B O N N E V I L L E   P O W E R   A D M I N I S T R A T I O N

Whistling Ridge Energy Project

Final Environmental Impact Statement

Appendices A-B

August 2011

DOE/EIS-0419

Cooperating Agency:
State of Washington, Energy Facility Site Evaluation Council

Appendix A

Application for Site Certification as amended October 12, 2009

Whistling Ridge Energy Project

Application for Site Certification Agreement

Submitted to

Washington Energy Facility Site Evaluation Council

Application 2009-01

Submitted March 10, 2009
Amended October 12, 2009

PLEASE NOTE: Both original and revised application sections are included on this CD. Originial application sections have a footer dated March 10, 2009. Revised sections have a footer dated October 12, 2009.

Revised application sections include:

Table of Contents
Introduction
2.1 Site Description
2.2 Legal Description and Ownership Interests
2.3 Construction on Site
2.12 Construction and Operation Activities
2.14 Construction Methodology
2.17 Study Schedules
2.19 Analysis of Alternatives
2.20 Pertinent, Federal, State and Local Regulations
3.1 Earth
3.3 Water
3.4 Habitat, Vegetation, Fish and Wildlife
3.5 Wetlands
3.6 Energy and Natural Resources
4.2 Land and Shoreline Use
4.3 Transportation

Whistling Ridge
ENERGY PROJECT

October 12, 2009

Mr. Jim Luce, Chair
Washington Energy Facility Site Evaluation Council
905 Plum Street SE, Third Floor
P. O. Box 43172
Olympia, Washington 98504-3172

Subject: **SUBMITTAL OF AMENDED APPLICATION 2009-01**
WHISTLING RIDGE ENERGY PROJECT
SKAMANIA COUNTY, WASHINGTON

Dear Mr. Luce:

Whistling Ridge Energy LLC hereby submits an Amendment to our Application 2009-01 for Site Certification for construction and operation of the Whistling Ridge Energy Project.

The primary revision is the change in site access. We are no longer proposing to use forest service road CG 2930 through the Columbia River Gorge National Scenic Area (CRGNSA). Instead site access is proposed from SR 14 to Cook-Underwood Road, to Willard Road, and then to West Pit Road. West Pit Road is an existing forest road that connects to the western boundary of the project site. West Pit Road is located entirely outside of the CRGNSA and would require some widening. Construction impacts are similar to those already described in the application for project access. No roadway improvements would be required to roads within the CRGNSA.

In addition to the change in road access description and associated roadway lengths, we have made 6 other minor changes to the Application:

- The size of the maintenance and operations yard has been increased from 2 acres to approximately 5 acres.
- A second alternative location has been included for the maintenance and operation yard along the new access road.
- The construction schedule in Section 2.12 has been updated to reflect a later decision date by the Governor, and therefore a later start to construction and operation.
- The zoning for the southern portion of turbine string A has been corrected from R-10 to For/Ag-20 based on testimony from Skamania County during the land use hearing.
- The recreation section has been corrected to add the location of two national trails, the Lewis and Clark National Historical Trail and the Oregon Pioneer National Historic Trail. As pointed out by the National Park Service in their EIS comment letter, both are located within five miles of the proposed facility. These trails roughly follow Highway 14 and Interstate 84, respectively.

The amendment package includes only those sections of the Application that have been revised and is intended to be an errata package to the existing application. Only those sections that have been changed would be replaced.

To assist the reviewers in inserting the amendment package, we have included a listing of the sections as an attachment to this letter. We have also marked the revised text using a strike-out and underline format along with a vertical line in the left hand margin. Text that is not marked as a change is identical to that shown in the March 2009 Application. The vast majority of the revisions result from the new access roadway.

The Amendment to the Application being submitted has been prepared in compliance with the regulations found in Section 463-60 of the Washington Administrative Code. The submittal includes:

(1) Sixty-five (65) copies of the Amendment
(2) Twenty (20) copies of the Amendment in electronic format (Adobe .pdf format)

The Amendment was prepared jointly by Whistling Ridge Energy LLC and URS Corporation. Whistling Ridge Energy LLC hereby certifies that, to the best of our knowledge, all Energy Facility Site Evaluation Council requirements have been reviewed, that the data has been prepared by qualified professional personnel, and the Amended Application is substantially complete.

As stated in Section 1.2, Designation of Agent, in the Application, Mr. Jason Spadaro and Mr. Allen Barkley will continue to serve as the primary points of contact during the review process, along with our legal counsel. Our project team remains ready to meet with you to discuss the application and its review process at your convenience.

Sincerely,

Jason Spadaro, President
Whistling Ridge Energy LLC

P.O. Box 266
Bingen, WA 98605
Tel: (509) 493-6103
Cell: (541) 490-5013
Fax: (509) 493-2535

Instructions for inserting Amendments into Application 2009-01

PLEASE NOTE: Only revised application sections are included in this package. Please retain unchanged sections, and replace only those sections that are included herein.

Application Section #	Section Title	Revised or Not
	Table of Contents	**Revised – please replace**
	Introduction	**Revised – please replace**
1.1	Description of Application	*Not revised – retain existing*
1.2	Designation of Agent	*Not revised – retain existing*
1.3	Assurances	*Not revised – retain existing*
1.4	Mitigation Measures	*Not revised – retain existing*
1.5	Sources of Information	*Not revised – retain existing*
2.1	**Site Description**	**Revised – please replace**
2.2	**Legal Description and Ownership Interests**	**Revised – please replace**
2.3	**Construction on Site**	**Revised – please replace**
2.4	Energy Transmission Systems	*Not revised – retain existing*
2.5	Water Supply	*Not revised – retain existing*
2.6	System of Heat Dissipation	*Not revised – retain existing*
2.7	Characteristics of Aquatic Discharge System	*Not revised – retain existing*
2.8	Wastewater Treatment	*Not revised – retain existing*
2.9	Spillage Prevention and Control	*Not revised – retain existing*
2.10	Surface Water Runoff	*Not revised – retain existing*
2.11	Emission Control	*Not revised – retain existing*
2.12	**Construction and Operation Activities**	**Revised – please replace**
2.13	Construction Management	*Not revised – retain existing*
2.14	**Construction Methodology**	**Revised – please replace**
2.15	Protection for Natural Hazards	*Not revised – retain existing*
2.16	Security Concerns	*Not revised – retain existing*
2.17	**Study Schedules**	**Revised – please replace**
2.18	Potential for Future Activities at the Site	*Not revised – retain existing*
2.19	**Analysis of Alternatives**	**Revised – please replace**
2.20	**Pertinent, Federal, State and Local Regulations**	**Revised – please replace**
3.1	**Earth**	**Revised – please replace**
3.2	Air	*Not revised – retain existing*
3.3	**Water**	**Revised – please replace**
3.4	**Habitat, Vegetation, Fish and Wildlife**	**Revised – please replace**
3.5	**Wetlands**	**Revised – please replace**
3.6	**Energy and Natural Resources**	**Revised – please replace**
4.1	Environmental Health	*Not revised – retain existing*
4.2	**Land and Shoreline Use**	**Revised – please replace pages 4.2-1 through 4.2-24**
	NOTE: Revisions are only made to pages 4.2-1 through 4.2-24, and to 4.2-73 to the end of the section – please REPLACE those portions with the new sections and RETAIN pages 4.2-25 through 4.2-72	**Retain pages 4.2-25 through 4.2-72**
		Revised – please replace pages 4.2-73 through to the end of section 4.2
4.3	**Transportation**	**Revised – please replace**
4.4	Socioeconomics	*Not revised – retain existing*
5.1	Air Emissions	*Not revised – retain existing*
5.2	Wastewater/Storm Water Discharge Permit Applications	*Not revised – retain existing*

TABLE OF CONTENTS

INTRODUCTION

PART 1 GENERAL

PART 2 PROPOSAL

TABLE OF CONTENTS
Cont'd

TABLE OF CONTENTS
Cont'd

TABLE OF CONTENTS
Cont'd

PART 3 NATURAL ENVIRONMENT

PART 4 BUILT ENVIRONMENT

TABLE OF CONTENTS
Cont'd

TABLE OF CONTENTS
Cont'd

List of Tables

TABLE OF CONTENTS
Cont'd

TABLE OF CONTENTS
Cont'd

TABLE OF CONTENTS
Cont'd

List of Figures

TABLE OF CONTENTS
Cont'd

TABLE OF CONTENTS
Cont'd

List of Appendices
(included on disk)

TABLE OF CONTENTS
Cont'd

List of Acronyms

A

AADT	average annual daily traffic
aMW	average MW
Applicant	Whistling Ridge Energy LLC

B

BLM	Bureau of Land Management
BMPs	best management practices
BNSF	Burlington Northern Sante Fe
B&O	Business and Occupation
BP	before the present
BPA	Bonneville Power Administration
bgs	below ground surface

C

CFR	Code of Federal Regulations
CRBG	Columbia River Basalt Group
CSZ	Cascadia Subduction Zone
CRL 40	Commercial Resource Land 40
CWM	coarse woody material

D

dB	decibels
dBA	A-weighted decibels
dBG	G-weighted decibel
dbh	diameter at breast height
DTM	digital terrain model

E

Ecology	Washington State Department of Ecology
EDNA	environmental designations for noise abatement
EFSEC	Energy Facility Site Evaluation Council
EIS	environmental impact statement
EPA	Environmental Protection Agency
EPC	Engineering, Procurement, and Construction
ESA	Endangered Species Act

F

°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FCRTS	Federal Columbia River Transmission System
FEMA	Federal Emergency Management Agency
FL 20	Forest Land 20

TABLE OF CONTENTS
Cont'd

For/Ag-20	Resource Protection
FPA/N	Forest Practices Application/Notification
G	
gpd	gallons per day
GMA	General Management Area
GMA Ag-1	GMA large-scale agricultural
GMA F-1	commercial forest
H	
H	horizontal
HCS+	Highway Capacity Software Plus
Hz	hertz
I	
I	interstate
IBC	International Building Code
K	
kV	kilovolt
KVA	key viewing areas
L	
L_{10}	noise levels equaled or exceeded 10 percent of the measured time interval
L_{50}	noise levels equaled or exceeded 50 percent of the measured time interval
L_{90}	noise levels equaled or exceeded 90 percent of the measured time interval
L_{dn}	day-night average sound level
L_{eq}	equivalent sound level
L_{max}	maximum equivalent sound level
L_{min}	minimum equivalent sound level
LHA	landslide hazard area
LOS	level of service
M	
M	magnitude
mm/yr	millimeters per year
MP	milepost
mph	miles per hour
msl	mean sea level
M_w	moment magnitude
MW	megawatt
N	
NAAQS	National Ambient Air Quality Standards

TABLE OF CONTENTS
Cont'd

NAT	Natural
NOI	notice of intent
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Services

P

μPa	micropascals
project area	the area within the project boundary
project site	the area within the project boundary and the surrounding area
PSD	Prevention of Significant Deterioration
PUD	Public Utility District
PWL	sound power level

Q

QA/QC	quality assurance/quality control

R

R-10	Residential 10
RCW	Revised Code of Washington
RES-20	Rural Estates 20
rpm	revolutions per minute
RV	recreational vehicle

S

SCADA	supervisory control and data acquisition
SCC	Skamania County Code
Scenic Area	Columbia River Gorge National Scenic Area
SCFD3	Skamania County Fire District No. 3
SEPA	State Environmental Policy Act
SMA	Special Management Area
SPCC	spill prevention, control, and countermeasure
SPL	sound pressure level
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan

T

TCP	traditional cultural properties
TECI	Turnstone Environmental Consultants
TMP	Transportation Management Plan
Turbine string	a series of turbines in a row; spaced approximately 350 to 800 apart

U

UNM	Unmapped

TABLE OF CONTENTS
Cont'd

USC	United States Code
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey

V

V	vertical
vpd	vehicles per day

W

WAC	Washington Administrative Code
WAVE	Water Availability Verification Evaluation
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WEST	Western Ecosystems Technology
WFPA	Washington Forest Practices Act
WNHP	Washington Natural Heritage Program
WSDOT	Washington State Department of Transportation

INTRODUCTION

Whistling Ridge Energy LLC, a limited liability corporation operating in the State of Washington, seeks a Site Certification Agreement to construct and operate the approximately 75-megawatt (MW) Whistling Ridge Energy Project to generate electricity using wind turbine technology. The project would be constructed in south-central Washington on an approximately 1,152-site approximately 7 miles northwest of the City of White Salmon in Skamania County, Washington. The project would be located on commercial forest land owned by S.D.S. Co., LLC and Broughton Lumber Company in an unincorporated area of Skamania County, outside of the Columbia Gorge National Scenic Area.

I.1 PROJECT SUMMARY

The Whistling Ridge Energy Project is intended to provide both a new source of non-polluting renewable energy in the State of Washington, and to provide much-needed economic development in Skamania County fully compatible with existing land use.

The Whistling Ridge Energy Project is designed to provide low-cost renewable electric energy to meet the growing needs of the Pacific Northwest. Located north of the Columbia Gorge, the project site has been selected primarily for its wind resource and its proximity to Bonneville Power Administration (BPA) power transmission lines, which traverse the site. The transmission lines have adequate capacity for the wind-generated power to be integrated into the power grid system, and the Applicant has made transmission and interconnection requests to BPA. The project site has the further advantage of being in proximity to the Vancouver/Portland metropolitan areas, with the capability of delivering cost-effective renewable energy to these growing communities.

Skamania County is entering its second decade of severe economic downturn, largely a result of the area's long dependence on timber harvests on public lands. Unlike urban counties with a diversity of businesses, Skamania County has been hard hit by the precipitous decline of timber harvest and associated revenues, and the pending sunset of federal timber payments created as mitigation for the impacts of enforcement of the Endangered Species Act. As described in Section 4.4 Socioeconomics, in 2006, employment in Skamania County averaged 3,116 jobs, of which 2,284 (73 percent) were held by wage and salary workers and 832 (27 percent) by merchants and sole proprietors. Place of work earnings (wages, salaries, and proprietors' earnings) accounted for approximately one-quarter of total personal income in the county, with income from property (dividends, interest, and rent) and transfer payments (mainly Social Security) making up the balance. The principal sources of employment were local government, accommodation and food services (tourism), federal government, and small scale manufacturing. The data available for this application does not reflect the current economic crisis that has greatly exacerbated Skamania County's already depressed economy rife with growing poverty, underemployment, and lost jobs.

The annual unemployment rate in Skamania County was 6.6 percent in 2007, and rose to 8.4 percent in 2008, before the full impact of the current recession took effect. Relative to the state as a whole, Washington unemployment rates in 2007 and 2008 were 4.5 percent and 5.5 percent, respectively, having risen from 5.0 percent in 2000 (WESD 2008). Per capita personal income in 2006 in Skamania County was $28,265, which was 74 percent of per capita personal income for the State of

Washington as a whole (BEA 2008). Median household income the same year (2006) was $39,476, or 70 percent of the same measure for Washington State as a whole ($56,184) (WOFM 2008). These statistics indicate relatively lower income in the area near the project when compared to other areas in Washington.

These current unemployment rates and trends and income levels not only reflect that the economy in Skamania County is more depressed than some other areas in Washington, but also that the current national economic slowdown that began in 2008 is affecting areas near the project. The 2008 annual unemployment rate in Skamania County was almost three percentage points higher than the state average, indicating a slow economy.

Fortunately, Skamania County has another natural resource, its winds, that can be developed to benefit local residents and the wider community.

The site on Whistling Ridge, located north of the Columbia River Gorge National Scenic Area and high above the Columbia Gorge, enjoys the same winds that have made the Gorge area a national center of wind power development. These are the same winds that draw wind surfers from around the world to wind swept reaches of the Columbia River near Hood River.

The proposed project site has been used for the last century for commercial forest operations. Most of the areas of the site identified for turbines have been forested recently in general conformance with established timber harvest schedules, and are connected by a network of existing forest roads.

Four major BPA high voltage transmission lines, located in two corridors, cross the site. A Williams Northwest natural gas pipeline is located on the northern edge, their natural compressor station is located to the west, and cellular towers and communications facilities are located nearby. Resource mining in the area has left rock pits in places. In short, the project site is heavily developed, includes no native habitat, and is permanently committed to its use as a utility corridor. The project, once developed, will be a highly compatible companion to sustainable forestry operations on the site, strengthening the landowners' capability to weather through economic cycles and to keep its 325 forestry and wood products personnel employed.

Approximately fifty 1.2 to 2.5 MW wind turbine generators would be placed on the site and connected to BPA's existing North Bonneville to Midway 230-kilovolt (kV) transmission line. The winds that traverse the site are robust, with high energy generation due to the well-understood, unique geographic features of the Columbia Gorge area. The site's potential ability to produce clean electricity so close to urban load, with ready access to transmission and minimal impacts to the natural environment, make it one of the premier as-yet undeveloped wind power sites in the Pacific Northwest.

