the blades feather on their axis and the rotor stops turning. Each turbine is equipped with a wind vane that signals wind direction changes to the turbine’s electronic controller. The electronic controller operates electric motors (the yaw mechanism), which turn the nacelle and rotor so that each turbine faces into the wind.

2.1.3.2 Electrical Collector System

The project would include an electrical collector system to collect energy generated at approximately 575 V from each wind turbine, transform the voltage of this energy to 34.5 kV using a pad-mounted transformer, and deliver the energy via underground cables to the proposed project substation (Figure 2-1).

Each turbine's 575 V to 34.5-kV transformer would be located on a transformer pad adjacent to each tower, or enclosed in the nacelle, depending on the turbine model. From there, power would be transmitted via underground 34.5-kV electric cables. These cables would be buried by digging trenches up to 5 feet wide and approximately 3 to 4 feet deep, placing the cables in these trenches, and then filling the trenches back in with the excavated soils. In areas where collector cables from several strings of turbines follow the same alignment (for example, near the proposed substation), multiple sets of cables would be installed within each trench where possible.

There would be approximately 8.5 miles of underground collector cable trenches. In areas where environmental constraints, geologic features, or cultural features necessitate, minor aboveground placement of collector cables may occur.

2.1.3.3 Project Substation and Interconnection

The project also would include a project collector substation to connect the proposed wind project to the FCRTS. This substation would further transform the energy delivered by the project's underground electrical collector system from 34.5 kV to 230 kV so that it would be suitable for delivery to the FCRTS at the proposed BPA substation. The proposed electrical interconnection to the FCRTS would provide the Applicant with access to wholesale electric market for sales of power from its proposed project.

The proposed collector substation would occupy a portion of a fenced 5-acre area at the northwest end of the project site, immediately adjacent to BPA's North Bonneville-Midway transmission line (Figure 2-1). A 50-foot cleared area would be maintained around the substation. The substation site would be a graveled, fenced area that would include the voltage transformers, switching equipment, and other electrical equipment, as well as an area to park utility vehicles. Transformers at the substation would be non-polychlorinated biphenyl oil-filled types.

The physical interconnection of the proposed wind project to the FCRTS would consist of overhead lines located between the project collector substation and BPA's North Bonneville-Midway 230-kV transmission line. To make this interconnection, a loop-in of BPA's North Bonneville-Midway 230-kV transmission line to the proposed BPA substation will be made. This loop-in would require several steel lattice and wood pole structures (some of the wood pole structures may be guyed) to be placed adjacent to both the North Bonneville-Midway 230-kV and Underwood Tap to Bonneville Powerhouse 1-North Camas 115-kV transmission lines. The Underwood Tap to Bonneville Powerhouse 1-North Camas 115-kV line adjacent to North Bonneville-Midway 230-kV transmission line would require a new steel lattice structure to raise the conductors such that the 230-kV line can cross underneath for this interconnection.

2.1.3.4 Operations and Maintenance Facility

A permanent Operations and Maintenance facility would be constructed on an approximately 5-acre area located at one of the following two locations: (1) adjacent to the proposed substation; or (2) west of the project site along West Pit Road (Figure 2-1). The entire 5-acre area would be fenced and have a locked gate.

The Operations and Maintenance facility would have approximately 3,000 square feet of enclosed space, including office and workshop areas, a kitchen, bathroom, shower, and utility sink. This structure would be constructed of sheet metal, and would be approximately 16 feet tall (to the roof peak). Water for the bathroom and kitchen would come from a new on-site well and would drain into an on-site septic system (see Section 2.1.3.6). A graveled parking area for employees, visitors, and equipment would be located adjacent to the building.

2.1.3.5 Meteorological Tower

There will be one permanent meteorological tower located within the project site boundary. The function of the permanent meteorological tower is to collect wind speed and direction at hub height as well as temperature, relative humidity and barometric pressure. These values are used to provide base data to compare the function of the individual turbine wind direction and speed sensing equipment. The data collected by the tower also serves as a historical basis for measuring wind farm actual performance vs. projected performance.

The location for the permanent meteorological tower would be determined during the micro-siting process. The selected site would be based on a meteorologist's recommendations for an on-site location that best represents the site's meteorological conditions.

The basic design for the tower would depend on the style selected. Most towers are un-guyed lattice towers at heights equal to the hub heights of the proposed wind turbines. Depending on the wind turbine selected for the Whistling Ridge Energy Project, the wind turbine would be approximately 221 to 262 feet high at the turbine hub. The meteorological towers are fairly large at the base with either three or four corners and taper in size up to hub height. Monitoring equipment would be located at the top, with the data logger and power conversion equipment located at the base.

2.1.3.6 Water Supply and Wastewater

During project construction, approximately 1.7 million gallons of water would be consumed for road compaction, dust control, wetting concrete and other construction purposes. The construction contractor would supply water used during construction. Water needed for construction would be purchased by the Applicant's construction contractor from an off-site vendor with a valid water right and transported to the site in water-tanker trucks.

The project would not be connected to a sewer system. Sanitary wastes would be collected in "portable toilets" during construction. Disposal of sanitary wastes would be managed through a contract with a portable toilet vendor. The contractor would incorporate applicable state capacity requirements based on the construction worker population on the project site at any given time. Collected wastes would be managed and disposed of by the contracted vendor.

Project operations would not require the use of any water for cooling or any other use aside from the limited needs of the Operations and Maintenance facility. Potable water intake would be in the form of a well accommodating the Operations and Maintenance facility's needs. Anticipated water use at this facility is expected to be less then 5,000 gallons per day for kitchen and bathroom use. The Applicant would seek and obtain approval for the new well from EFSEC, in consultation with Skamania County Environmental Health Department and Ecology.

There would be no industrial wastewater stream from operation of the project. Wastewater discharge would come from the Operations and Maintenance facility discharging to an on-site septic system. No wastewater would be used, discharged or recycled for wind turbine operations.

2.1.3.7 Access Roads

Access to the project site is provided by county and private logging roads that extend north from SR 14. From SR 14, access would be provided via County roads (Cook-Underwood Road to Willard Road) and then via a new connection to West Pit Road, an existing private dirt logging road that is located entirely outside of the National Scenic Area. Approximately 2.5 miles of roadway improvements would occur on West Pit Road, which currently varies in width between 20 and 26 feet. To create a drivable surface of 25 feet with 5 feet of clearing on each side, portions of the roadway and some corners would be widened. In addition, an existing culvert that runs along a portion of this road that was upgraded during the summer of 2009. This culvert may need some additional lengthening if the roadway is widened over the culvert. West Pit Road would continue to be used during the project's operational phase.

West Pit Road connects to a network of existing private logging roads on S.D.S. Co., LLC and Broughton Lumber Company property, and provides access to most areas where project facilities would be located (Figure 2-1). Because the project site already has this existing network of logging roads, relatively few new roads would have to be constructed. Approximately 7.9 miles of existing private logging roads would be improved. In areas where there are no existing logging roads near proposed wind turbine strings, approximately 2.4 miles of new gravel access roads would be constructed. All new roadway construction would occur on private lands owned by S.D.S. Co., LLC and Broughton Lumber Company.

The existing logging roads to be improved were originally built to allow large trucks and logging equipment to access the project site for ongoing commercial logging purposes. These roads are generally 8 to 12 feet wide, although some are currently as wide as 20 feet. Improvements to allow use by wind project construction vehicles generally would involve widening and providing a gravel all-weather surface. Most of the roads used to provide access to the site by construction vehicles would be widened to approximately 25 feet (width of finished road), with an additional 5 feet of shoulder on either side.

Once assembled, the construction cranes required to erect turbines and tower sections require a 35-foot-wide road (of which 25 feet needs to be graveled). Therefore, the roads that run adjacent to turbine strings and roads that connect turbine strings to one of the central staging areas would be approximately 35 feet wide (25 feet plus 5 feet of shoulder on either side). Because cranes might be needed to maintain turbines over their operational life, the 35-foot-wide roads would be kept as maintenance access roads for the expected 30-year life of the project.

All private roadway improvements required prior to hauling and new private roadway construction at the proposed project site would be designed and constructed under the direction of a licensed engineer, in accordance with the standards for the applicable road classifications as set forth in the Skamania County Private Road Guidelines and Development Assistance Manual (Skamania County 2008), as adopted by the County Resolution in 2008. All existing county roadways requiring improvements prior to hauling would be designed and constructed in accordance with the WSDOT *Design Manual* (WSDOT 2007) and *A Policy on Geometric Design of Highways and Streets* (AASHTO 2004). A gravel surface would be installed, compacted to meet all equipment load requirements, and maintained to reduce wind erosion and dust. Existing culverts across intermittent streams would be replaced with wider or stronger culverts as necessary, and drainage improvements would be made (pursuant to a Project Erosion Control Plan and National Pollutant Discharge Elimination System [NPDES] permit) as necessary to control runoff.

In addition to the permanent access roads described above, temporary access may be required for constructing some facilities. For example, constructing the underground collector cables would require that heavy equipment be able to access trench locations where they are not directly adjacent to roads. Generally, equipment would be driven across open ground to accomplish this construction; in some locations minor grading may be required to allow safe access to construction locations (construction locations would be determined only after final pole locations have been selected). These temporary access roads would be re-graded and reseeded as necessary to restore vegetation after the construction phase is over.

After the project is constructed, use of the improved and new access roads on private lands would be limited to the landowner and to project maintenance staff.

2.1.4 PROJECT CONSTRUCTION

2.1.4.1 Construction Activities

Construction of the proposed wind project is expected to take approximately one year, and would likely occur from early spring through late fall. Construction of the project would involve the following tasks:

- Harvesting trees in areas that are not already cleared
- Constructing roads and turbine crane pads
- Constructing foundations for turbine and meteorological towers
- Trenching for underground utilities
- Placing underground electrical and communications cables in trenches
- Constructing the project substation
- Constructing the Operations and Maintenance building

- Transporting tower sections to the site and assembling towers
- Transporting nacelle, rotor, and other turbine equipment to the site and installing the equipment on the assembled towers
- Final testing
- Final road grading, final erosion control, and site cleanup

Staging and equipment lay-down areas would be used. These locations would be selected from sites that are accessible from existing roadways and are currently disturbed, or where disturbance can be minimized. Disturbances for staging and lay-down areas would be restored following construction.

In addition, the proposed transmission interconnection would be constructed between the project substation and BPA's existing North Bonneville-Midway transmission line, which passes through the wind project site. Access for construction of the interconnection would be via existing access roads for the BPA transmission line, which are used for periodic inspection and maintenance of that line. The construction sequence for the transmission interconnection would include the following activities:

- **Stringing Conductors/Static Wires.** Conductor stringing involves a sequence of running pilot lines through pre-positioned pulleys located on each tower. A truck-mounted, spooled conductor is then positioned at the beginning of the segment to be strung. Take-up spools, also truck-mounted, are located at the end of the segment to be installed. Pilot lines are pulled through with tension maintained and the conductors follow and are left in position on the towers. Installation is completed by connecting the conductors to the individual insulators, while adjusting the conductors sag between towers to predetermined dimensions. In some locations, static wires also would be installed for protection of the transmission line. The static wires would be installed in a manner similar to the conductors. The conductor stringing operation primarily involves the movement of wheeled vehicles along the access road.
- **Site Cleanup.** Following construction of the interconnection, all residual construction debris would be removed and disturbed areas would be restored as required.