I.2 DEMAND FOR ELECTRIC POWER IN THE PACIFIC NORTHWEST

Whistling Ridge Energy LLC is proposing to develop a reliable source of clean and cost-effective renewable electrical power in the Pacific Northwest. The Fifth Northwest Electric Power and Conservation Plan was issued by the Northwest Power and Conservation Council in May 2005. The Plan found that Northwest electricity demand was projected to grow at an average annual rate of nearly 1 percent per year, resulting in an over 5,000-MW deficit by 2025 using the medium forecast.

The Fifth Power Plan states that "*Renewable resources are also a priority resource in the Northwest Power Act. Like conservation, their potential and cost-effectiveness are sensitive to developing technology and the cost of more traditional generating alternatives… Renewables have potential risk reduction benefits related to their ability to hedge risks of fuel price volatility and the risks of possible measures to mitigate greenhouse gas emissions.*"

The Washington Department of Community, Trade and Economic Development in recent reports to the Washington State Legislature has found that*: "…the region should begin an aggressive program to capture the large amount of cost-effective conservation that is available and to lay the groundwork for building a large amount of wind generation…*" (Washington CTED 2005).

More recently, state policy has been driven by the electorate's enactment of a Renewable Portfolio Standard that requires all but the state's smallest utilities to acquire new sources of renewable energy with which to supply consumers with clean electricity. This policy, mandated by the voters, resembles similar (though more aggressive) standards in Oregon and California, and has spurred active development of potential wind energy resources within the state to serve in-state utilities.

The Renewable Portfolio Standard, coupled with load growth in Washington's urban areas, has prompted investor-owned and public power utilities to seek new sources, most often developed by Independent Power Producers, to meet their resource goals.

According to the American Wind Energy Association, the power of the wind can be imposing. Winds capable of flagging trees, prohibiting crop cultivation or even, on occasion, blowing a semi-trailer truck off the road, can be harnessed to be a non-polluting, never-ending source of energy.

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. Since our country's founders tended to build our cities and towns where the wind doesn't blow strongly, the vast majority of people don't live in high-wind areas. Yet, when wind power is converted to electricity, it can be sent long distances to serve the needs of the cities and towns where we live.

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 the distribution voltage (a few thousand volts). The distribution-higher voltage power flows through underground lines to a collection point where the power may be combined with other turbines. In many cases, the electricity is sent to nearby farms, residences and towns where it is used. Otherwise, the distribution-voltage power is sent to a substation where the voltage is increased dramatically to transmission-voltage power (a few hundred thousand volts) and sent through very tall transmission lines many miles to distant cities and factories (AWEA 2007).

I.3 REDUCTION OF ENVIRONMENTAL IMPACTS

The project's location is intended to reduce or eliminate the environmental impacts that would occur if a similar project were to be construction on an undisturbed site:

- The site has been in commercial forest operation for over a century and the majority of the locations proposed for the wind turbines have recently been harvested and reforested, eliminating the need for large amounts of clearing for the purpose of locating a wind project. With this project, the site will remain in sustainable forestry operation.

- The site has existing forest roads that can be used with minimal widening for equipment delivery and for Operations and Maintenance, eliminating the need for new clearing. The site can be accessed from County roads via existing roads, requiring only minor improvements.

- The site is crossed by BPA's existing North Bonneville to Midway 230-kV transmission line, allowing direct connection through a substation, and eliminating the environmental impacts associated with the need to create a new high voltage transmission line.

- The site is situated in proximity to the Vancouver/Portland metropolitan area, and can provide a robust source of new clean energy to these markets.

- Unlike a fossil fueled power generation plant, wind energy produces no air emissions, and contributes no green house gas emissions

I.3.1 Water Use

The project would have minimal water needs. Small amounts of water would be used during construction for dust control. During operation, the only water needs are for the Operations and Maintenance staff. The staff of eight to nine employees would use less than 5,000 gallons per day for domestic purposes.

I.3.2 Transmission System

Whistling Ridge Energy LLC proposes to connect the project to the BPA electrical transmission grid. These transmission lines are outside the scope of this Application.

I.4 ELEMENTS OF THE PROJECT SUBMITTED FOR APPROVAL

The project submitted for review and approval under Chapter 80.50 Revised Code of Washington includes the following elements:

- An installed capacity of approximately 75 MW of electricity
- Up to fifty 1.2- to 2.5-MW wind turbines
- Electrical transformers
- 34.5 kV collector lines and systems (primarily underground)
- Permanent meteorological towers
- ~~An~~ Two alternative locations for an Operations and Maintenance facility
- A substation located adjacent to BPA's existing North Bonneville to Midway 230-kV transmission line
- Approximately 2.4 miles of newly-constructed and ~~7.2~~7.9 miles of improved roads to provide access to the wind turbine locations during construction and for Operations and Maintenance

In addition to Operations and Maintenance facilities, the project proposes temporary facilities, including construction phase laydown and storage/staging areas, rock crusher and portable concrete batch plant(s). If built, these facilities will be on site or along the access road to the site, minimizing the impacts on the surrounding roads. The project substation would be built on the project site adjacent to BPA's North Bonneville to Midway 230-kV transmission line, facilitating interconnection with the BPA grid. The proposed electrical interconnection to BPA will provide the access to the regional transmission grid for sales to the wholesale electric market. The development of the proposed interconnection requires a federal action, limited exclusively to the interconnection with the BPA grid.

I.5 SUMMARY OF ENVIRONMENTAL FINDINGS

The project has been planned and designed to eliminate or fully mitigate all environmental impacts. The following is a summary of the elements of the environmental in terms of project design and operation.

I.5.1 Geology, Soils, and Floodplains

The project would have minor and insignificant impacts on earth resources, as described in Section 3.1 of this Application. This includes excavation, grading, trenching, backfill, and compaction associated with site development, the wind turbine foundations, and roadway improvements.

Because surface soils on the project site are considered moderately susceptible to erosion, there is potential for adverse impacts on the site soil in areas of steep topography during grading and foundation construction activities. During the dry season, soils that are disturbed and stripped of vegetative cover may be susceptible to wind erosion. The potential for erosion by wind and water will be minimized through the use of erosion control measures outlined in Section 3.1.7.3 Mitigation Measures.

I.5.2 Air

Because the project uses wind technology to generate electricity, no impacts to air quality would be created during project operation.

During construction, there would be temporary and localized minor impacts from construction vehicle exhaust, similar in nature to those produced by any construction project that involves heavy equipment and transportation of materials to the project site. Construction of the project would produce limited odors associated with exhaust from diesel equipment and vehicles, fugitive dust emissions from construction-related traffic, and additional wind-blown dust as a result of ground disturbance. Whistling Ridge Energy LLC would implement an effective dust control program to minimize any potential disturbance from construction-related dust.

I.5.3 Water

Sections 2.10 Surface Water Runoff and 3.3 Water describe water discharges, water resources, and stormwater management. A Stormwater Pollution Prevention Plan would be prepared and implemented during construction to control the flow of stormwater.

No perennial streams are located in or adjacent to the Whistling Ridge Energy Project. Five drainage ways have been identified on site, ultimately draining to the east of the project site. Runoff is conveyed via these drainage way, and by additional ditches in the southwest portion of the site downslope to perennial streams outside the project site that eventually drain to the Columbia River.

The proposed access road, West Pit Road, crosses one unnamed drainage in the Lapham Creek watershed. This stream had observed flow through the existing culvert under West Pit Road at the time of the July 2009 field visit. However, the surface flow and the channel disappear downstream of the culvert. There is no surface water connection to Lapham Creek. The planned improvements to West Pit Road would cross the unnamed drainage~~existing roads that would occur inside the Scenic Area would cross one intermittent stream~~. This ~~stream~~ drainage has no defined channel ~~and carries water only during runoff events~~downstream of the existing culvert. It is classified as a Class V stream under Skamania County Code 21.04.020(B). Buffers are established for Class V streams. However, expansion of existing uses is allowed within these water resource buffers. The road improvements in these regulated fish and wildlife protection areas do not exceed the allowed expansion threshold. For a full discussion of fish, wildlife, their habitats, and project impacts to these, please see Section 3.4. Additional details regarding water sources and pathways are identified in Section 3.3 Water and Section 3.5 Wetlands.

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 facilities. There would be no industrial wastewater stream from the project beyond wastewater from the Operations and Maintenance building discharging to an on-site septic system. The anticipated use is expected to be less then 5,000 gallons per day for kitchen and bathroom use. Potable water intake would be in the form of a well accommodating the Operations and Maintenance facilities' needs.

I.5.4 Wetlands

No wetlands or wetland indicators were identified within the study area (the project site and previously proposed access roadways). One undelineated wetland is identified as occurring outside the study area perimeter west of turbines C1-C4 (see Figure 3.5-1, Project Site Wetlands in Section 3.5 Wetlands).[1]

A preliminary review of the National Wetland Inventory maps indicates wetlands occur along State Route (SR) 14 near White Salmon, Washington (Figure 3.5-2, Access Route NWI Wetlands in Section 3.5 Wetlands). As described in Section 4.3 Transportation, only minor no roadway improvements to SR 14 would possibly be required at the intersection of SR 14 and Cook-Underwood Road. No wetland impacts are anticipated to occur. The National Wetland Inventory does not show the presence of wetlands along the local secondary and forest roads proposed to be used by the project. As the National Wetland Inventory is based on historic aerial photography interpretations, a field investigation will occur in springconducted in 2009 to confirmed whether or notthat wetlands and other regulated waters of the US or the State may would not be impacted by the project.

I.5.5 Plants and Animals

Construction and operation of the Whistling Ridge Energy Project would require the removal of vegetation in some areas to accommodate roadway construction and improvement, turbine siting, staging, and construction. Because no rare plants were identified in the portion of project site surveyed to date, no project-related impacts on any federal- or Washington State-listed plant species are anticipated during construction or operation of the proposed project.

With the exception of the planned improvement to existing roadsWest Pit Road that would cross one intermittent streamunnamed drainage, no water bodies on the project site would be impacted. No impacts to aquatic species, their habitat, or designated critical habitat are expected as a result of construction and operation of the proposed facility. Water quality would be maintained during construction and operation of the project by incorporating best management practices.

Construction and operation of the Whistling Ridge Energy Project is expected to have limited impacts on wildlife resources. Project actions would include the construction of permanent roadways, improvement (i.e. widening and resurfacing) of existing roadway, and installation and operation of wind turbines. Impacts to wildlife habitat may result from vegetation removal in forested areas where the proposed roadway and turbine alignment is planned. Vegetation management in areas surrounding each turbine would range from complete removal of vegetation to limitations on tree height.

Three federally-listed or candidate species have the potential to occur within the project site, including northern spotted owl, western gray squirrel, and northern goshawk. Ongoing forest management on lands located within the proposed project site has reduced suitable habitat for these

---

[1] The wetland on the project site results from a constructed impoundment according to National Wetland Inventory maps and so is not regulated locally as a critical area according to Skamania County Code Title 21A.04.020(A)(1)(b).

species through fragmentation of mature forest stands.

Northern Spotted Owl. The spotted owl prefers forest habitats characterized by multi-layered canopy, and a high incidence of large trees that provide suitable structure for nesting and roosting. No late-seral forests are present within the project site. Further, no spotted owls have been detected in the proposed project site or spotted owl activity centers located in proximity to the proposed project. No impacts to northern spotted owls are expected.

Western Gray Squirrel. The gray squirrel prefers habitat where contiguous tree canopy allows arboreal travel in a minimum of a 198-foot (60-meter) radius around the nest (Ryan and Carey 1995). Contiguous forest habitat located on the project site would not persist indefinitely in the absence of the proposed project. The project site also contains very few oak trees, and those that were observed were of small stature (less than 20 feet tall), stunted, and growing in openings on exposed rocky slopes in shallow soils. Acorn crops from oak trees are an important food source for western gray squirrels, and the lack of this primary food source may deter use of the project site by gray squirrels. Because habitat for this species is considered rare or of moderate/poor quality on the project site, impacts to western gray squirrel are expected to be negligible.

Northern Goshawk. Goshawks inhabit a wide variety of forest habitats, including true fir, mixed conifer, montane riparian deciduous forest and Douglas fir forests. Goshawk nest sites tend to be associated with patches of relatively large, dense forest located in proximity to water; however, home ranges often consist of a wide range of forest age classes and conditions. Although no goshawks were detected during protocol surveys, individuals were spotted during general avian migration and breeding surveys. Potential impacts to this species may include turbine collision-related mortality or displacement; however, the risk for this species is considered low.

Potential operation-related impacts to avian species include turbine collision and displacement. The data collected from the project site indicate that the area is not within a major migratory pathway, at least during fall migration.

Based on the two seasons of surveys plus two season studies by Klickitat County (Kennedy Jenks 2003), overall use of the project site by golden eagle, northern goshawk, pileated woodpecker, prairie falcon, and willow flycatcher was very low. Adverse impacts to these species are not anticipated. Of the species that were commonly observed, turkey vultures have very low susceptibility to turbine collisions (Orloff and Flannery 1992). To date, this species has not been documented as a turbine fatality in the Pacific Northwest. Vaux’s swifts, western bluebirds, and olive-sided flycatchers were commonly observed flying at rotor-swept heights, and some turbine-related mortality may occur for these species over the life of the project. These collisions would likely be rare, and it is unlikely that the Whistling Ridge Energy Project would have any negative impacts on population levels on and near the project site. Higher numbers of Vaux’s swifts and western bluebirds were recorded during fall migration, whereas olive-sided flycatcher appears to primarily use the project site for breeding.

Waterfowl, waterbirds, and shorebirds were not observed using lands within the project site during this study, and mortality involving this group is expected to be rare.

Based on surveys conducted during high activity periods over two years, it is likely that some bat mortality would occur during operation; however, mortality estimates are difficult due to our lack of understanding of why bats collide with wind turbines (Kunz et al. 2007, Baerwald et al. 2008). Data collected to date on species composition, activity patterns, and habitat use indicates that adverse impacts to bats are not anticipated as a result of the proposed project. Data collected during 2009 surveys will improve our understanding of bat use and activity patterns, and help to refine our assessment of the degree of impacts.

Mule deer, black-tailed deer, and elk may be displaced temporarily from winter range if the timing of construction activities coincides with use of these habitats. Construction-related displacement is expected to be of short duration. Because data on operational impacts to big game as a result of wind farm operation is limited, it is difficult to predict the impact of the proposed project on wildlife using priority habitats on the proposed project site. Additional coordination with Washington Departmen of Fish and Wildlife (WDFW) is ongoing, and will continue to address this resource.

I.5.6 Noise

The large distances between much of the project area and potentially affected residences, the temporary nature of construction, and the restriction of construction activities to daytime hours would serve to minimize potential noise impacts from construction activities. Based on the anticipated noise levels and the timing aspects of these impacts, construction noise impacts are expected to be insignificant.

The two nearest residences to the turbines are located 0.48 mile (2,560 feet) and 0.8 mile (4,265 feet) away. In addition, an application has been submitted for a new homesite that would be located approximately 0.38 mile (2,000 feet) from the nearest turbine. Existing noise levels range are 34 to 35 A-weighted decibels (dBA) at night, and 38 dBA during the daytime. With the project, night time noise levels could increase to 39 to 43 dBA, and 40 to 43 dBA during the day. These levels are considered to be low under applicable State standards.

I.5.7 Land Use

The project is consistent with existing and proposed zoning and comprehensive plan designations, and no impacts to land use are anticipated.

I.5.8 Visual Resources

The project has the potential to create low to moderate levels of visual impact at most key viewpoints. Selected viewpoints have been included in Section 4.2.3 Aesthetics of the Application that represent a variety and range of views in the project area. The photos used for the simulations show the worst-case seasonal conditions for visual contrast between the wind turbines and the primarily green and brown landscape backdrop. The period with the least visual contrast is anticipated to occur when there is snow cover and gray skies.

I.5.9 Recreation

It is expected that the project would not "unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area" (Wild and Scenic Rivers Act, 16 United States Code 1271-1287), so no impacts to wild and scenic rivers would occur. The project would not have a direct impact on any recreation area as measured by impairing access, diminishing use, or restricting planned installations and improvements. The project would affect the visual experience of visitors in some locations (see Figure 4.2-27 Key Recreation Viewing Areas and Recreational Facilities within Approximately 25 Miles). See 4.2.3 Aesthetics for more information about visual and aesthetic qualities and impacts.