After the project has been constructed, trees on most of the site would be allowed to mature on a normal forest management schedule (according to the SDS staff, trees in the project area grow about 2 feet per year on average). Figure 2-2 shows the current forest types in the project area.

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Aerial Photo: 2006 USDA NAIP Imagery
Forest Cover Source: SDS Lumber Company

Source: GeoDataScape.

Figure 2-2
Current Forest Types

URS

Whistling Ridge Energy Project
Skamania County, Washington

The exception would be in an area immediately surrounding the turbines and the access roads to the turbines. To allow for safe access to each tower for maintenance, to eliminate the potential for trees falling against the towers during storms, and for fire protection, an area extending approximately 150 feet from the center of each tower would be managed to maintain vegetation below approximately 15 feet in height. These dimensions may be adjusted during the final micrositing[1] process to best balance the interest of maximizing electrical generation, along with maximizing replanting of all trees to ensure the best possible operation of the site for ongoing commercial forestry purposes.

2.1.4.2 Construction Schedule

Assuming that the state of Washington approves the Applicant's application for a Site Certificate and BPA grants the Applicant's interconnection request, the Applicant would then begin construction of its proposed Whistling Ridge Energy Project. Actual construction activities, from groundbreaking to commercial operations, are expected to take approximately 15 months. Although actual timing of project approvals needed to start construction are not precisely known at this time, the Applicant anticipates project permitting with EFSEC to be completed by the end of 2010 or early 2011, and hopes to receive a Record of Decision (ROD) from BPA approving the requested interconnection shortly thereafter. Under this schedule, the Applicant would conduct final project engineering, equipment procurement, and contractor selection in the fourth quarter 2010 and the first quarter 2011. Project construction and pre-operational testing would occur from the second quarter 2011 to the second quarter 2012. If this schedule is met, the Applicant anticipates that the Whistling Ridge Energy Project would begin commercial power production by May 2012.

2.1.4.3 Construction Manpower and Truck Trips

The average size of the construction workforce would be about 110 workers, with a peak of approximately 265 workers in the seventh month of the construction period. Table 2-2 shows the approximate number of on-site construction workers by activity, which would vary month by month. Table 2-3 shows the on-site construction labor by month of construction.

[1] "Micrositing" is process of choosing the wind turbine and their exact positions within the project area. Micrositing will occur after permit approvals are obtained and all permit conditions are known.

Table 2-2
On-Site Construction Workers by Activity

Task	Approximate On-Site Manpower
Site Certification Agreement Approved	
Engineering/Design/Specifications/Surveys	15
Order/Fabricate Wind Turbines	0
Order/Fabricate Substation Transformer	0
Road Construction	50
Foundations Construction	50
Electrical Collection System Construction	50
Substation Construction	40
Wind Turbine Assembly and Erection	75
Plant Energization and Commissioning	25
Plant Substantial Completion	0
Construction Punchlist Clean-Up	25

Table 2-3
On-Site Construction Labor by Month

Month Before Commercial Operation	Project Management and Engineers	Field Technical Staff	Skilled Labor and Equipment Operators	Unskilled Labor	Total Approximate On-Site Manpower
14	5	10	0	0	15
13	5	10	0	0	15
12	10	8	58	14	90
11	10	8	58	14	90
10	17	15	114	44	190
9	17	15	114	44	190
8	22	21	158	64	265
7	17	16	133	49	215
6	12	11	103	39	165
5	15	16	120	39	190
4	8	11	61	20	100
3	8	11	61	20	100
2	8	11	61	20	100
1	3	5	17	0	25
0	1	1	10	13	25
Cleanup	1	1	10	13	25

Truck trips to and from the Whistling Ridge Energy Project for construction-related activities would average 30 trips during the AM peak hours and 10 trips during PM peak hours. During the peak month of construction activity (approximately eight months prior to commercial operation), traffic would increase to 390 vehicles along eastbound SR 14 at the east junction with Cook-Underwood Road.

2.1.4.4 Construction Costs and Fiscal Considerations

The total estimated construction cost of the Whistling Ridge Energy Project would be approximately $150 million, which includes the wind turbines and associated equipment.

Construction of the proposed project also would result in fiscal contributions within the three-county area of Skamania, Klickitat, and Hood River counties. These contributions are anticipated to be approximately $13.2 million, or just under 10 percent of the total estimated $150 million in construction costs. The $13.2 million would include supplies purchased from local suppliers, as well as increased sales tax revenues from purchases (such as food, gasoline, and lodging) made by construction workers. In addition, Skamania County would be expected to experience an increase in sales tax revenue of approximately $6,600 due to sales tax on the construction contract.

2.1.5 PROJECT OPERATION

Once operational, the Whistling Ridge Energy Project would operate 24 hours per day, seven days per week. Project operations would require eight to nine permanent full-time and/or part-time staff. Positions required for project operation include those listed in Table 2-4.

Table 2-4
Operations and Maintenance Staff

Staff Positions	Number of Operating Personnel
Plant Site Manager	1
Operations Manager	1
Operating Technicians	4 to 5
Administrative Manager	1
Administration Assistant	1
Total	8 to 9

The annual cost of project operation would be approximately $3.75 million. Of this annual amount, approximately $1.5 million would be for labor costs, such as wages and benefits for employees. The remaining $2.25 million in annual costs would include expenditures for materials, supplies, equipment, insurance, and contracted maintenance labor.