I.5.10 Historic and Cultural Resources

No archaeological sites or historic properties were identified in the project area during the field inventory. All previously documented archaeological sites in the project vicinity are located well outside of the project area. Construction or operation of the proposed facilities would not result in impacts to known/recorded cultural resources. Traditional cultural properties are not known to exist in the project area and no impacts are anticipated.

I.5.11 Transportation

Access to the proposed project site would be provided through the existing County and private roadway network. Access to all proposed wind tower locations would require road improvements and limited new road construction within the project area. In addition to approximately ~~7.2~~7.9 miles of existing private logging roads that would require improvement, approximately 2.4 miles of new private gravel access roads would need to be constructed. The new gravel roadways would extend toward and run along the turbine strings, and would be designed and constructed according to the County private roadway standards. The new private roadways that extend toward the turbine strings would be designed for a minimum drivable section width of 25 feet with allowance for side slope and drainage.

The new private roadways that would run along or between the turbine strings would be designed for a minimum drivable section width of 25 feet with an additional 5-foot section on both sides to accommodate drainage and clearance for the project crane that will be on site to assemble the tower sections, the nacelles, and blades. None of the newly constructed roads would need to be paved, but they would require an all-weather driving surface.

During construction, there would be an average of 143 workers on site, and a maximum of 265 workers at the site daily. Estimated traffic volumes include existing local traffic, construction workers and vehicles, and over-size and over-weight trucks. Approximately 65 to 75 percent of the construction labor force would most likely be hired from the cities of Portland and Vancouver. Approximately 25 to 30 percent of the workers would likely be residents of Skamania, Klickitat, and Hood River counties. The respective percentages are based on the relative populations in the cities of Portland and Vancouver when compared to Skamania, Klickitat, and Hood River Counties. All construction workers are expected to commute up to approximately 60 miles each way daily to and from the proposed project site.

During the one-year construction period, there would be over-size and over-weight trucks transporting large wind energy components to the proposed project site throughout the day. Over-size and over-weight trucks are only expected during an approximate two to three month period when the wind energy components are transported to the proposed project site. It is expected that during the AM peak hour, approximately 30 construction vehicles would travel through the junction of SR 14 and Cook-Underwood Road. During the afternoon peak hour, as many as 10 construction vehicles could travel through this junction.

Peak-hour LOS analyses were completed for the junction of SR 14 and Cook-Underwood Road using estimated ~~2010~~ 2011 traffic volumes. The results indicate that estimated ~~2010~~ 2011 traffic volumes, including construction vehicles, would have a minimal impact on the operations of the intersection of SR 14 and Cook-Underwood Road. Delays would increase slightly (approximately 4 to 5 seconds per vehicle) for vehicles turning left or right from Cook-Underwood Road over estimated ~~2008~~ 2009 operations. The southbound approach on Cook-Underwood Road at SR 14 ~~also~~ has ~~would experience degradation~~ degraded in level of service from A to B over estimated 2008 operations, and would remain at LOS B in 2011 with construction traffic..

I.5.12 Socioeconomics

The project would generate new local employment, additional business for local service and materials providers, and additional tax revenues to Skamania County and the state. The overall permanent socioeconomic impact of the project would be positive.

Construction

During the estimated one-year construction period (excluding engineering, design, specifications, and survey), approximately 330 full-time and part-time workers would be employed at some point during construction. Some of these jobs would not last the entire construction period. The on-site construction work force would peak at approximately 265 workers over the construction period and average 143 workers over the 12 months. Eight to nine permanent full- or part-time Operations and Maintenance staff would be required once the project is operational.

Whistling Ridge Energy Project local procurements[2] for construction materials, services and equipment leasing associated with construction are projected to total approximately $13.2 million. These procurements would augment the revenues of many construction-related businesses in Skamania County and the three-county area in general. In addition, the consumption spending of local project workers and their households out of their wages and salaries would stimulate the retail trade and services sector of the local and regional economies. Total payroll costs for project construction, including fringe benefits and other labor overhead costs, are projected to be approximately $18 million, of which approximately $4.5 million is expected to be earned in the three-county area including Skamania, Klickitat, and Hood River Counties.

An analysis of the primary and secondary effects of these construction spending streams within the three-county area reveals that indirect and induced value added from construction would be $3.9 million, and that 71 indirect and induced jobs would be attributable to construction. The total economic impact (direct, indirect, and induced) is expected to be $8.5 million in value added and

[2] Local procurements are procurements that would occur with the three-county area including Skamania, Klickitat, and Hood River Counties.

107 jobs (IMPLAN 2008). Project construction would create a total of 107 jobs in the three-county area, which would continue throughout the construction period.

The total cost of construction is estimated to be approximately $150 million. In addition to the local area procurements mentioned above, the Applicant would purchase large amounts of wind power generation equipment from various domestic and foreign suppliers. Depending on legislation currently under consideration in the state legislature, state sales and use tax may be levied only on procurements that are not directly related to electricity generation. Should the state sales tax exemption for wind power be extended, capital equipment such as turbines, transformers, transmission cables, and substation equipment would not be taxable.

The local procurements are estimated to be 10 percent of total procurements (approximately $13.2 million). The majority (estimated at 90 percent) of local procurements would be directly related to electricity generation. Taxable sales due to project construction would therefore be approximately $1.32 million, resulting in $92,400 in sales and use tax revenue for Washington State and Skamania County taxing districts.

The Skamania County sales and use tax rate for the unincorporated area is 7.0 percent, meaning that after the state government's share of 6.5 percent, a remaining 0.5 percent goes to the County. Due to the project's location within the unincorporated area of Skamania County, Skamania County would receive $6,600 of the $92,400 in sales and use tax revenues related to project construction. This one-time influx of revenue ($6,600) would represent an increase of one percent when compared to the sales and use tax collected in Skamania County during calendar year 2007 ($630,515) (WDOR 2008). These positive fiscal impacts to the County and the State would be a one-time occurrence resulting from project construction activities.

Modest increases in sales of goods and services would occur during construction, such as local purchases by construction workers. Sales tax revenues resulting from these types of purchases would be beneficial and small within the context of the Skamania County economy.

Operation

The estimated gross payroll (including fringe benefits and other payroll overheads) for the operational workforce is $1.5 million, or an average annual labor cost of $167,000 to $188,000 per employee. This is approximately 25 percent higher than the standard industrial wage for this industry in Skamania County (IMPLAN 2008). In addition to the regular operational workforce, a temporary workforce with appropriate skills would be utilized during major maintenance or other non-routine operational work.

Using IMPLAN regional economic modeling software for the power generation and supply industry in the three-county area including Skamania, Klickitat, and Hood River Counties, a wind power facility employing nine full-time workers would have a gross annual operating cost valued at approximately $3.75 million, which would include direct purchases from suppliers (including fuels, maintenance supplies and services, retail goods and professional services). Sales, use and other indirect business taxes on that level of spending are estimated at $200,000 (IMPLAN 2008) per year, which would accrue to state and local government jurisdictions. Employee spending from salaries and wages is estimated at around $900,000 per year, assuming an average local expenditure rate of

70 percent of compensation.

An increase in the tax base equal to the numbers of turbines multiplied by an estimated value of $1.75 million per turbine ($87.5 million) would represent an increase of 6.5 percent in assessed value in the County. Using the average property tax rate for Skamania County of $8.36/$1,000 assessed value (WDOR 2009), the increase in property tax revenue to the County would be $731,500 and would represent a permanent, annual increase of 7.6 percent compared to the amount of property tax collected (current and delinquent) in calendar year 2007 ($9.6 million) (WDOR 2008). Property tax revenues would be higher to the extent that increased wages and economic activity in the County results in higher valued properties.

These additional and permanent annual revenues could help satisfy the need for alternate funds to replace decreasing federal funding. Assuming that the annual tax revenue of $731,500 would be distributed among funds, funds receiving the most revenue would be the State School Fund ($185,281), School District 405 Maintenance and Operations ($149,461), the County Road fund ($115,035), and the Current Expense fund ($111,086). A portion of the State School Fund would be returned to Skamania County for Skamania County schools (L. Moore, personal communication).

I.5.13 Housing

The approximately 15 percent of the construction work force that would be specialized craftsmen originating outside of Washington and Oregon would likely have relatively short assignments, so few are expected to bring their families with them when they arrive to work on the project. The population increase in the project area and elsewhere in the three-county area would therefore be limited mainly to these workers for a temporary period of time, plus, during the work week, the non-local workers who would temporarily commute on a weekly basis from the Portland-Vancouver area.

The total estimated number of workers requiring transient housing would be 52 (average) and 97 (peak) over the 12-month construction period, assuming that one-third of the workers from the Portland-Vancouver metropolitan area would commute on a weekly basis and the specialized, temporary staff also would require lodging. These construction workers are expected to seek temporary accommodation in the general vicinity of the project site, and to use motels, trailers, campers, and other forms of transient housing. Approximately 1,082 hotel rooms or RV campsites exist within 25 miles of the project site. Assuming 70 percent occupancy, approximately 325 of these units (313 hotel rooms) would be available at any one time. Assuming a worst-case scenario that workers would want hotel or motel lodging, the peak demand of 97 rooms (assuming, again a worst-case scenario that no workers would share rooms) would represent approximately 31 percent of the available rooms and would therefore not stress the lodging facilities within 25 miles. Construction of the proposed project is not expected to result in a significant impact on transient accommodation availability in the project vicinity, nor is the project expected to affect median housing values, median gross rents, or new housing construction. The applicant has no plans to provide on-site temporary housing for workers or shuttle to or from hotels or other temporary lodging facilities.

I.5.14 Public Services

The influx of construction workers into project area communities on a daily and weekly basis could result in a minor and temporary increase in the demand placed on public service providers. This increase in demand could have a minor and temporary effect on local police departments, providers of emergency medical services, and local fire departments. The contractor would develop emergency plans for project construction.

The impact of project construction on local schools would be at most minor and temporary, as few out-of-state construction workers are likely to be accompanied by families. Construction-related impacts to local utilities also are expected to be minor and temporary.

Response times in the project vicinity are not expected to change due to project construction. Construction trucks would represent additional volume on area roads, but would not deter any emergency vehicles from travel. The project would be constructed entirely within land managed for commercial forestry by the Applicant.

Anticipated water uses during construction include spraying roads for dust control, construction support (such as concrete curing and hydrostatic testing of equipment), and restroom facilities for construction and support workers (estimated average of 143 and peak of 265 workers). Water needed for construction will be purchased by the contractor from an off-site vendor with a valid water right and transported to the project site in water-tanker trucks.

The needs of public service providers are considered in Section 4.3 Transportation. Section 4.2.4 Recreation addresses the potential for impacts on parks and other recreational facilities.

I.6 AGENCY CONTACTS MADE TO DATE

The Applicant has been actively involved in meeting and consulting with local and state agency personnel and with Tribal leaders during the preparation of studies supporting this Application. A summary of the key contacts made to date are listed in this section.

I.6.1 Local Government

- ***City of Bingen (January 2009).*** Consulted with city administrator to obtain information stating that there are currently no load restrictions in place for Maple Street in the City of Bingen, Washington. Additional information was provided stating that there is a significant increase in traffic volumes during the summer months due to recreational activities in the local area.

- ***Klickitat County Public Works Department (January 2009).*** Obtained the county "Resolution to Designate Haul Routes" document that could be used as a haul route agreement template for the project by Skamania County. The document was forwarded to Skamania County for review.

- ***Skamania County Planning Department.*** Three pre-application conferences were held between 2004 and 2008 with Karen Witherspoon and staff (including meetings on March 24, 2006 and August 22, 2007).

- ***Skamania County Public Works Department.*** Pre-application meetings with County Road Engineer and Building Inspector took place (also present in meeting with Planning Department on August 22, 2007). In addition, the Skamania County Public Works Department Manager, the County Engineer, and the Maintenance Superintendent were consulted to better understand existing roadway conditions, the proposed haul route, and traffic patterns. Information obtained included:

    - Contacting Skamania County Public Utility District and Embarq, the local telephone service provider

    - Contacting the Burlington Northern Santa Fe Railroad to get a determination on weight restrictions for the tracks that cross Maple Street in the City of Bingen, Washington

    - Average daily traffic on Cook-Underwood Road at approximately milepost 12. They also stated that the intersection of Cook-Underwood Road and Kollock-Knapp Road is located at approximately milepost 10 to 10.5

    - Recommendation that right of way ownership and easements be determined early on in the planning process

    - Requirement that both pre and post construction roadway inspections would need to be conducted along the haul route and that one additional roadway inspection would be required at one year post construction

- ***Skamania County Assessor.*** Phone and office discussions regarding tax benefits to Skamania County from a potential wind energy project.

- ***Skamania Economic Development Council.*** Various meetings and discussions regarding economic development and wind energy.

- ***Skamania Public Utility District.*** Meeting with Commissioners and General Manager (Bob Wittenberg) regarding Skamania Public Utility District system vulnerability to interruption by BPA and benefits to be realized by a potential wind energy project in Skamania County.

- ***Underwood Fire District.*** Meeting with Fire Commissioners to discuss service agreement for potential wind energy project.

- ***Mill A Volunteers.*** Meeting with members to discuss possible formation of Fire District and inclusion of potential wind energy project.

I.6.2 State Government

- ***Washington Department of Archeology and Historic Preservation***. File search for historic and cultural properties within or near the project site.

- ***WDFW.*** Meetings with WDFW included:

  - Meeting February 26, 2004 with Bill Weiler, Habitat Biologist and Liane Wedemeter of US Fish and Wildlife Service to discuss survey methods and results of wildlife surveys completed to date, and to discuss future surveys

  - Meeting and site tour November 16, 2007 to discuss survey methods and results of additional wildlife surveys completed to date.

  - Several information exchanges with Area Habitat Biologist (Bill Weiler) to discuss project impacts, review survey results, and discuss survey protocols.

  - Several follow-up meetings with Travis Nelson and Greg Huckel of WDFW during June, July and August of 2009 to continue the discussion and consultation on wildlife.

- ***Washington State Department of Natural Resources.*** Meeting and discussions with staff regarding application to lease adjoining Department of Natural Resources property for wind energy purposes.

- ***Washington State Department of Transportation, Goldendale Office.*** Discussed information relating to over-size and over-weight vehicles traveling on SR 14. They stated that the current prohibition for loads in excess of 125 feet including the trailer and load between mileposts 19.00 and 83.53 could be over-ruled for trucks traveling between the SDS Lumber Company facility and the junction of SR 14 and Cook-Underwood Road. The Goldendale office must be contacted prior to any over-size hauls. Pilot cars would be required and Washington State Patrol involvement may be required.

- ***Washington State Department of Transportation, Southwest Region Office.*** Discussed information relating to Road and bridge restrictions for over-size and over-weight motor vehicles traveling on SR 14 and over-size and over-weight load permit requirements.

I.6.3 Federal Government

- ***Bonneville Dam Project Office (January 2009).*** Obtained information on lockage length and width parameters as well as average daily usage numbers for the months of May through October.

- ***Bonneville Power Administration.*** Meetings with BPA included:

  - Meeting on August 22, 2007 as part of pre-application conference with Skamania County Planning Department.

- Meeting on September 30, 2008 with Rick Yarde to discuss National Environmental Policy Act process and Tribal consultation.

- ***US Fish and Wildlife Service.*** Meetings with USFWS included:

  - Meeting February 26, 2004 with Bill Weiler, Habitat Biologist and Liane Wedemeter, US Fish and Wildlife to discuss survey methods and results of wildlife surveys completed to date, and to discuss future surveys.

  - Ongoing consultation with Ken Berg, Jim Michaels and Mark Ostwald of USFWS to discuss survey work and results.

I.6.4 Tribal Government

- Letter sent to Yakama Nation Cultural Resources Department.

- Site tour and consultation with local Tribes of Yakama Nation (see Appendix F).

- Communication with Yakama Nation Cultural Resources Program concerning consultation and survey assistance.

I.6.5 Railroad

- ***Burlington Northern Santa Fe Railroad.*** Transportation Technology Services provided rail car length, width, and weight parameters as well as transport restrictions between the Port of Longview and the SDS Lumber facility.

SECTION 1.1 DESCRIPTION OF APPLICANT (WAC 463-60-015)

1.1.1 APPLICANT

This application for a Site Certification Agreement is made for the construction and operation of the Whistling Ridge Energy Project. The Applicant is Whistling Ridge Energy LLC.

This application for a Site Certification Agreement was professionally prepared by URS Corporation under the direction of S.D.S Co., LLC and SDS Lumber Company. These parties believe that the application is substantially complete and meets the requirements established in Chapter 80.50 Revised Code of Washington (RCW) and Title 463 Washington Administrative Code (WAC).

1.1.2 WHISTLING RIDGE ENERGY LLC

Whistling Ridge Energy LLC was incorporated in the state of Washington in February 2009. Whistling Ridge Energy LLC is a special purpose corporation formed to develop, permit, finance, construct, own and operate the Whistling Ridge Energy Project. Whistling Ridge Energy LLC is a Washington corporation formed under Title 23B of the RCW. It is wholly-owned by S.D.S Co., LLC.

Whistling Ridge Energy LLC would own and operate the Whistling Ridge Energy Project and would manage all of the affairs of the project, including activities related to obtaining permits and other approvals required for development of the project. It is anticipated that one or more additional equity participants may join with Whistling Ridge Energy LLC in connection with obtaining permanent financing for the project.

Whistling Ridge Energy LLC has elected to be treated for federal income tax purposes as an S-Corporation. It has no employees. Pursuant to an agreement between Whistling Ridge Energy LLC and S.D.S Co., LLC, staffing is provided by S.D.S Co., LLC, who hires third party consultants and contracts for other goods and services as necessary. Whistling Ridge Energy LLC may reimburse S.D.S Co., LLC for services rendered.

1.1.3 SDS LUMBER COMPANY AND S.D.S CO., LLC

SDS Lumber Company and S.D.S Co., LLC are privately-held corporations, incorporated in the state of Washington. SDS Lumber Company has owned and operated a wood products manufacturing facility in Bingen, Washington continuously since 1946. SDS Lumber Company's operations include lumber and plywood manufacturing, log handling and transportation, marine transportation and construction, log chipping for the pulp and paper industry, biomass energy generation, and other land development and land use ventures in the Skamania and Klickitat County area. SDS Lumber Company is an affiliated entity of S.D.S Co., LLC. S.D.S Co., LLC owns forest lands in the states of Oregon and Washington. Some of these lands would be utilized for the Whistling Ridge Energy Project in Skamania County.

1.1.4 BROUGHTON LUMBER COMPANY

Broughton Lumber Company is a privately-held corporation incorporated in the state of Washington. Broughton Lumber Company operated a sawmill in Skamania County from the early 1930s until 1988. Broughton Lumber Company currently manages its forest lands to produce logs for sale to various parties. Broughton Lumber owns forest lands in the state of Washington. Some of these lands would be utilized for the Whistling Ridge Energy Project in Skamania County.

SECTION 1.2 DESIGNATION OF AGENT
(WAC 463-60-025)

All official communications concerning this Application during the application review process should be directed to Mr. Jason Spadaro, President, Whistling Ridge Energy LLC. He is the designated agent for the project and may be contacted as cited below:

Mr. Jason S. Spadaro
President, Whistling Ridge Energy LLC
P.O. Box 266
Bingen, WA 98605
(509) 493-6103 (phone)
(541) 490-5013 (cell)
(509) 493-2535 (fax)
jasons@sdslumber.com

Mr. Allen Barkley will serve as a secondary contact. Mr. Barkley's contact information is as follows:

Mr. Allen Barkley
Wind Power Associates
PO Box 1267
931 Pine St.
Goldendale, WA 98620
541 993 1707 (phone)
509 773 5187 (fax)
abark@gorge.net

SECTION 1.3 ASSURANCES
(WAC 463-60-075)

1.3.1 INSURANCE

Whistling Ridge Energy LLC would establish and maintain, or cause to be established and maintained, several forms of insurance during the construction and operation of the Whistling Ridge Energy Project. Insurance would be maintained as required by law, customary business practice, and to satisfy third-party participants and lenders. The following coverages would be included:

- Commercial General Liability Insurance:

  The construction contractor and subcontractors would be required to carry commercial general liability insurance, including products and completed operations in amounts sufficient to respond to liability and property damage risks arising during the construction and startup phase of the Whistling Ridge Energy Project.

  Whistling Ridge Energy LLC would obtain and maintain in full force and effect, commercial general liability insurance against claims for liability and property damage arising out of the use and occupancy of the premises.

  Whistling Ridge Energy LLC would purchase insurance policies to cover liabilities arising from environmental, casualty, and other major incidents. The insurance industry views facilities such as the Whistling Ridge Energy Project as low to moderate risk. Therefore, high coverage limits are available at reasonable costs.

- Automobile Insurance

  The construction contractor and subcontractors would be required to carry automobile liability insurance covering all owned, leased, non-owned, and hired automobiles used during the construction and startup phase of the project.

  Whistling Ridge Energy LLC would obtain and maintain in full force and effect automobile liability insurance covering owned, non-owned, and hired autos.

- Property Insurance

  Whistling Ridge Energy LLC would obtain and maintain at all times during the term of construction and operation of the facility, physical damage insurance on the buildings and all improvements that are to be erected on the premises on an “all risk” basis, including coverage against damage or loss caused by earth movement and flood in an amount sufficient to cover any expected losses or damages.

  The potential for damages can be defined. Damages would occur only if engineered safeguards would fail. In many cases, more than one simultaneous failure would be required to produce significant damages. Upon completion of project design, insurance underwriters would evaluate the design and estimate maximum potential damages due to failure. In some cases design changes may be implemented to reduce the damages. Insurance would then be purchased to cover the maximum expected damages.

- Worker's Compensation and Washington Stop Gap Liability

  Whistling Ridge Energy LLC would fully comply with the statutory requirements for worker's compensation as required with respect to any employees performing work on the subject property and premises. Whistling Ridge Energy LLC also would insure for their exposure with Employer's Liability insurance (Washington Stop Gap Liability).

  Whistling Ridge Energy LLC would require of the construction contractor and subcontractors working on the project similar compliance with the statutory requirements for worker's compensation with respect to their employees performing work on the subject property and premises. Whistling Ridge Energy LLC also would require Employer's Liability insurance for exposure under Washington Stop Gap Liability.

1.3.2 ENVIRONMENTAL IMPAIRMENT

Whistling Ridge Energy LLC and its operator(s) would be responsible, as required by law, for acts of environmental impairment related to the ownership and operation of the Whistling Ridge Energy Project. Such losses may, in some circumstances, be covered by general liability insurance, which Whistling Ridge Energy LLC and the construction contractor would carry. In addition, Whistling Ridge Energy LLC and/or its contracted operator(s) would obtain environmental impairment liability insurance to the extent such coverage is available on a commercially viable basis. This insurance would cover the acts of Whistling Ridge Energy LLC and its operator(s) at the site, consistent with or in excess of then-prevailing industry standards for such insurance in the wind power generating industry. Commercial viability would be determined by reference to the norm of the industry.

1.3.3 SITE CLOSURE BOND

No set-aside from operating funds is anticipated for site abandonment, but Whistling Ridge Energy LLC would obtain a site closure bond in an amount to be determined by Washington State Energy Facility Site Evaluation Council (EFSEC) upon approval of an initial site restoration plan. To the extent site facilities are not otherwise removed, recycled, or salvaged, Whistling Ridge Energy LLC would maintain ongoing responsibility for site facilities and site integrity as the site owner.

SECTION 1.4 MITIGATION MEASURES (WAC 463-60-085)

1.4.1 MITIGATION MEASURES

The following summarizes the mitigation measures in Part 3.0 – Natural Environment and Part 4.0 – Built Environment of this application.

1.4.1.1 Section 2.15, Protection from Natural Hazards

Earthquake Hazards

All structures on the site would be built in accordance with the seismic design provisions presented in the 2006 version of the International Building Code (IBC), and the American Society of Civil Engineers 07-05 standard. The site soil is best represented as Stiff Soil (Soil Site Class D). Based on the site location and site conditions described above, we recommend that the values listed in the following chart be used for seismic design of the project in accordance with Section 1613.5.3 of the 2006 IBC. The occupancy category of the proposed structure is assumed III as per Section 1613.5.6 of the 2006 IBC.

2006 IBC Seismic Design Values

Parameter	Value	2006 IBC/ASCE 7-05 Reference
Soil Profile Site Class	C	Table 1613.5.2
0.2 Second Spectral Acceleration S_s	0.60 g	Figure 1613.5 (1)
1.0 Second Spectral Acceleration S_l	0.20 g	Figure 1613.5 (2)
Peak Ground Acceleration ($0.4S_{Ds}$)	0.186 g	ASCE 7-05 equation 11.4-5
Site Coefficient F_a	1.16	Table 1613.5.3 (1)
Site Coefficient F_v	1.6	Table 1613.5.3 (2)
Seismic Design Category[a]	D	Tables 1613.5.6 (1) & (2)

a. Assumes Seismic Use Group III

A visual inspection would be conducted following abnormal seismic activity. These inspections would look for signs of incipient mass movement in those areas identified as potentially susceptible to such failures.

Slope Failure and Mass Wasting

No mitigation measures are required.

1.4.1.2 Section 3.1, Earth

Seismicity

No mitigation measures are proposed beyond adhering to local building codes and standard turbine and foundation design. The proposed facility would comply with the state building code provisions for seismic hazards applicable to the proposed location.

Soils

Site-specific geotechnical engineering evaluations would be conducted prior to design of the project to identify design methods to address the potential impacts presented above. Mitigation of soil impacts at the site would be incorporated into the final design of the foundations and roadways. A SWPPP would be developed prior to construction or modification of any roads or facilities. The SWPPP would be submitted for approval to EFSEC and followed throughout construction at the site.

Topography

No mitigation measures for topography are anticipated at this time.

Unique Physical Features

At this time, no mitigation measures are anticipated. Additional geotechnical investigations for tower foundation design would provide deeper (> 16 feet) subsurface data. If the additional data indicates potential for slope instability, mitigation would be accomplished through engineering or avoidance.

Erosion/Enlargement of Land Area (Accretion)

BMPs and other measures would be taken to mitigate the erosion hazard at the project site.

Erosion control measures for construction at the site are outlined in Sections 2.10.2 and 2.14.1. The sequences and methods of construction activities would be controlled to limit erosion and are summarized below:

- Construction activities would be controlled to help limit erosion. Clearing, excavation and grading would be limited to those areas of the project absolutely necessary for construction of the project. Areas outside the construction limits would be marked in the field and equipment would not be allowed to enter these areas or to disturb existing vegetation.

- The construction contractors would implement the EFSEC-approved Erosion and Sedimentation Control Plan during construction to minimize soil loss due to surface water flows.

- The EFSEC-approved Environmental Protection Control Plan would be implemented to provide adequate maintenance and inspection of the erosion and sediment control system. The plan specifies that control structures would be inspected at a frequency sufficient to provide adequate environmental protection. Such inspections would increase in frequency during rainfall periods. In addition, supplies including sandbags and channel-lining materials would be stored on site for emergency use.

- Surface runoff would be diverted around and away from cut and fill slopes and conveyed in pipes or protected channels. If the runoff is from disturbed areas, it would be directed to a sediment trap prior to discharge.

1.4.1.3 Section 3.2, Air

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

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

No mitigation is proposed for project operations, as there would be no air or odor emissions.

1.4.1.4 Section 3.3, Water

Surface Water Resources (Movement/Quality/Quantity)

Permanent BMPs would be designed and incorporated into the final construction plans and specifications prepared by the site civil design engineer. These permanent BMPs would include erosion and sediment control through site landscaping, grass, and other vegetative cover. All final designs would conform to the applicable Stormwater Management Manual. Non-structural BMPs also would be incorporated into the operations manual including good housekeeping, preventative and corrective maintenance procedures, steps for spill prevention and response, employee training, and inspection and record-keeping procedures.

Runoff/Absorption

The required BMPs are expected to: minimize erosion, control sedimentation, prevent run-on of stormwater onto disturbed areas, and prevent runoff from disturbed areas. One measure may be treatment of stormwater exiting disturbed areas. Construction-phase erosion and sedimentation control BMPs, as described in Section 2.10, Surface Water Runoff, would be implemented to mitigate the expected impacts of soil disturbance. These may include chemical source control, silt fencing, stabilized construction entrances, street sweeping, straw bale check dams, and rock check dams. With implementation of BMPs, no negligible impacts on runoff or on adjacent surrounding properties are anticipated during construction activities. Construction BMPs are described in further detail in Section 2.10, Surface Water Runoff.

Permanent, operations-phase runoff control and water quality enhancement BMPs, also described in Section 2.10, Surface Water Runoff would be implemented to mitigate the expected impacts of increased runoff rate and pollution from vehicle traffic. These BMPs would include stabilized landscaped areas and vegetated ditches or swales, and would provide the necessary control of stormwater runoff.

Groundwater Resources

No impacts have been identified regarding the quantity of water infiltrating the site following construction. BMPs that are recommended for site development include stabilized landscaped areas and vegetated ditches or swales.

Storage of chemicals onsite is minimal; however, the site development plan would require an SPCC Plan that would protect groundwater (See Section 2.9, Spillage Prevention and Control). Therefore, mitigation for groundwater quality impacts is not necessary.

Public and Private Water Supplies

No impacts to public water supplies and no adverse impacts to private water supplies (water wells) are expected. Therefore, no mitigation measures are required.

1.4.1.5 Section 3.4, Habitat, Vegetation, Fish and Wildlife

Habitat and Vegetation

Mitigation for potential impacts resulting from the proposed project includes the following:

- The applicant has commissioned extensive studies by qualified biologists of rare plants and habitats at the project site to avoid impacts to sensitive populations. The results and recommendations of these studies have been incorporated into the proposed design, construction, and operation of the project. In the event that the final project layout includes areas that contain suitable habitat for rare plants which have not previously been surveyed, an additional rare plant survey would be conducted at the appropriate time of year.

- The turbine strings have avoided sensitive riparian areas.

- Locating wind turbines in an actively-managed commercial forest avoids impacts to higher quality habitats.

- To the extent possible, new road construction and associated habitat impacts have been minimized by improving and using existing roads instead of constructing new roads.

- Use of certified "weed free" straw bales during construction to avoid introduction of noxious weeds

- All temporarily disturbed areas would be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed to accelerate the revegetation of these areas and to avoid the establishment and spread of noxious weed species.

- Implementation of a noxious weed control program, in coordination with the Skamania County Noxious Weed Control Board, to control the spread and prevent the introduction of noxious weed species.

Fish

Section 3.3, Water, lists the project BMPs that would be incorporated to protect water quality and quantity. Pursuant to an erosion control plan for the project and an NPDES permit, drainage improvements would be made as needed. All temporarily disturbed areas would be regraded and reseeded with an appropriate mix of native plant species to restore vegetation after the construction phase is completed.

Wildlife

The primary mitigation goal for the Whistling Ridge Energy facility is to avoid sensitive wildlife resources when siting turbines and access roads. Because of the relatively small footprint of wind energy facilities and the flexibility of the process, it is likely that avoidance can be achieved. Wind turbines would also be sited in areas already actively managed for timber harvest. New road construction would be minimized by improving and using existing roadways. All temporarily disturbed areas would be regraded and reseeded with an appropriate mix of native plant species to restore vegetation after the construction phase is over.

Mitigation for potential impacts resulting for the proposed project includes the following sequentially-performed actions:

- Rectify the impact by repairing, rehabilitating, or restoring the affected environment in consultation with relevant wildlife agencies.

- Conduct thorough analysis of sensitive natural resources to avoid impacts and increase avoidance during micrositing.

- Implement a two year minimum post-construction mortality study
- The Applicant plans to convene a Technical Advisory Committee to evaluate the mitigation and monitoring program and determine the need for further studies or mitigation measures. The Technical Advisory Committee would be composed of representatives from WDFW, USFWS, Skamania County, and the Applicant. The role of the Technical Advisory Committee would be to coordinate appropriate mitigation measures, monitor impacts to wildlife and habitat, and address issues that arise regarding wildlife impacts during construction and operation of the project. The post-construction monitoring plan would be developed in coordination with the Technical Advisory Committee.
- Implement project design features that would minimize project impacts, including:
  - Installing tubular steel turbine towers to eliminate perching opportunities provided by lattice towers
  - Burying electrical lines between turbines and from turbine strings to substation
  - Using the minimum amount of turbine lighting required by the FAA
  - Installing newer generation up-wind turbines

1.4.1.6 Section 3.5, Wetlands and Jurisdictional Waters

No impacts to wetlands are expected to occur and therefore no mitigation measures would be required.

1.4.1.7 Section 3.6, Energy and Natural Resources

No impacts to energy and natural resources are expected to occur and therefore no mitigation measures would be required.

1.4.1.8 Section 4.1, Environmental Health

Noise

Construction

Construction would generally occur only during daytime hours to reduce the potential for noise impacts from this activity. Construction noise is exempt from Washington noise limits during daytime hours. To ensure that construction noise emission assumptions relied upon herein are valid and acoustical design goals are met by the project during construction, the following mitigation measures are proposed:

- All noise-producing project equipment and vehicles using internal combustion engines would be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed "package" equipment (e.g., arc-welders, air compressors) would be equipped with shrouds and noise control features that are readily available for that type of equipment.