Operation of the proposed project also would result in permanent fiscal contributions to the regional economy. Skamania County would be expected to experience an increase in annual property tax revenue of approximately $731,500 due to the increase in assessed value of the parcels on which the Whistling Ridge Energy Project would be constructed. This would represent an annual increase of 7.6 percent compared to the amount of property tax collected for these parcels in calendar year 2007.

2.1.6 FOREST HARVEST DURING PROJECT CONSTRUCTION AND OPERATION

The project site is on land managed for commercial forestry by S.D.S. Co., LLC and Broughton Lumber Company. All of the parcels on which the project is located are managed for a continual cycle of growth, harvest, and replanting. As a longstanding commercial forestry site, no old-growth forests exist in areas where the project is proposed. Many of the remaining stands of trees on the sections of land that would have turbines on them are near maturity and S.D.S. Co., LLC and Broughton Lumber Company have recently implemented timber harvest plans on portions of these sections. Harvests have occurred in the project area over time, pursuant to long-established harvesting schedules (Figure 2-3).

Harvests have typically occurred approximately every 50 years; however, the harvest periods vary depending on the market and the demand for the type of timber. As a result, some harvests have occurred as frequently as every 40 years, and some have been up to every 65 to 70 years. Additional harvests are planned, subject to requirements of a Forest Practice Application.

In areas surrounding the proposed wind turbines that have not been recently harvested or that are not planned to be harvested before project construction, trees would be harvested and the land would be replanted with seedlings. This clearing would allow for safe construction of the proposed wind project, and would reduce the potential for tree growth to interfere with the wind resource on the site during the commercial life of the project (that is, during the 30-year commercial life of the project, trees that are planted at the time of construction in the cleared area would regrow at a rate that would not interfere with wind energy production).

Typically, the cleared area for the wind turbines would extend approximately 50 feet in all directions from each turbine. From a distance of approximately 50 feet to 150 feet from the base of the turbines, tree heights would be limited to a height of approximately 15 feet above the elevation of the base of the turbine. Extending from approximately 150 feet to 500 feet from the base of the turbines, there would be a restriction of approximately 50 feet in height above turbine foundation level for trees located within an area formed by a 90-degree angle centered on the prevailing wind direction and on the downwind side of the prevailing wind direction. Final locations and dimensions would be determined during the final design, micrositing and construction process (Figure 2-4).

In addition to clearing around the turbines, there would be an approximately 100-horizontal-foot limitation placed on trees along any overhead electrical cable corridors, or such standards as are determined by the project engineers in consultation with BPA or others, as applicable. The permanently disturbed, cleared area described above would be considered a “forest conversion” under the Washington Forest Practices Act, because it is being implemented for the purpose of the project. However, to the extent feasible for the project, cleared areas would be reforested in accordance with typical commercial forestry management practices.

The areas where tree clearing is required would be clear-cut using crawler tractors, rubber-tired skidders, and mobile feller-bunchers, as has been done on other stands on the property. Logs would be transported by truck to SDS facilities in Bingen, Washington. Except for areas to be maintained and permanently cleared for the construction of permanent improvements and ongoing operations and maintenance access needs (which would be replanted with appropriate native grasses and low-growing shrubs), cleared areas would be replanted with trees within one year after completion of construction (tree planting is done in the spring of each year).

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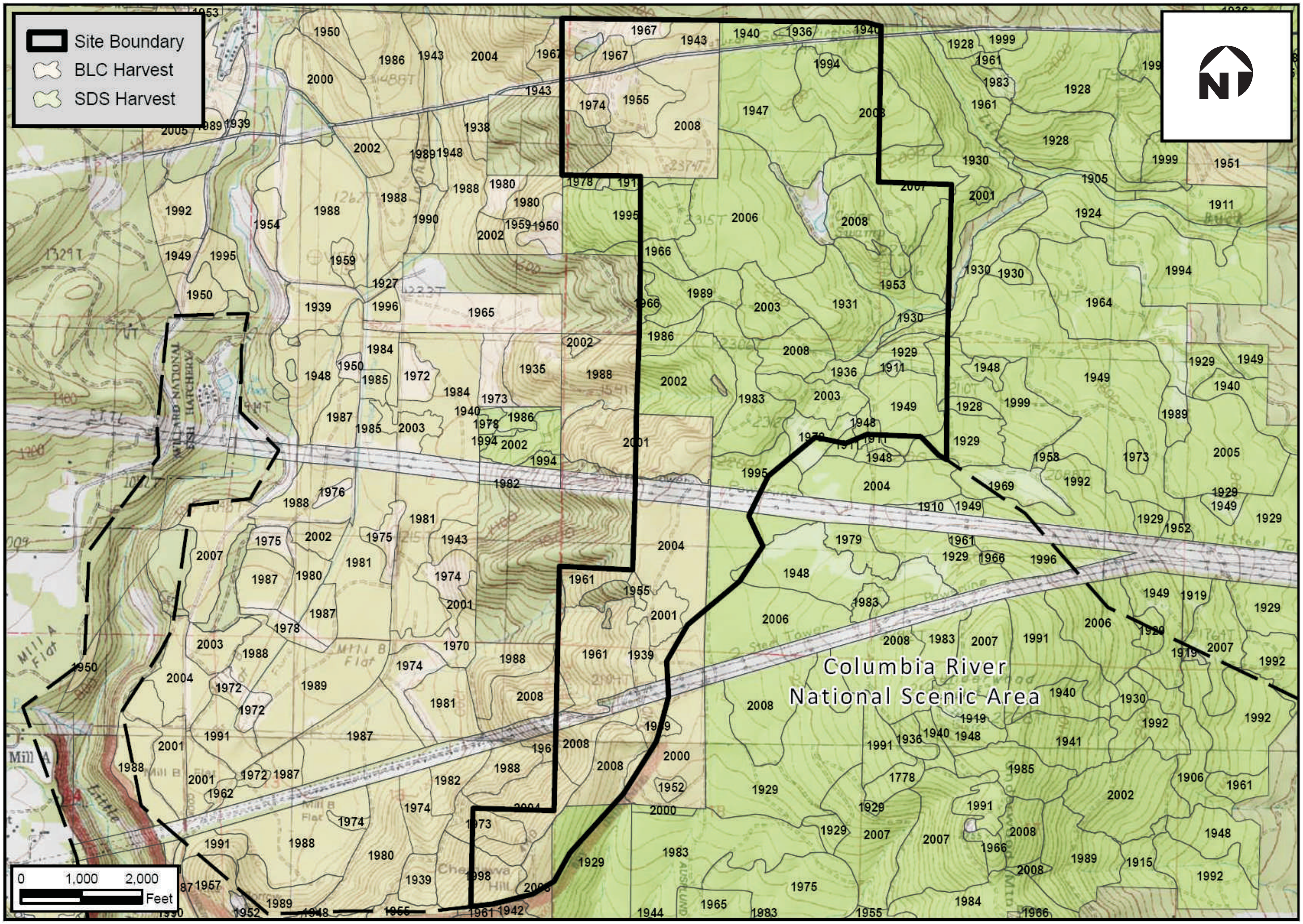