- All mobile or fixed noise-producing equipment used on the project that is regulated for noise output by a local, state, or federal agency, would comply with such regulation while in the course of project activity.

- The use of noise-producing signals, including horns, whistles, electronic alarms, sirens, and bells, would be for safety warning purposes only. Unless required for such safety purposes, and as allowable by applicable regulations, no construction-related public address, loudspeaker, or music system would be audible at any adjacent noise-sensitive land use.

- The EPC Contractor would implement a noise complaint process and hotline number for the surrounding community. Whistling Ridge Energy LLC would have the responsibility and authority to receive and resolve noise complaints.

Operation

The noise modeling analysis indicated that the noise levels at the three closest residences (located 0.38, 0.48 and 0.8 mile away) would be 37 to 42 dBA for the 9 m/sec wind speed case, at and above which the wind turbine generators are expected to produce the most noise. With averaged measured existing sound levels reasonably representing ambient noise levels at these nearest noise-sensitive receivers, the cumulative increase over ambient for most operating cases would remain below applicable thresholds, and less than or equal to 5 dBA, and would result in no need for operation noise mitigation.

Risk of Fire or Explosion

The construction manager would be responsible for staying abreast of fire conditions in the project area by contacting WDNR and implementing any necessary fire precautions. A Fire Protection and Prevention Plan would be developed for EFSEC approval and implemented, in coordination with the Skamania County Fire Marshall and appropriate agencies. The following chart lists sources of potential fire and explosion along with measures to mitigate the risk of either occurring.

Fire and Explosion Risk Mitigation Plan

C / O[a]	Potential Fire or Explosion Source	Mitigation Measures
C & O	General Fire Protection	• All on-site service vehicles fitted with fire extinguishers • Fire station boxes with shovels, water tank sprayers, etc. installed at multiple locations on site along roadways during summer fire season • Minimum of one water truck with sprayers must be present on each turbine string road with construction activities during fire season
C & O	Dry vegetation in contact with hot exhaust catalytic converters under vehicles	• No gas powered vehicles allowed outside of graveled areas • Mainly diesel vehicles (i.e. w/o catalytic converters) used on site • Use of high clearance vehicles on site if used off-road
C & O	Smoking	• Restricted to designated areas (outdoor gravel covered areas)
C & O	Explosives used during blasting for excavation work	• Only state licensed explosive specialist contractors are allowed to perform this work – explosives require special detonation equipment with safety lockouts • Clear vegetation from the general footprint area surrounding the excavation zone to be blasted • Standby water spray trucks and fire suppression equipment to be present during blasting activities
C & O	Electrical Fires	• Use of generally high clearance vehicles on site • No gas powered vehicles allowed outside of graveled areas • All major construction equipment used is to be diesel powered (i.e. w/o catalytic converters)
C & O	Lightning	• Specially engineered lightning protection and grounding systems used at wind turbines and at substation • Footprint areas around turbines and substation are graveled with no vegetation
C	Portable Generators – hot exhaust	• Generators not allowed to operate on open grass areas • All portable generators to be fitted with spark arrestors on exhaust system
C	Torches or field welding on-site	• Immediate surrounding area would be wetted with water sprayer • Fire suppression equipment to be present at location of welder/torch activity
C & O	Electrical Arcing	• Electrical designs and construction specifications meet or exceed requirements of the National Electric Code and National Fire Protection Agency

a. Indicated risk during construction (C) and/or operations (O)

Lightning-induced fires are rare in the project area and both the wind turbine generators and the substation are equipped with specially engineered lightning protection systems. With the types of modern wind turbines proposed for the project, however, turbine malfunctions leading to fires in the nacelle are extremely rare. The turbine control system detects overheating in turbine machinery, and internal fires would be detected by these sensors, causing the machine to shut down immediately and send an alarm signal to the central SCADA system, which would notify operators of the alarm by cell phone or pager.

The potential fire risks are similar in nature but lower for project decommissioning. Fire prevention measures during decommissioning would be similar to those for project construction.

1.4.1.9 Section 4.2, Land and Shoreline Use

Land Use

No impacts to land use are anticipated, and no mitigation measures are required.

Light and Glare

Mitigation measures for light and glare would be as follows:

- Most construction would occur during daylight hours, minimizing construction lighting at during hours of darkness
- Turbines and blades would be painted with a non-reflective gray finish to blend in with the background, and to eliminate the need for white daytime aviation warning lights
- To prevent glare, non-reflective earth-tone/light paint colors would be used on exterior surfaces of buildings or other facilities
- The facility lights outside the Operations and Maintenance area and the substation sites would be hooded and directed downward to minimize backscatter and illumination of off-site areas
- Lights would be the minimum wattage required for safety
- Sensors and switches would be used to keep lights turned off when lighting is not required

Aesthetics

Because the turbines are most frequently seen against the sky, particularly in close-range views where visual concerns are the greatest, a non-reflective flat neutral gray or light color is recommended to minimize aesthetic impacts.

Recreation

Impacts to recreation users during the construction phase would primarily result from dust and noise from construction equipment. While the project would not affect any trails or pathways in the Scenic Area, there may be some distant views of wind turbines from trails during operations. Because they are high on the ridge, no mitigation measures are proposed other than painting the turbines a flat gray.

Historic and Cultural Preservation

Because no cultural resources (archaeological sites or historic properties) were identified in the project area, no mitigation actions are required. If cultural resources are inadvertently discovered during project construction and operations, assessment of the find would be necessary. If such cultural resources are found to be significant, mitigation measures would need to be devised and implemented.

Agricultural Crops/Animals

There would be no impacts to agricultural crops and animals, therefore mitigation measures are not proposed.

1.4.1.10 Section 4.3, Transportation

Construction Traffic Control

The following mitigation measures are proposed to reduce impacts from project construction on roadway traffic in the region:

- A Transportation Management Plan (TMP) would be prepared in consultation with both WSDOT and Skamania County and submitted to EFSEC for approval that would direct and obligate the contractor to implement procedures to minimize traffic impacts
- The TMP would include requirements for coordination of project-related construction traffic and WSDOT planned construction projects
- The TMP would include requirements for coordination of project-related construction traffic and Skamania County, City of Bingen, and City of White Salmon summer recreational traffic
- Whistling Ridge Energy LLC and its contractors would be required to comply with State and County permitting requirements for over-size and over-weight vehicles
- Whistling Ridge Energy LLC would be required to notify land owners in the project vicinity prior to construction of transportation routes that would be used for construction equipment and labor
- Approved State and/or County advanced warning construction signs would be placed prior to and during construction
- Certified flaggers would be used when necessary to direct traffic when over-size and over-weight trucks either enter or exit public roads, to minimize risk of accidents
- Pilot cars would be used both in front of and behind all trucks transporting over-size or over-weight loads on all public roadways
- Traffic flow would not be restricted for more than 20 minutes during the construction phase

Access Roadway Construction

All sections of the access roadway system that would require improvements or new construction would be designed and built according to WSDOT and Washington State access management standards.

Hazardous Materials Transport

Transport of hazardous materials would be conducted in a manner that would protect both human health and the environment and would be in accordance with applicable Federal and WSDOT requirements.

Roadway Maintenance

- Pre- and post-haul construction visual assessments of roadway surface conditions would be conducted identifying weak or deteriorated areas along the haul route that may require mitigation

- Should mitigation be required, a mitigation design program would be developed to repair all pavement sections to pre-construction conditions or better

- Whistling Ridge Energy LLC would be responsible for maintaining turbine string access roads, access ways, and other roads built to construct and operate the proposed project

- All snow removal would be performed in a safe manner that would not degrade roadway conditions

1.4.1.11 Section 4.4, Socioeconomic Impact

Socioeconomic impacts are expected to be beneficial in the form of additional jobs, increased sales, and increased tax revenues. Temporary increases in population due to worker relocation during construction are likely to be less than significant in view of the availability of housing, transient accommodations, and other public services in the region. Specific mitigation measures to lessen the impacts of the construction phase on public service providers in the Whistling Ridge Energy Project vicinity include:

- Construction activities would be coordinated with local police and fire departments, as well as emergency medical service providers, to ensure access to all locations in the project site vicinity in the case of an emergency.

- To help mitigate loss of access and other traffic-related impacts, adequate traffic control and signage, indicating closures and alternate routes, would be provided where needed.

- Construction vehicle trips in and out of the immediate construction zone would be coordinated and scheduled away from peak travel periods as much as possible, to minimize general traffic disruption.

- Noise and dust problems generated by construction would be mitigated through the use of properly muffled construction equipment, and by the use of approved dust control methods.

For related discussions of impacts and mitigation, see Section 3.2 Air, Section 4.1 Environmental Health, and Section 4.3 Transportation.

1.4.2 FAIR TREATMENT

No social or environmental justice impacts are anticipated to result from the construction and operation of the Whistling Ridge Energy Project. There will be no land use displacements or relocations as a result of project, nor will the developed area for the project extend beyond the private forestry land owned by S.D.S. Co., LLC and Broughton Lumber Companies. The construction and operation of the project is not predicted to result in potential disproportionately high and adverse effects to minority or low income populations.

The project would not displace any minority or low-income populations. The project would be constructed on private land not occupied by residents or businesses owned by anyone other than the Applicant. As discussed in Section 4.4.1.1, the area near the project does not have a substantially higher minority or low-income population when compared to larger reference populations. Section 4.1, Environmental Health, states that infrasound (noise) potential impacts are considered to be either non-existent or less than significant during operation. Permanent visual changes due to project operation would be low to moderate. Therefore, this analysis finds that high and disproportionate impacts upon minority and low-income populations would not occur.

The demographics of the project study area have been identified and a public involvement effort undertaken to reach all of the surrounding residents, including minority and low-income populations.

The overall population and minority population data for year 2008 for Skamania County are shown in Table 1.4-1, followed by Table 1.4-2 showing population living under the poverty level.

The race and ethnicity composition of the project area is estimated by analyzing the three census block groups that most closely match an area defined by a three-mile radius around the project site. When combined, the population in these three census blocks is approximately 12 percent minority. The second most common race and ethnicity category for residents in this area is (1) Hispanic/Latino, and (2) Some Other Race or Two or More Races.

The population living within three miles of the project site has a lower minority percentage than the two nearest cities (White Salmon and Hood River), Klickitat County, Hood River County, Washington State, and Oregon State. The population within three miles of the project site has a higher minority percentage (12 percent) compared to the same measure for Skamania County as a whole (11 percent). Although minority residents do exist near the project site, the area near the project does not have a substantially higher minority population when compared to larger reference populations.

Table 1.4-1
Race and Sex Composition in the Project Vicinity, 2008

Jurisdiction	Population 2008	Sex (%)		Race (%)									
				Hispanic					Non Hispanic				
		M	F	W	B	AIAN	API	SOR	W	B	AIAN	API	SOR
City of White Salmon	2,205	48	52	4	0	0	0	13	79	0	1	1	2
City of Hood River	6,865	47	53	8	0	0	0	15	73	0	1	1	2
Skamania Co.	10,700	51	49	4	0	0	0	0	90	0	2	0	2
Klickitat Co.	20,100	50	50	9	0	0	0	0	83	0	3	1	2
Hood River Co.	21,625	49	51	15	0	3	0	7	69	0	1	2	2
Washington St.	6,587,600	50	50	8	0	0	0	0	76	3	1	7	3
Oregon State	3,791,075	50	50	5	0	1	0	4	81	2	1	4	3

Source: Claritas (2009).
For the purpose of this analysis, minority includes those residents identified as Black or African American, American Indian or Alaskan Native, Asian Pacific Islander, Some Other Race, Two or More Races, or Hispanic/Latino.
Percentages may not total 100 percent due to decimal places not expressed in this table.
AIAN = American Indian or Alaskan Native
API = Asian Pacific Islander
B = Black
CBG = Census Block Group
CT = Census Tract
SOR = Some Other Race or Two or More Races
W = White

Poverty status in 2000 is available for all areas studied. More current poverty statistics (for the period 2005 to 2007 as an annual average) are only available for the areas with relatively larger populations (Klickitat County, Hood River County, Washington, and Oregon). Table 1.4-2 shows 2000 poverty statistics for all areas (for comparison purposes), and also shows more current poverty statistics where available. Poverty estimates for 2008 were not available.

In 2000, 17 percent of the populations of the cities of White Salmon and Hood River were living below the poverty level. This same measure was 13 percent for Skamania County, 17 percent for Klickitat County, and 14 percent for Hood River County the same year. The cities and counties near the project site had relatively more residents living below the poverty level compared to Washington as a whole, and Oregon as a whole in 2000.

Approximately nine percent of the population living within approximately three miles of the project site lived below the poverty level in 2000, indicating fewer people living in poverty compared to the cities and counties near the project site. The geographic areas for which more recent (2005–2007 annual average) poverty statistics are available have all increased in percentage of persons living below the poverty level, as shown in Table 1.4-2.

Table 1.4-2
Population Living Below the Poverty Level

Jurisdiction[a]	Population For Whom Poverty Status is Determined[b]	Number of Persons Living Below Poverty Level	Percentage of Persons Living Below Poverty Level
Combined Census Block Groups Within Approx. 3 Miles of Project Site (2000)	3,191	299	9
Individual Census Tract 9503 Block Group 2 (2000)	1,467	193	13
Individual Census Tract 9503 Block Group 3 (2000)	685	69	10
Individual Census Tract 9504 Block Group 2 (2000)	1,039	37	4
City of White Salmon (2000)	2,144	357	17
City of Hood River (2000)	5,801	1,004	17
Skamania County (2000)	9,763	1,281	13
Klickitat County (2000/annual 2005-2007)	18,983/19,540	3,236/3,779	17/19
Hood River County (2000/annual 2005-2007)	19,986/21,061	2,845/3,044	14/14
Washington State (2000/annual 2005-2007)	5,765,201/ 6,237,571	612,370/ 737,254	11/12
Oregon State (2000/annual 2005-2007)	3,347,667/ 3,611,297	388,740/ 488,896	12/14

Source: US Census (2008a and 2008b).

a. Estimates of this type of data for the areas with smaller populations (census block groups, cities, and Skamania County) were not available for more recent years from the US Census or from Claritas.

b. Poverty status was determined by dividing the population living below poverty by the population for whom poverty status is determined, which excludes those living in institutional housing.

Operation of the project would result in a positive economic impact to Skamania County and the state due to increased tax revenues, employment, and local expenditures. Operation of the project would require 8 to 9 full-time employees. These new jobs will increase the opportunities for all Skamania County residents, including minority and low-income populations.

SECTION 1.5 SOURCES OF INFORMATION (WAC 463-60-095)

1.5.1 INTRODUCTION

American Wind Energy Association (AWEA). 2007. Wind Power Today. Available at: http://www.awea.org/pubs/factsheets/windpowertoday_2007.pdf

Anchor Environmental, L.L.C. 2003. Klickitat County Energy Overlay Draft Environmental Impact Statement.

Baerwald et al. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. *Current Biology* 18:695–696.

Bureau of Economic Analysis (BEA). 2008. Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. Table CA05 Personal income and detailed earnings by industry; Table CA25 Total employment by industry; Table CA1-3 Personal income, population, per capita personal income. Accessed December 12, 2008 and January 23, 2009 at http://www.bea.gov/regional/reis/default.cfm#step3.

IMPLAN. 2008. IMPLAN Regional Economic Input/Output Modeling Software. www.implan.com. Modeling completed December 20, 2008.

Kennedy/Jenks Consultants. 2003. Klickitat County Energy Overlay Draft Environmental Impact Statement. August.

Kunz, T.H., E.B. Arnett, B.M. Cooper, W.P. Erickson, R.P. Larkin, T. Mabee, M.L. Morrison, M.D. Strickland, and J.M. Szewczak. 2007. Assessing impacts of wind-energy development on nocturnally active birds and bats: a guidance document. *Journal of Wildlife Management* 71: 2449–4486.

Moore, Leslie. Skamania County Assessor's Office. Phone and email communication with Katie Carroz, Carroz Consulting LLC. February 5, 2009.

Orloff, S. and A. Flannery. 1992. Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas. Work performed by BioSystems Analysis, Inc., Tiburon, CA. Sacramento, CA: California Energy Commission.

Ryan, L. A. and A.B. Carey. 1995. Distribution and Habitat of the Western Gray Squirrel (*Sciurus griseus*) on Fort Lewis, Washington. *Northwest Science* 69(3):204-216.

Washington Department of Community, Trade and Economic Development (Washington CTED). 2005. 2005 Biennial Energy Report - Issues and Analysis for the Washington State Legislature and Governor. January.