Source: SDS Lumber

Figure 2-3
Harvesting Schedule

URS

Whistling Ridge Energy Project
Skamania County, Washington

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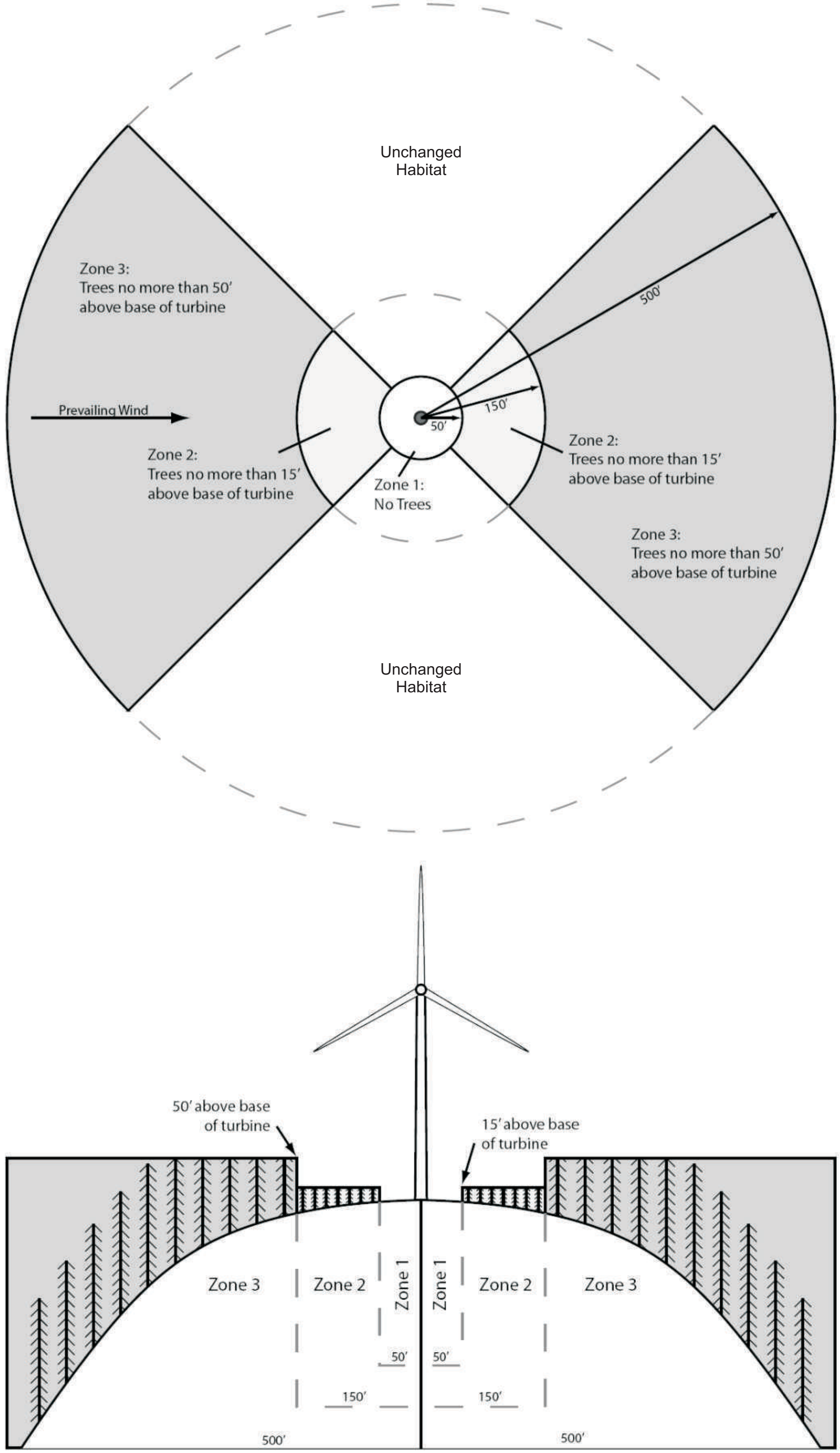

Source: GeoDataScape.