Washington State Department of Revenue (WDOR). 2008. Website, Reports: Table 24: Property Tax Levies by County, Due in Calendar Years 2006 – 2008; Table 28: Property Tax Collections by County for Calendar Year 2007; Table: Local Taxable Retail Sales. Accessed December 30, 2008 at http://dor.wa.gov/Content/AboutUs/StatisticsAndReports/.

———. 2009. Website: Reports, Table 2: Local Tax Distributions; Taxable Retail Sales Report; Tables 25 and 26: Property Tax Levy Rates by County. Accessed January 26, 2009, and February 4, 2009 at http://dor.wa.gov/Content/AboutUs/StatisticsAndReports/.

Washington Employment Security Department (WESD). 2008. Labor Market and Economic Analysis. Resident Labor Force and Employment in Washington State and Labor Market Areas. Accessed January 25, 2009 at http://www.workforceexplorer.com/cgi/dataanalysis/?PAGEID=94&SUBID=149.

Washington State Office of Financial Management (WOFM). 2008. Median Household Income Estimates by County: 1989 to 2007 and Projection for 2008; October 2008. Accessed January 23, 2009 at http://www.ofm.wa.gov/economy/hhinc/default.asp.

1.5.2 SECTION 2.1, SITE DESCRIPTION

Haagen, Edward. 1990. *Soil Survey of Skamania County Area, Washington*. US Department of Agriculture, Natural Resources Conservation Service, Washington Soil Survey Program.

Northwest Sustainable Energy for Economic Development (NWSEED). 2002a. Washington State Wind Speed at 50 Meters. Available at: http://www.windpowermaps.org/default.asp. Seattle, Washington.

———. 2002b. Clark, Skamania, and Klickitat County Wind Resources Map—Wind Power at 50 Meters. Available at: http://www.windpowermaps.org/default.asp. Seattle, Washington.

United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS). 2008. *Skamania County, Washington WETS Table - Climate Data Set.* National Water and Climate Center. Portland, Oregon. Available at: http://www.wcc.nrcs.usda.gov/climate/clim-data.html.

1.5.3 SECTION 2.3, CONSTRUCTION ON SITE

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

Washington State Department of Transportation (WSDOT). 2007. *Design Manual*. Publication M 22-01.02. November.

1.5.4 SECTION 2.14, CONSTRUCTION METHODOLOGY

United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS). 2003. *Skamania County Area, Washington, Soil Survey - WA659.*

1.5.5 SECTION 2.15, PROTECTION FROM NATURAL HAZARDS

Geomatrix Consultants (Geomatrix). 1995. Seismic design mapping for the State of Oregon. Unpublished final report prepared for the Oregon Department of Transportation.

Harris, S.L. 1988 *Fire and Ice: The Cascade Volcanoes.* The Mountaineers and Pacific Search Press. Seattle, Washington.

Lidke, D.J., S.Y. Johnson, P.A. McCrory, S.F. Personius, A.R. Nelson, R.L. Dart, L. Bradley, K.M. Haller, and M.N. Machette. 2003. Map and data for Quaternary faults and folds in Washington. *USGS Open-File Report* 03-428.

McCrumb, D.R., D.O. West, and W.A. Kiel. 1989. Geology and Seismic Considerations of the Satsop Nuclear Power Plant Site. *Engineering Geology in Washington* 1: 589–606.

Noson, L.L., A. Qamar, and G.W. Thorsen. 1988. Washington State Earthquake Hazards. *DGER Information Circular* 85.

Petersen, M.D., A.D. Frankel, S.C. Harmsen, C.S. Mueller, K.M. Haller, R.L. Wheeler, R.L. Wesson, Y. Zeng, O.S. Boyd, D.M. Perkins, N. Luco, E.H. Field, C.J. Wills, and K.S. Rukstales. 2008. Documentation for the 2008 Update of the United States National Seismic Hazard Maps. *USGS Open-File Report* 2008-1128.

Pezzopane, S.K. 1993. Active faults and earthquake ground motions in Oregon. Ph.D. Thesis, University of Oregon, 208 p.

Rogers, A.M., T.J. Walsh, W.J. Kockelman, and G.R. Priest. 1996. “Map showing known or suspected faults quaternary displacement in the Pacific Northwest,” Plate 1 in Assessing Earthquake Hazards and Reducing Risk in Pacific Northwest. *USGS Professional Paper* 1560.

Walsh, T.J., M.A. Korosec, W.M. Phillips, R.L. Logan, and H.W. Schasse. 1987. Geologic Map of Washington – Southwest Quadrant.

Wolfe, E.W. and T.C. Pierson. 1995. Volcanic-Hazard Zonation for Mount St. Helens, Washington. *USGS Open-File Report* 95-497.

Wong, I.G. and J.D.J. Bott. 1995. A look back at Oregon’s earthquake history, 1981-1994. *Oregon Geology* 57: 125–139.

Wong, I.G. and W.J. Silva. 1998. “Earthquake ground shaking hazards in the Portland and Seattle metropolitan areas.” In *Geotechnical Earthquake Engineering and Soil Dynamics III*, P. Dakoulas, M. Yegian, and R.D. Holtz (eds.): American Society of Civil Engineers, Geotechnical Special Publication No. 75, 1, 66-78.

1.5.6 SECTION 2.19, ANALYSIS OF ALTERNATIVES

Northwest Power and Conservation Council (NWPCC). 2005. The Fifth Northwest Electric Power and Conservation Plan. May 2005.

Skamania County. 2007. Skamania County 2007 Comprehensive Plan.

Western Electricity Coordinating Council (WECC). 2005. WECC 2005 Power Supply Assessment. May 31.

1.5.7 SECTION 3.1, EARTH

Adams, J. 1996. "Great Earthquakes Recorded by Turbidities of the Oregon-Washington Coast," in Assessing Earthquake Hazards and Reducing Risk in Pacific Northwest. *USGS Professional Paper* 1560: 147–160.

Atwater, B.F. 1987a. A Periodic Holocene Recurrence of Widespread, Probably Coseismic Subsidence in Southwestern Washington. *EOS* 68, no.44.

———. 1987b. Evidence for great Holocene earthquakes along the outer coast of Washington State. *Science* 236, no. 4804: 942–944.

———. 1992. Geologic Evidence for Earthquakes during the Past 2000 Years along the Copalis River, Southern Coast of Washington. *Journal of Geophysical Research* 97: 1901–1919.

Atwater, B.F., S. Musumi-Rokkaku, K. Satake, Y. Tsuji, K. Uedaand, D.K. Yamagushi. 2005. The Orphan Tsunami of 1700 – Japanese Clues to a Parent Earthquake in North America, *USGS Professional Paper* 1707.

Atwater, B.F., A.R. Nelson, J.J. Clague, G.A. Carver, D.K. Yamaguchi, P.T. Bobrowsky, J. Bourgeois, M.E. Darienzo, W.C. Grant, E. Hemphill-Haley, H.M. Kelsey, G.C. Jacoby, S.P. Nishenko, S.P. Palmer, C.D. Peterson, and M. A. Renhart. 1995. Summary of Coastal Geologic Evidence for Past Great Earthquakes at the Cascadia Subduction Zone. *Earthquake Spectra* 11, no.1: 1–18.

Bakun, W.H., R.A. Haugerud, M.G. Hopper, and R.S. Ludwin. 2002. The December 1872 Washington State earthquake. *Bulletin of the Seismological Society of America* 92, no. 8: 3239–3258.

Carver, G.A. and R.M. Burke. 1987. Late Holocene paleoseismicity of the southern end of the Cascadia subduction zone (abs). *EOS* 68, no.44: 1240.

Darienzo, M.E. and C.D. Peterson. 1987. Episodic Tectonic Subsidence Recorded in Late Holocene Salt Marshes, Northwest Oregon (abs). *EOS* 68, no. 44: 1469.

———. 1990. Episodic Tectonic Subsidence Recorded in Late Holocene Salt Marshes, Northern Oregon Central Cascadia Margin. *Tectonics* 9, no.1: 1–25.

Dewberry, S. and R. Crosson. 1996. The M^D 5.0 Earthquake of 29 January 1995 in the Puget Lowland of Western Washington: An Event on the Seattle Fault. *Bulletin of the Seismological Society of America* 86, no. 4: 1167–1172.

Geomatrix Consultants (Geomatrix). 1995. Seismic design mapping for the State of Oregon. Unpublished final report prepared for the Oregon Department of Transportation.

Grant, W.C. and D.D. McLaren. 1987. Evidence for Holocene subduction earthquakes along the northern Oregon coast (abs). *EOS* 68, no.44: 1239.

Heaton, T.H. and S.H. Hartzel. 1986. Source Characteristics of hypothetical subduction earthquakes in the Northwestern United States. *Seismological Society of America Bulletin* 76, no.3: 675–708.

Kelsey, H.M., R.C. Witter and E. Hemphill-Haley. 2002. Plate-boundary earthquakes and tsunamis of the past 5500 years, Sixes River estuary, Southern Oregon. *Geol. Soc. Am. Bull.* 114, no.3: 298–314.

Kelsey, H.M., A.R. Nelson, E. Hemphill-Haley, and R. C. Witter. 2005. Tsunami history of an Oregon coastal lake reveals a 4600 yr record of great earthquakes on the Cascadia subduction zone. *Geol. Soc. Am. Bull.* 117: 1009–1032

Korosec, M. 1987. Geologic Map of the Hood River Quadrangle, Washington and Oregon. Washington Division of Geology and Earth Resources *Open File Report* 87-6.

Lidke, D.J., S.Y. Johnson, P.A. McCrory, S.F. Personius, A.R. Nelson, R.L. Dart, L. Bradley, K.M. Haller, and M.N. Machette. 2003. Map and data for Quaternary faults and folds in Washington. *USGS Open-File Report* 03-428.

McCaffrey, R., A.I. Qamar, R.W. King, R. Wells, G. Khazaradze, C.A. Williams, C.W. Stevens, J.J. Vollick, and P.C. Zwick. 2007. Fault locking, block rotation and crustal deformation in the Pacific Northwest. *Geophysical Journal International*.

Nelson, A.R., B.F. Atwater, T. Bobrowsky, L.A. Bradley, J.J. Clague, G.A. Carver, M.E. Darienzo, W.C. Grant, H.W. Krueger, R. Sparks, T.W., Stafford Jr., and M. Stuiver. 1995. Radiocarbon evidence for extensive plate-boundary rupture about 300 years ago at the Cascadia subduction zone. *Nature* 378: 371–374.

Nelson, A.R. and S.F. Personius. 1996. "Holocene ruptures, Central Cascadia Rupture Zone," in Assessing Earthquake Hazards and Reducing Risk in Pacific Northwest, *USGS Professional Paper 1560*: 91–114.

Noson, L.L., A. Qamar, and G.W. Thorsen. 1988. Washington State Earthquake Hazards. *DGER Information Circular* 85.

Personius, S.F., R.L. Dart, L. Bradley, and K.M. Haller. 2003. Map and data for Quaternary faults and folds in Oregon. *USGS Open-File Report* 03-095.

Peterson, C.D. and M.E. Darienzo. 1996. “Discrimination of Climatic, Oceanic, and Tectonic Mechanisms of Cyclic Marsh Burial, Alsea Bay, Oregon,” in Assessing Earthquake Hazards and Reducing Risk in Pacific Northwest. *USGS Professional Paper* 1560: 115–146.

Petersen, M.D., A.D. Frankel, S.C. Harmsen, C.S. Mueller, K.M. Haller, R.L. Wheeler, R.L. Wesson, Y. Zeng, O.S. Boyd, D.M. Perkins, N. Luco, E.H. Field, C.J. Wills, and K.S. Rukstales. 2008. Documentation for the 2008 Update of the United States National Seismic Hazard Maps. *USGS Open-File Report* 2008-1128.

Pezzopane, S.K. 1993. Active faults and earthquake ground motions in Oregon. Ph.D. Thesis, University of Oregon, 208 p.

Rogers, G.C. 1988. An Assessment of the Megathrust Earthquake Potential of the Cascadia Subduction Zone. *Can. J. Earth Sci.* 25: 844–852.

Satake, K. and Y. Tanioka. 1996. Tsunami Heights along the Pacific Northwest Computed from the M_w=9 Earthquake of January 1700. *Geological Society of America* 28, no.5: 108.

Satake, K., K. Wang, and B.F. Atwater. 2003. Fault slip and seismic moment of the 1700 Cascadia earthquake inferred from Japanese tsunami descriptions. *Journal of Geophysical Research* 108, no. B11: 2535.

Savage, J.C. and M. Lisowski. 1991. Strain Measurements and the Potential for a Great Subduction Earthquake off the Coast of Washington. *Science* 252, no.5002: 101–103.

Shennan, I., A.J. Long, M.M. Rutherford, F.M. Green, J.B. Innes, J.M. Lloyd, Y. Zong, K.J. Walker. 1996. Tidal marsh stratigraphy, sea-level change and large earthquakes: I. A 5,000-year record in Washington, USA. *Quaternary Science Reviews* 15: 1023–1059.

Toppozada, T.R. 1975. Earthquake intensity as a function of intensity data in California and western Nevada. *Bulletin of the Seismological Society of America*. 65, no. 5: 1223–1238.

United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS). 1988. *Soil Survey of Cowlitz County, Washington.*

———. 2003. *Skamania County Area, Washington, Soil Survey - WA659.*

Weaver, C. S. and K. M. Shedlock. 1996. “Estimates of Seismic Source Regions from the Earthquake distribution and regional tectonics in the Pacific Northwest,” in Assessing Earthquake Hazards and Reducing Risk in Pacific Northwest. *USGS Professional Paper 1560*: 285–306.

Witter, R.C., H.M. Kelsey, and E. Hemphill-Haley. 2003. Great Cascadia earthquakes and tsunamis of the past 6700 years, Coquille River estuary, southern coastal Oregon. *Geological Society of America Bulletin* 115: 1289–1306.

Wong, I.G. and J.D.J. Bott. 1995. A look back at Oregon's earthquake history, 1981-1994. *Oregon Geology* 57: 125–139.

Wong, I.G., S.K. Pezzopane, and R. Blakely. 1999. A characterization of seismic sources in western Washington and northwestern Oregon (abs). *Seismological Research Letters* 70: 221.

Yamaguchi, D.K., B.F. Atwater, D.E. Bunker, B.E. Benson, and M. Reid. 1997. Tree-ring dating the 1700 Cascadia earthquake. *Nature* 389: 922–923.

1.5.8 SECTION 3.2, AIR

United States Environmental Protection Agency (EPA). 2008. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006*. April.

1.5.9 SECTION 3.3, WATER

Haagen, Edward. 1990. *Soil Survey of Skamania County Area, Washington*. US Department of Agriculture, Natural Resources Conservation Service, Washington Soil Survey Program.

1.5.10 SECTION 3.4, HABITAT, VEGETATION, FISH AND WILDLIFE

Anchor Environmental, L.L.C. 2003. Klickitat County Energy Overlay Draft Environmental Impact Statement.

———. 2004. Klickitat County Energy Overlay Final Environmental Impact Statement. September.

Arnett, E.B., K. Brown, W.P. Erickson, J. Fielder, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, T. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersly. 2008. Patterns of fatality of bats at wind energy facilities in North America. *Journal of Wildlife Management* 72: 61–78.

Carraway, L. N. and B. J. Verts. 1994. Sciurus griseus. *Mammalian Species*, No. 474: 1–7.

Baerwald et al. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. *Current Biology* 18:695–696.

Dalquest, W. W. 1948. Mammals of Washington. *University of Kansas Publications, Museum of Natural History*, 2:1–444.

Fiedler, J. K. 2004. Assessment of bat mortality and activity at Buffalo Mountain Windfarm, eastern Tennessee. Thesis, University of Tennessee, Knoxville, USA.

Franklin, Jerry F. and C.T. Dyrness. 1988. *Natural Vegetation of Oregon and Washington.* Oregon State University Press.

Gruver, J. C. 2002. Assessment of bat community structure and roosting habitat preferences for the hoary bat (Lasiurus cinereus) near Foote Creek Rim, Wyoming. Thesis, University of Wyoming, Laramie, USA.

Hayes, JP. 1997. Temporal variation in activity of bats and the design of echolocation-monitoring studies. *J Mammal* 78: 514–524.

Howe, R. W., W. Evans, and A. T. Wolf. 2002. Effects of wind turbines on birds and bats in northeastern Wisconsin. Wisconsin Public Service Corporation, Green Bay, USA.

Johnson, G. D. 2005. A review of bat mortality at wind-energy developments in the United States. *Bat Research News* 46:45–49.

Johnson, G. D., M. K. Perlik, W. P. Erickson, and M. D. Strickland. 2004. Bat activity, composition and collision mortality at a large wind plant in Minnesota. *Wildlife Society Bulletin* 32:1278–1288.