Figure 2-4
Turbine Timber Buffer

URS

Whistling Ridge Energy Project
Skamania County, Washington

2.1.7 PROJECT DECOMISSIONING

For financial evaluation and contractual purposes, the Whistling Ridge Energy Project is expected to have a useful life of at least 30 years. While some project elements may have a typical lifespan of only about 30 years, the trend in the wind energy industry has been to "repower" older wind energy projects by upgrading equipment with more efficient turbines. It therefore is likely that the project would be upgraded with more efficient equipment and have a useful life longer than 30 years.

However, if the project were terminated, the necessary authorization from the appropriate regulatory agencies would be obtained to decommission the facilities. All aboveground facilities would be removed from the site, and unsalvageable material would be disposed of at authorized sites. To avoid unnecessary future ground disturbance and related environmental impacts, the turbine foundations would likely be removed to a depth of 3 to 4 feet below ground surface (bgs), and underground electrical cables would likely be abandoned in place. The soil surface would be restored as close as reasonably possible to its original condition. Reclamation procedures would be based on site-specific requirements and forest management techniques commonly employed at the time the area is to be reclaimed, and would include re-grading, adding topsoil, and replanting all disturbed areas. Decommissioned roads would be reclaimed or left in place based on landowner preference, and right of way would be surrendered to the landowner.

In compliance with WAC 463-72, Site Restoration and Preservation, Whistling Ridge Energy LLC will provide EFSEC with an initial site restoration plan at least ninety days prior to the beginning of site preparation. The plan will address site restoration that would occur at the conclusion of the project's operating life (estimated to be 30 years), and restoration in the event the project is suspended or terminated during construction or before it has completed its useful operating life. The plan will include or parallel a decommissioning plan for the project.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, the state of Washington would deny the Applicant's application for a Site Certificate for the proposed Whistling Ridge Energy Project, and/or BPA would not grant interconnection of the project to the FCRTS. As a result, the proposed Whistling Ridge Energy Project would not be constructed or operated under this alternative. This alternative would not help the state of Washington in achieving the renewable energy goals mandated by the state's RPS. Furthermore, this alternative would not help to meet the region's need for additional power in coming years. If the proposed project is not constructed, it is likely that this need would be addressed by some combination of energy efficiency and conservation measures, existing power generation sources, and/or the development of other new renewable and non-renewable generation sources.

In addition, it is reasonably expected that under the No Action Alternative, the proposed project site would continue to be used for logging and other timber harvest activities. This site has been in commercial forestry use for the last century, during which the site has been logged over a series of approximately 50-year logging rotations. If the proposed wind project is not approved and built, the Applicant and others would continue to use the site for commercial forestry production. Ongoing timber management activities at the project site under this alternative would include regular tree clearing, harvesting, replanting, and development of additional access roads as necessary.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The Applicant has proposed a particular type of generation facility (wind) at a specific site. The lead agencies, Washington EFSEC and BPA, need to respond to the Applicant's requests for authorizations and approvals for the proposed wind project at this site. While this EIS focuses on the alternatives of either granting or not granting the Applicant's requests, various other alternatives have been considered for the proposed project. These alternatives include alternative locations for the proposed project, different project sizes, alternative wind generation technologies, and different project configurations. For potential alternatives, the Applicant has identified a number of criteria that must be met in order for the Applicant to have a technically and economically feasible project:

- The project must be located in an area with a steady supply of robust wind power, and on a site on which construction can reasonably occur (no significant geotechnical constraints)
- To reduce startup costs, the project must be located on land the Applicant owns and controls, and land that can serve a dual purpose of commercial forestry and power production
- To enable the power to reach urban markets and eliminate the cost and time required to construct new transmission lines, the project must be located in proximity to existing high-voltage transmission lines
- The costs of construction must be outweighed by the potential return on investment, requiring a minimum number of potential megawatts to be achieved by the project
- The project output must be at a competitive price and of adequate supply to be attractive to utilities looking to fulfill their Renewable and Alternative Energy Portfolio Standards

The following sections describe alternatives that were considered but eliminated from detailed study in this EIS because of technical or economic feasibility issues, not meeting the identified purpose and need for proposed action, or clearly greater environmental impacts.

2.3.1 ALTERNATIVE PROJECT LOCATIONS

SDS owns and manages 70,000 acres of timberland in Washington and Oregon. SDS manages its forestlands with the objective of producing as much high quality wood as possible without compromising the future economic and environmental benefits of their forests. In reviewing its lands for a potential location of a wind project, SDS sought:

- Areas of Applicant-owned property found to have a steady source of robust wind
- Applicant-owned land that contained high ridges on which to place wind turbines with little impact to the continued underlying use of the land for commercial forestry
- Land in proximity to existing high voltage transmission lines

No other sites were identified that are under the ownership of the Applicant or as close to transmission infrastructure facilities.

2.3.2 LARGER OR SMALLER GENERATION FACILITY SIZE

During the project planning process, the Applicant considered the feasibility of constructing and operating a larger generation facility, both in terms of more wind turbines and a larger area, involving the proposed project site. Regarding more turbines, the site does contain a series of ridge lines that are conducive to locating wind turbines but at the same time are limiting as to where those turbines can be placed. In general, placement of turbines in areas substantially below the ridge lines would not effectively make use of the wind resource at the project site, thereby compromising the economic feasibility of the proposed project. Accordingly, the constrained topography has necessitated a restricted power plant design.

Regarding a larger area for the proposed project, the project site is located between the National Scenic Area on the south and land owned by Washington DNR on the north. While the Applicant did not consider locating turbines within the National Scenic Area due to its sensitivities, consideration was given to locating turbines on the DNR lands directly north of the site. These lands have similar topographical characteristics as the proposed project site, and also have been logged through commercial forestry activities. However, use of these lands for project turbines was rejected from further consideration due to comments from the public and DNR's own reluctance to consider leasing the site to the Applicant.

Lands east and west of the proposed project site also were considered but was rejected from further evaluation because these lands are at a lower elevation and do not include the north-trending ridge lines suitable for wind turbine placement that exist on the proposed site.

The Applicant also considered the feasibility of a smaller generation facility at the proposed project site, either by removing turbines or utilizing a smaller project site. However, the project is proposed as an "integrated whole," as a single power plant, not pieces of a whole, where some turbines may be eliminated. It proposes a defined output, based on site and design characteristics and market demand and Applicant objectives. These objectives include providing a minimum level of generation to be attractive to utilities seeking to fulfill their RPS requirements, as well as providing a return on investment to the Applicant. In order to provide this return, the Applicant has determined that the project must be capable of producing a minimum of 70 MW. The number of wind turbines at the project site has already been minimized to the extent practicable in light of the Applicant's objectives. Accordingly, if any turbines are removed from the project design, other locations must be found to replace those turbines to maintain the minimum necessary capacity. The constrained site location and topography limits the ability to relocate turbines within the project site.

In sum, the project size was selected to optimize project energy output and economic feasibility. A smaller wind turbine facility would be unlikely to offset project development costs. A larger project would require additional infrastructure capacity and transmission capacity.

2.3.3 ALTERNATIVE WIND GENERATION TECHNOLOGIES

Consideration was given to alternative technologies for the generation of power from a wind resource. Several types of wind energy conversion technologies have been developed over the past three decades and include (1) vertical axis Darrieus wind turbines,(2) two-bladed downwind wind turbines, (3) smaller three-bladed upwind wind turbines (500 to 750 kW), and (4) larger 3-bladed upwind wind turbines (1 to 3 MW). The three-bladed, upwind, horizontal axis is currently the preferred technology, based on proven reliability and commercial viability.

2.3.4 ALTERNATIVE PROJECT CONFIGURATIONS

As discussed above, the proposed project site contains a series of ridge lines that are conducive to locating wind turbines but at the same time are limiting as to where those turbines can be placed. This means that there are limited options for locating wind turbines within the site. Alternative turbine configurations were considered, but were eliminated from further study because they either did not appropriately utilize the wind resource present at the site or compromised the economic feasibility of the proposed project.

2.3.5 ALTERNATIVE INTERCONNECTIONS

Alternatives for interconnecting with BPA's existing high voltage transmission lines that currently cross the proposed project site were considered. The currently proposed location of the substation was chosen because it is a relatively clear and low-elevation area that is adjacent to the proposed site of the Operations and Maintenance facility.

Initially, an option of providing interconnection to the FCRTS at a point along the North Bonneville-Midway 230-kV transmission line within the wind project site and directly east of the currently proposed interconnection point was identified. This alternative interconnection point was located between structures 22/6 and 23/1 on the North Bonneville-Midway 230-kV transmission line. However, this option would have required the development of interconnection facilities within the National Scenic Area because structure 22/6 is on the border of, and structure 23/1 within, the Scenic Area. Given the high sensitivity of the Scenic Area, construction of an interconnection alternative within its boundaries was eliminated from further study.

An alternative interconnection also was considered off of the wind project site, approximately 1.5 miles west of the currently proposed interconnection point. BPA's transmission engineers identified a potential alternative interconnection site between structures 21/4 and 22/1 on the North Bonneville-Midway 230-kV transmission line. This site is located in a relatively flat, lower-elevation area that may have easier access in the winter than the currently proposed interconnection site. However, this alternative would have required the Applicant to construct and operate a new 1.5 mile section of 230-kV transmission line from the wind project site to this interconnection point. Development of such a new line would have required the clearing of an approximately 125-foot-wide right-of-way corridor for the line, as well as the clearing and construction of additional new transmission line access roads. This corridor would be located in steep terrain, and would require timber harvesting, new access roads, and vegetation control in areas where slopes approach 100 percent in places. In addition to potential additional impacts to plants, wildlife, cultural resources, aquatic areas, and wetlands that could be avoided by siting the project substation within the wind project site, this alternative likely would have greater visual and geological impacts due to the new transmission line corridor's location on steep, more visible slopes.

The Applicant also has stated that the additional costs of constructing the new line associated with this alternative line likely would make the project no longer economically viable. In additional to the substantial additional costs of constructing this additional line, timber harvesting operations on the steep terrain that exists in the potential narrow corridor for the new line under this alternative would be impossible to conduct economically adjacent to the existing BPA system unless a much larger area was harvested at the same time. Because of the much greater potential for environmental effects as compared to merely developing the currently proposed interconnection within the already planned wind project site, as well as the significant additional cost implications, this alternative was considered but eliminated from detailed study in this EIS.

Finally, an interconnection with the other existing BPA transmission line that crosses the wind project site also was considered. However, this alternative was rejected from further study because the other existing BPA line is a 115-kV transmission line that does not have sufficient capacity to transmit the energy from the Whistling Ridge Energy Project.