Kennedy/Jenks Consultants. 2003. Klickitat County Energy Overlay Draft Environmental Impact Statement. August.

Kunz, T.H., E.B. Arnett, B.M. Cooper, W.P. Erickson, R.P. Larkin, T. Mabee, M.L. Morrison, M.D. Strickland, and J.M. Szewczak. 2007. Assessing impacts of wind-energy development on nocturnally active birds and bats: a guidance document. *Journal of Wildlife Management* 71: 2449–4486.

Orloff, S. and A. Flannery. 1992. Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas. Work performed by BioSystems Analysis, Inc., Tiburon, CA. Sacramento, CA: California Energy Commission.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. *Condor* 82:309–313.

Ryan, L. A. and A.B. Carey. 1995. Distribution and Habitat of the Western Gray Squirrel (*Sciurus griseus*) on Fort Lewis, Washington. *Northwest Science* 69(3):204-216.

Schmidt, E., A.J. Piaggio, C.E. Bock, and D.M. Armstrong. 2003. National Wind Technology Center Site Environmental Assessment: Bird and Bat Use and Fatalities – Final Report. NREL/SR-500-32981, National Renewable Energy Laboratory, Golden, Colorado.

US Fish and Wildlife Service (USFWS). 1992. Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls, 1992 Revised Version.

———. 2009. Listed and Proposed Endangered and Threatened Species and Critical Habitat; Candidate Species; and Species of Concern in Skamania County (Revised November 1, 2007). Available at: http://www.fws.gov/westwafwo/speciesmap/SKAMAN.html.

US Forest Service (USFS). 1985. *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington.* Pacific Northwest Region. E.R. Brown, technical editor.

———. 2006. Northern Goshawk Inventory and Monitoring Technical Guide. Gen. Tech. Report WO-71. July.

Van der Haegen, M., S. Van Leuven, and D. Anderson. 2004. Surveys for western gray squirrel nests on sites harvested under approved forest practice guidelines: analysis of nest use and operator compliance. *Wildlife Research Report*. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Washington Department of Wildlife (WDW). 1993. Status of the Western Gray Squirrel (*Sciurus griseus*) in Washington. Olympia, WA. Final status report.

Washington Natural Heritage Program (WNHP). 2003a. Special Status Plants Species and Habitats Data Search. Washington Natural Heritage Information System.

———. 2003b. *Rare Plant List for Skamania County*. Washington Natural Heritage Program. http://www.dnr.wa.gov/nhp/refdesk/lists/plantsxco/skamania.html.

———. 2009. Special Status Plants Species and Habitats Data Search. Washington Natural Heritage Information System.

Weiler, Bill. Washington Department of Fish and Wildlife. Telephone conversation with Greg Johnson, Western Ecosystems Technology, Inc. 2003.

Whiteacre, L., J. Henderson, R. Holmes, L. Hoover, R. Lesher, J. Lippert, E. Olson, L. Potash, J. Seevers, M. Stein, and N. Wogen. 1998. *Survey Protocols for Survey & Manage Strategy 2 Vascular Plants, Version 2.0.* Bureau of Land Management. December. Available at: http://www.blm.gov/or/plans/surveyandmanage/SP/VascularPlants/cover.htm.

Woodbridge, B. and C.D. Hargis. 2006. Northern goshawk inventory and monitoring technical guide. *Gen. Tech. Rep. WO-71*. Washington, DC: US Forest Service.

1.5.11 SECTION 3.5, WETLANDS AND OTHER JURISDICTIONAL WATERS

CH2M Hill. 2007. Wetland Delineation Report, Saddleback Wind Energy Project, Skamania County, Washington. Prepared for Horizon Wind Energy LLC. Portland, Oregon.

1.5.12 SECTION 3.6, ENERGY AND NATURAL RESOURCES

American Wind Energy Association (AWEA). 2008. *The Difference Wind Makes*. http://www.awea.org/pubs/factsheets/The_Difference_Wind_Makes.pdf

1.5.13 SECTION 4.1, ENVIRONMENTAL HEALTH

American Wind Energy Association (AWEA). 2008. *Wind Energy Siting Handbook.* February.

Caithness Windfarm Information Forum. 2006. Summary of Wind Turbine Accident data to November 1st 2006. Available at www.caithnesswindfarms.co.uk.

California Department of Transportation (CDOT). 1998. Technical Noise Supplement. October.

Hill, Gail Kinsey. 2008. Siemens fined $10,500 for wind turbine tower collapse that killed worker. *The Oregonian*. February 26.

Holltitz, Nikki. Skamania County Department of Planning. Telephone conversation Tyrone Hunter, URS Corporation, December 22, 2008.

International Organization for Standardization (ISO). 1996a. Acoustics – description and measurement of environmental noise – Part 1: Basic quantities and procedures. Ref. No. ISO 1996/1-1982 (E).

———. 1996b. Acoustics – description and measurement of environmental noise – Part 2: Acquisition of data pertinent to land use. Ref. No. ISO 1996-2:1987 (E).

———. 1996c. Acoustics – description and measurement of environmental noise – Part 3: Application to noise limits. Ref. No. ISO 1996-3:1987 (E).

Jakobsen, Jorgen. 2005. Infrasound Emission from Wind Turbines. *Journal of Low Frequency Noise, Vibration and Active Control* 24, no. 3: 145–155.

Mills, Thomas. Vestas Wind Systems. Email to Mark Storm, URS Corporation, October 19, 2007.

Morgan, Colin, Ervin Bossanyi, and Henry Seifert. 1998. Assessment of Safety Risks Arising from Wind Turbine Icing. April.

Van den Berg, Godefridus Petrus. 2006. The sounds of high winds: the effect of atmospheric stability on wind turbine sound and microphone noise.

1.5.14 SECTION 4.2, LAND AND SHORELINE USE

Beckham, S.D., R. Minor, K.A. Toepel, and J. Reese. 1988. Prehistory and History of the Columbia River Gorge National Scenic Area, Oregon and Washington. Heritage Research Associates *Report* No. 75. Heritage Research Associates, Inc. Eugene, Oregon.

Buhyoff, G.J., P.A. Miller, J.W. Roach, D. Zhou, and L.G. Fuller. 1994. An AI Methodology for Landscape Visual Assessments. *AI Applications* 8, no. 1: 1-13.

Columbia River Gorge National Scenic Area. 1992. Recreation Development Proposals List. September.

Federal Highway Administration (FHWA). 1988. *Visual Impact Assessment for Highway Projects*. FHWA-HI-88-054.

Griffin, D. and T.E. Churchill. 2001. Cultural Resource Survey and Traditional Cultural Property Study of the Lower White Salmon River, Klickitat/Skamania Counties, Washington. Archaeological Frontiers, Eugene, Oregon. Manuscript on file at the Washington State Office of Archaeology and Historic Preservation, Olympia, Washington.

Masten, Ruth A. and Jerry R. Galm. 1989. An Overview of Cultural Resources within the Wild and Scenic Areas of the White Salmon and Klickitat Rivers, Klickitat and Skamania Counties, Washington. Vols 1 and 2. Eastern Washington University Reports in Archaeology and History 100-69. Archaeological and Historical Services, Cheney, Washington.

Patterson, James W., Jr. 2005. Development of Obstruction Lighting Standards for Wind Turbin Farms. Federal Aviation Administration. November.

Thayer, R.L. and C.M. Freeman. 1987. Altamont, Public Perceptions of a Wind Energy Landscape. *Landscape and Urban Planning* 14: 379–398.

US Forest Service (USFS). 1995. *Landscape Aesthetics, A Handbook for Scenery Management*.

1.5.15 SECTION 4.3, TRANSPORTATION

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

Skamania County. 2007. Skamania County 2007 Comprehensive Plan.

———. 2008. Skamania County Private Road Guidelines and Development Assistance Manual.

Transportation Research Board (TRB). 2000. *Highway Capacity Manual*.

Washington State Department of Transportation (WSDOT). 2006. *Annual Traffic Report*.

———. 2007. *Design Manual*. Publication M 22-01.02. November.

1.5.16 SECTION 4.4, SOCIOECONOMIC IMPACT

Barkley, Allen. Secondary contact for the Applicant. Email communication with Katie Carroz, Carroz Consulting LLC. December 8, 2008.

Bureau of Economic Analysis (BEA). 2008. Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. Table CA05 Personal income and detailed earnings by industry; Table CA25 Total employment by industry; Table CA1-3 Personal income, population, per capita personal income. Accessed December 12, 2008 and January 23, 2009 at http://www.bea.gov/regional/reis/default.cfm#step3.

Carlson, John. Skamania County Emergency Management. Phone conversation with Katie Carroz, Carroz Consulting LLC. December 30, 2008.

Claritas. 2009. Claritas Marketplace 2008 Population, Race/Ethnicity, Age, Sex, and Housing data for counties, states, places, and census block groups. Accessed January 26, 2009, and February 4, 2009 at www.clartiasmarketplace.com.

Cox, Dave. Undersheriff, Skamania County Sheriff's Office. Phone conversation with Katie Carroz, Carroz Consulting LLC. December 17, 2008.

ECONorthwest. 2002. Economic Impacts of Wind Power in Kittitas County.

———. 2006. Economic Impacts of the Kittitas Valley Wind Project. Available at http://www.econw.com/consulting/subtopics?topic=energy&subtopic=renewable_energy).

Educational Service District 112 (ESD). 2008. School Districts, Skamania County. accessed December 15 and 17, 2008 at http://www.esd112.org/schooldistricts/skamania_county.html.

Energy Facility Site Evaluation Council (EFSEC). 2006. In the Matter of Application No. 2003-01: Sagebrush Power Partners, LLC; Kittitas Valley Wind Power Project, Exhibit 80 SUP (SG-T SUP), Economic Development Group of Kittitas County. Prefiled Supplemental Testimony, Witness #1: Stephen Grover.

Fullerton, Gail A. and Ole Helgerson. 2008. Underwood Community Wildfire Protection Plan Accessed December 12, 2008 at http://www.skamaniacounty.org/Wildfire/UnderwoodCWPP/Underwood%20CWPP%20Draft.pdf.

Hovey, Russ. Department of Natural Resources. Phone conversation with Katie Carroz, Carroz Consulting LLC. January 13, 2009.

IMPLAN. 2008. IMPLAN Regional Economic Input/Output Modeling Software. www.implan.com. Modeling completed December 20, 2008.

Klickitat County Public Economic Development Authority (Klickitat County PEDA). 2008. Personal communication with Michael Canon, Executive Director, and Katie Carroz, Carroz Consulting LLC. December 19, 2008.

Mill A Community Action Committee. 2008. Website. Accessed December 30, 2008 at http://community.gorge.net/mill-a/.

Mill A School District. 2008. Website. accessed December 17, 2008 at http://www.milla.k12.wa.us/Index.htm.

Moore, Leslie. Skamania County Assessor's Office. Phone and email communication with Katie Carroz, Carroz Consulting LLC. February 5, 2009.

Municipal Research and Services Center of Washington (MSRC). 2008. MSRC Website. Accessed December 17, 2008 at http://www.mrsc.org/Subjects/PubSafe/Fire/fireservice.aspx#Skamania.

National Wind Coordinating Committee (NWCC). 2009. Wind Energy Series, January 1997. Accessed January 25, 2009 at http://www.nationalwind.org/publications/wes/wes05.htm.

Oregon Employment Department (OED). 2009. Oregon Labor Market Information Service (OLMIS) Unemployment Rates. Accessed January 25, 2009 at http://www.qualityinfo.org/olmisj/AllRates.

Oregon Office of Economic Analysis (Oregon OEA). 2008. State and County Population Forecasts and Components of Change, 2000 to 2040. Accessed December 9, 2008 at http://www.oregon.gov/DAS/OEA/demographic.shtml#Short_Term_State_Forecast.

Portland State University Population Research Center (PSU Research Center). 2008a. Preliminary 2008 Population Estimates as of July 1, 2008. Accessed December 6, 2008 at http://www.pdx.edu/prc/.

———. 2008b. 2007 Oregon Population Report, Table 9: Population by Age and Sex for Oregon and Its Counties: July 1, 2007. Accessed December 6, 2008 at http://www.pdx.edu/prc/.

Real Estate.com. 2008. RealEstate.com, Hood River, OR Homes for Sale and Real Estate Data. Accessed December 12, 2008 at http://www.realestate.com/OR/Hood-River/Hood-River.aspx.

Renewable Energy Policy Project (REPP). 2003. The Effect of Wind Development on Local Property Values. May. Accessed December 28, 2008 at http://www.repp.org/articles/static/1/binaries/wind_online_final.pdf.

———. 2009. Website: Wind Energy and the Economy. Accessed February 3, 2009 at http://www.awea.org/faq/wwt_economy.html.

Skamania County Chamber of Commerce (SCCC). 2008. Industry; Schools. Accessed December 12, 2008 at http://www.skamania.org/industry.cfm.

Skamania County Emergency Medical Service (EMS). 2008. Website. Accessed December 19, 2008 at http://www.skamaniaems.com/index.html.

Skamania County Public Utility District Office Staff. Phone conversation with Katie Carroz, Carroz Consulting LLC. December 30, 2008.

Skinner, Tracy. Washington Survey and Ratings Bureau. Email communications with Katie Carroz, Carroz Consulting LLC, December 12 through December 23, 2008. Accessed December 17, 2008 at www.wsrb.com.

Skyline Hospital. 2008. Skyline Hospital Website. Accessed December 19, 2008 at http://www.skylinehospital.com/index.html.

TravelWashington. 2008. Accessed December 12, 2008 at http://www.travel-in-wa.com/.

US Census. 2008a. American Community Survey, Race and Sex, Three-year (2005-2007) Annual Average Housing Estimates, Median Gross Rent, Median Value of Owner-Occupied Housing Units. Accessed December 9 and 11, 2008 at www.census.gov.

———. 2008b. Census 2000, Summary File 1: Table P8 Race, Table P12 Sex, Table QT-H1 Housing Information, and Table P17 Housing Information; Summary File 3: Table 87 Poverty Level, Table QT-H12 Contract Rent and Gross Rent, and Table QT-H14 Value, Mortgage Status, and Selected Conditions. Accessed December 9 and 11, 2008; and January 26, 2009 at www.census.gov.

US Department of Agriculture (USDA). 2007. Economic Research Service; The Economics of Food, Farming, Natural Resources, and Rural America. Accessed January 25, 2009 at http://www.ers.usda.gov/data/unemployment/RDList2.asp?ST=OR.

US Forest Service (USFS). 2008. Website. Accessed December 23, 2008 at http://www.fs.fed.us/srs/county.shtml and http://www.fs.fed.us/news/2008/releases/10/srs.shtml.

Washington Association of Sheriffs and Police Chiefs (WASPC). 2008. Criminal Justice Information: Crime in Washington. Accessed December 19, 2008 at http://www.waspc.org/index.php?c=Criminal%20Justice%20Information%20Support.

Washington Employment Security Department (WESD). 2008. Labor Market and Economic Analysis. Resident Labor Force and Employment in Washington State and Labor Market Areas. Accessed January 25, 2009 at http://www.workforceexplorer.com/cgi/dataanalysis/?PAGEID=94&SUBID=149.

Washington State Auditor. 2009. Washington State Auditor, Local Government Financial Reporting System. Accessed February 3, 2009 at http://www.sao.wa.gov/applications/lgfrs/.

Washington State Department of Revenue (WDOR). 2008. Website, Reports: Table 24: Property Tax Levies by County, Due in Calendar Years 2006 – 2008; Table 28: Property Tax Collections by County for Calendar Year 2007; Table: Local Taxable Retail Sales. Accessed December 30, 2008 at http://dor.wa.gov/Content/AboutUs/StatisticsAndReports/.

———. 2009a. Website: Statistics and Reports, 2007 Comparison to County Assessor Statistics Reports. Accessed January 25, 2009 at http://dor.wa.gov/Content/AboutUs/StatisticsAndReports/stats_proptaxstats_Assessor.aspx.

———. 2009b. Website: Reports, Table 2: Local Tax Distributions; Taxable Retail Sales Report; Tables 25 and 26: Property Tax Levy Rates by County. Accessed January 26, 2009, and February 4, 2009 at http://dor.wa.gov/Content/AboutUs/StatisticsAndReports/.

Washington State Office of Financial Management (WOFM). 2008a. Washington State Office of Financial Management Official April 1, 2008 Population Estimates. Accessed December 6, 2008 at http://www.ofm.wa.gov/pop/april1/default.asp.

———. 2008b. April 1 Population Estimates by Age and Sex, 1980-2008: Washington State. , Accessed December 8, 2008 at http://www.ofm.wa.gov/pop/coagemf/default.asp.