2.3.6 ALTERNATIVE ACCESS ROADS

During project planning, different alternatives for accessing the proposed project site were assessed. There are three potential ways to access the project site. All are via County roads from SR 14 to Cook-Underwood Road. In addition to the proposed access route that is included as part of the Proposed Action, from Cook-Underwood Road, the project site could be accessed by:

- **Route 1:** Ausplund Road to a private logging road vacated by Skamania County in 1987, which crosses private property (not owned by the Applicant) that is currently used for residential, agricultural orchards, and commercial timber production and harvest

- **Route 2:** Kollock-Knapp Road to Scoggins Road to a private logging road called the CG2930 road on County Assessor's maps, which crosses property owned by the Applicant that is currently used for commercial timber production and harvest

The private logging road in Route 1 was made a County right of way in 1923. It was vacated for public use in 1987 by resolution of the Skamania Board of County Commissioners; however, the rights to use the road by abutting property owners remain. Additionally, road improvements to this route would be required for access to construct the wind energy facility and for ongoing operations and maintenance traffic. Impacts to a non-project landowner from these activities would occur if Route 1 were used. Therefore, Route 1 has been eliminated as a construction roadway access alternative.

Route 2 would require minor roadway improvements that would not directly impact any non-project landowners. However, these roadway improvements would require construction within the National Scenic Area. Therefore, Route 2 has been eliminated as a construction roadway access alternative.

2.4 BENEFITS AND DISADVANTAGES OF DELAYING PROJECT IMPLEMENTATION

The benefits of deferring action on the proposal would include:

- Delaying or deferring construction impacts of traffic, noise and dust
- Delaying or deferring potential operational impacts on noise, visual resources, and wildlife

The disadvantages of deferring action on the proposed project would include the following:

- The Whistling Ridge Energy Project would not help the state of Washington in achieving the renewable energy goals mandated by the state's RPS.
- The Whistling Ridge Energy Project would not help to meet the region's need for additional power in coming years. If the proposed project is not constructed, it is likely that this need would be addressed by some combination of energy efficiency and conservation measures, existing power generation sources, and/or the development of other new renewable and non-renewable generation sources.
- It is reasonably expected that under the No Action alternative, the proposed project site would continue to be used for logging and other timber harvest activities so there would be continued impacts from access, timber cutting, and replanting over time. This site has been in commercial forestry use for the last century, during which the site has been logged over a series of approximately 50-year logging rotations. If the proposed wind project is not approved and built, the Applicant and others would continue to use the site for commercial forestry production. Ongoing timber management activities at the project site under this alternative would include regular tree clearing, harvesting, replanting, and development of additional access roads as necessary.
- The Applicant would be denied the ability to create new business and job opportunities through diversifying and maximizing the use of its existing holdings
- Up to a peak of 265 new construction jobs in Skamania County would not be created
- Eight to nine new operation jobs in Skamania County would not be created

- A new revenue source to Skamania County and the state of Washington from the payment of sales and business taxes would be deferred or eliminated

2.5 COMPARISON OF ALTERNATIVES

Under the Proposed Action, the state of Washington would approve the Applicant's application for a Site Certificate for the proposed Whistling Ridge Energy Project, and BPA would grant interconnection of the proposed project to the FCRTS. Under the No Action Alternative, the state of Washington would deny the Applicant's application for a Site Certificate for the proposed project, and/or BPA would not grant interconnection of the Whistling Ridge Energy Project to the FCRTS.

Table 2-5 compares BPA's Proposed Action and the No Action Alternative to the BPA purposes identified in Chapter 1 of this EIS. Table 1-1 in Chapter 1 of this EIS summarizes the potential environmental impacts and mitigation for each alternative. Detailed analysis of potential impacts is contained in Chapter 3 of this EIS.

Table 2-5
Comparison of Alternatives to BPA Purposes

Purpose	BPA Proposed Action	No Action Alternative
Maintain the electrical stability and reliability of the FCRTS	The physical interconnection of the Whistling Ridge Energy Project would be designed to ensure that the electrical stability and reliability of BPA's transmission system is maintained, and contractual terms would be put in place to ensure that project operations do not adversely affect electrical stability and reliability.	Not granting an interconnection would have no effect on the electrical stability and reliability of BPA's transmission system.
Continue to meet BPA's statutory and contractual obligations	The Proposed Action would further BPA's efforts to provide open access to its transmission system consistent with its Tariff, and would not be expected to interfere with BPA's other existing contractual obligations or compliance with any statutory requirements.	The No Action Alternative would not further BPA's efforts concerning transmission open access, and would not interfere with other existing contractual obligations or compliance with any statutory requirements.
Act consistently with BPA's environmental and social responsibilities	Through this EIS and other environmental processes, BPA is ensuring compliance with NEPA and other applicable environmental laws for its Proposed Action. Allowing interconnection of the Wind Project would increase the availability of desired renewable resources in the region through a project that has been designed to minimize or avoid environmental impacts to the extent practicable.	By not allowing the requested interconnection of the wind Project under the No Action Alternative, BPA would deny this renewable resource access to the energy market. Although this alternative would avoid the environmental impacts of the Wind Project, the proposed Wind Project site would continue to be used for commercial forestry and environmental impacts from access, timber cutting, and replanting would be expected to continue over time.
Provide for cost and administrative efficiency	The Proposed Action would involve providing an interconnection to BPA's transmission system at a reasonable cost, and contractual arrangements would ensure efficient administration of management and operation of this interconnection.	The No Action Alternative would not have long-term interconnection cost or administration implications for BPA.

2.6 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO). 2004. *A Policy on Geometric Design of Highways and Streets*. 5th Edition

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