———. 2008c. Washington State County Growth Management Population Projections: 2000 to 2030. 2007 County Projections by Five-Year Intervals. Medium Series. http://www.ofm.wa.gov/pop/gma/projections07.asp, accessed December 9, 2008.

———. 2008d. WOFM Housing and Housing Change by Structure Type by County, 2000-2008, 2008 Housing Unit Inventory by County. Accessed December 10 and 11, 2008 at www.census.gov.

———. 2008e. Median Household Income Estimates by County: 1989 to 2007 and Projection for 2008; October 2008. Accessed January 23, 2009 at http://www.ofm.wa.gov/economy/hhinc/default.asp.

Washington State Office of the Superintendent of Public Instruction (OSPI). 2008. Data and Reports. Accessed December 15, 2008 at http://www.k12.wa.us/dataadmin/default.aspx.

Washington State Patrol. District 5 Public Information Contact, Phone conversation with Katie Carroz, Carroz Consulting LLC. January 26, 2009.

Weeks, Joe. Southeast (Ellensburg) Region of the Washington State Department of Natural Resources Fire Service. Phone conversation and email with Katie Carroz, Carroz Consulting LLC. February 5, 2009.

Woodall. 2008. Woodall's Camping Directory Website. Accessed December 12, 2008 at http://www.woodalls.com/.

SECTION 2.1 SITE DESCRIPTION
(WAC 463-60-125)

2.1.1 LOCATION OF WHISTLING RIDGE ENERGY PROJECT

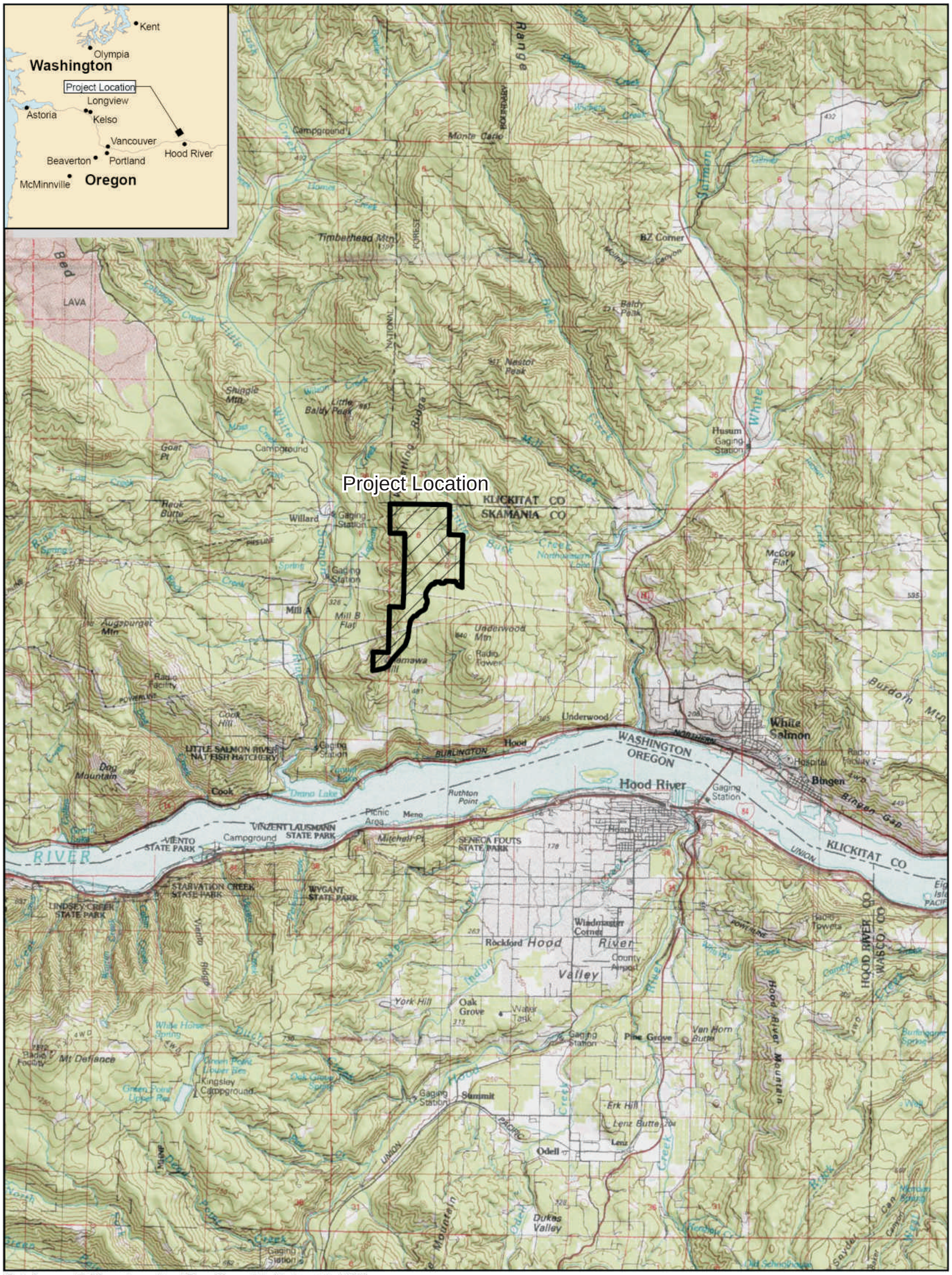
The proposed Whistling Ridge Energy Project would be located on private land located approximately 7 miles northwest of the City of White Salmon in Skamania County, Washington (Figure 2.1-1, Location of Proposed Whistling Ridge Energy Project). The project would be located on commercial forestland owned by S.D.S. Co., LLC and Broughton Lumber Company in an unincorporated area of Skamania County, outside of the Columbia Gorge National Scenic Area.

The project site encompasses 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.

The Applicant seeks approval of construction of wind turbine generators, roads, and electrical collection cables and transmission lines within corridors that will be described and analyzed in the environmental impact statement (EIS). Actual final locations of wind turbine generators and other related and supporting facilities would be established during the micrositing process. During the micrositing process (when the final, exact locations of the turbines and other project elements and equipment are determined), the Applicant must balance a number of technical and engineering factors, including limitations posed by the terrain, wind data (speed, wind sheer, etc.), wake effects of turbines, location of roadways and transportation systems, and feasibility of access, setbacks (internally established or permit requirements), geotechnical considerations (subsurface conditions), environmental restrictions (avoidance of sensitive habitat), cultural/archeological restrictions (avoidance of cultural resource sites), telecommunications constraints (line of sight microwave paths), Federal Aviation Administration (FAA) lighting requirements, and other site-specific criteria that are not fully resolved until final engineering is completed.

Access to the project area is provided by county and private logging roads that extend north from State Route (SR) 14. From SR 14, access would be provided via County roads (Cook-Underwood Road to ~~Kollack-Knapp~~Willard Road~~ onto Scoggins Road~~) and then via a new connection direct to West Pit Road, an existing private logging road. West Pit Road connects~~and then~~ to a network of existing private logging roads. 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.

33758687_101.cdr



Data Source: USGS quad map, Hood River, Oregon-Washington, dated 1982.

0 1 2 3 Miles

1:100,000

Revised Figure 2.1-1

Location of Proposed Whistling Ridge Energy Project

Job No. 33758687

URS

Whistling Ridge Energy Project
Skamania County, Washington

As shown on Table 2.1-1, approximately 384 acres would be developed for the wind turbine foundations, connecting roadways, and overhead and underground transmission lines.

Table 2.1-1
Area of Development
(acres)

Project Element	**Area Proposed for EFSEC Certification and Micrositing**	**Permanent Impact**	**Temporary Impact**	**Total Temporary and Permanent Impact**
Project Site[a]	1,152			
Area to be Developed				
Windfarm Footprint[b]	384	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[f]	8.9	0.0	2.4	2.4
Operation and Maintenance Yard & Storage Area[g]	~~3.1~~5.0	~~3.1~~5.0	0.0	~~3.1~~5.0
Substation Plot & Study Area[h]	7.1	7.1	0.0	7.2
Total Area to be Developed Within Project Site	**NA**	**54.25**	**52.1**	**106.6**
Impact Area Outside of Project Area				
Roadway Corridor Outside Project Site[i] (based on ~~2.1~~2.5 miles of improved road)	~~11.0~~12.1	~~2.1~~6.1	~~5.5~~0	~~7.7~~6.1

a. Project site is the area shown on Figure 2.1-1 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, as described in Section 2.3 and shown on Figure 2.3-4.
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 7.5 miles.
e. Total area encompassed by a 200-foot corridor on the overhead transmission lines minus any area that overlaps with roadway or turbine string corridors.
f. 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.
g. Area includes the 2-acre Operations and Maintenance site plus a 50-foot area around the perimeter.
h. Area includes the 5-acre substation site plus a 50-foot area around the perimeter.
i. 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 ~~intersection of Scoggins and CG2930~~ an intersect point with Willard Road, based on a length of ~~2.1~~2.5 miles.

Because the project site already has a network of logging roads, relatively few new roads would have to be constructed. Approximately ~~7.2~~7.9 miles of existing private logging roads located on land owned by SDS Co., LLC and Broughton Lumber Company 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 of these construction roads would continue to be used during the project's operational phase.

Of the total ~~9.6~~10.3 miles of access roads, approximately ~~7.5~~7.8 miles would be located within the project area. The remaining approximately ~~2.1~~2.5 miles would be located outside of the project area ~~within~~ and outside of the Columbia River Gorge National Scenic Area. All new road construction would occur within the project area (Table 2.1-2).

Table 2.1-2
Summary of Access Roadway Improvements and Construction (acres)

Roadway	Within Project Area	~~Within Columbia River Gorge National Scenic Area~~ Outside of Project Area	Total
Improved roadway	~~5.1~~5.4	~~2.1~~2.5	~~7.2~~7.9
New roadway	2.4	0	2.4
Total	~~7.5~~7.8	~~2.1~~2.5	~~9.6~~10.3

Existing logging roads are constructed, and are regularly improved and maintained to enable 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 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.

The project proponent has requested to integrate power from the Whistling Ridge Energy Project into the Federal Columbia River Transmission System (FCRTS) that exists within the project area.

2.1.2 PROMINENT GEOGRAPHIC FEATURES

The project site is located on a series of north-trending ridges that range in elevation from approximately 2,100 to 2,300 feet above mean sea level (msl). The land west of the proposed project site drops sharply to a narrow river terrace and then to an elevation of less than 800 feet above msl in the Little White Salmon River valley. The topography northeast of the site drops gradually toward the White Salmon River or climbs gently up the northeast flank of Underwood Mountain (2,728 feet above msl). To the south, the topography drops to a terrace of largely agricultural use, then toward the Coumbia River.

2.1.3 TYPICAL GEOLOGICAL AND CLIMATOLOGICAL CHARACTERISTICS

The following summarizes the geological and climatological characteristics of the site. For a more complete discussion of site geology, please see Section 3.1, Earth.

2.1.3.1 Geology

The White Salmon, Washington area is located within the Cascade Range and the Columbia Intermontane Physiographic Province. The project area is located just within the western boundary of the Columbia Plateau, which is located at the western edge of the Columbia Intermontane Physiographic Province (Freeman et al. 1945). This lowland province is surrounded on all sides by mountain ranges and highlands, and covers a vast area of eastern Washington and parts of northeastern Oregon and western Idaho.

A variety of younger volcanic rocks and sedimentary materials that range from Pliocene (1.8 to 5.3 million years before the present [BP]) to Holocene (less than 10,000 years BP in age) overlie the Columbia River Basalt Group (CRBG) in the project area. Sedimentary rocks are generally thought to underlie the basalts in the project area.

The proposed project site is located within the northern boundary of the structural Hood River Valley, which extends a few miles into southern Washington. In general, the geology of the area consists of basalt flows extruded from local vents, layered with conglomerate, tuff, tuff breccias, and other volcanoclastic deposits. These formations are typically overlain by silt and clay soil of varying thickness in the project vicinity. The bedrock underlying the proposed project site consists of Grande Ronde Basalt of the CRBG and Quaternary basalt of Underwood Mountain—a shield volcano that lies approximately midway between the lower reaches of the Little White Salmon and White Salmon Rivers. Its southern slopes drain to the Columbia River.

No faults are mapped within the footprint of the proposed Whistling Ridge Energy Project area. However, faults are mapped approximately 1.5 miles southwest and northeast of the proposed project area. Many of these faults are inferred and shown as dotted lines buried by younger surficial deposits. The activity of the area faults is unknown. However, a review of aerial photography shows no indication of recent movement along the trace of the inferred faults.

During the current subsurface exploration, groundwater was not encountered in the site up to a depth of 16 feet below ground surface (bgs). It should be noted that these observations reflect groundwater levels at the time of the field investigation. Actual groundwater levels may fluctuate significantly in response to seasonal effects, regional rainfall, and other factors not observed during this investigation. There may be regional or perched water tables at greater depth. Prior to final design of the tower foundations, additional subsurface investigations (boreholes) would be required to provide geotechnical data at foundation and anchor depths. Future deep foundation investigations will include observation of groundwater, if encountered.

2.1.3.2 Climate

Skamania County's location, sheltered by the Cascade Mountains in the Columbia River Gorge, provides for a moderating climate between the storms rolling in from the Pacific Ocean and the extreme seasonal temperature shifts that occur in eastern Washington. Winters may be near freezing, depending on location, while summers are usually mild. Frequent strong winds and precipitation dominate the weather pattern within the Gorge throughout the year (Haagen 1990).

Temperature and precipitation data was recorded at Wind River, Washington and Bonneville, Oregon from 1951 to 1978 (Haagen 1990). Wind River is at about 1,100 feet above msl and about 15 miles northwest of the Whistling Ridge Energy Project site. Bonneville, Oregon is situated around 80 feet above msl and lies about 19 miles southwest of the project site. Average winter temperatures were 38 and 39 degrees Fahrenheit (°F), respectively, with average daily minimums of 33 and 28°F. The average summer temperatures are 63°F (Wind River, WA) and 65°F (Bonneville, OR) with an average daily maximum of 76°F.

Carson Fish Hatchery, located at 1,130 feet above msl and about 19 miles northwest of the project site, recorded slightly cooler winter and similar summer temperatures from 1977 to 2000 (USDA NRCS 2008). Average December and February temperatures settled around 34°F with average daily minimums around 28°F. Summer temperatures averaged 61°F with daily maximums averaging 80°F.

The average total annual precipitation from 1951 through 1978 is 77 inches at Bonneville, Oregon and 102 inches at Wind River, Washington. Twenty percent of the total precipitation for both areas falls between April and September. The average seasonal snowfalls are 13 and 109 inches, respectively (Haagen 1990). Carson Fish Hatchery received an average annual total precipitation of 88 inches from 1977 through 2000. Average seasonal snowfall during the same period at the fish hatchery totaled 77 inches (USDA NRCS 2008).

The prevailing winds though the Columbia Gorge shift seasonally. Gale force winds are not uncommon. Westerly winds prevail during the summer months. Cold easterly winds usually blow through the Gorge during winter months. These winter winds occasionally collide with the moist Pacific air masses leading to severe ice storms, locally described as silver thaws (Haagen 1990).

Wind power and wind speed maps published by the Northwestern U.S. Wind Mapping Project and verified by the U.S. Department of Energy's National Renewable Energy Laboratory identify the ridge line where the Whistling Ridge Energy Project would be constructed as a viable wind energy resource. Models indicate that winds passing 50 meters above the ground surface in this vicinity reach sustained speeds of between 15.7 and 17.9 miles per hour depending upon location (NWSEED 2002a). Such wind speeds rate this area as wind power potential of good (Class 4) to Outstanding (Class 5) (NWSEED 2002b). One concentrated area within the project area is identified as having outstanding (Class 6) wind power potential with sustained wind speeds of 17.9 to 19.7 miles per hour.

2.1.4 LAND USE PLANS AND ZONING ORDINANCES

A description of the applicable comprehensive plans, zoning, and development regulations and other land use programs relevant to the Whistling Ridge Energy Project is included in Section 4.2.1, Land Use.

The site is located entirely within unincorporated areas of Skamania County. Portions of the land are designated as Conservancy in the Skamania County Comprehensive Plan. The majority of the land is currently zoned as Unmapped, except for a small part of the southwest portion of the project area where seven turbines are proposed, and the alternative site for the maintenance and operations facility located along West Pit Road. Pursuant to the locally adopted land use plans and ordinances in effect at the time of this application, wind energy facilities are an outright permitted use in the Unmapped (UNM) area of the project. In the southwest portion of the property where approximately seven proposed turbines would be located, ~~approximately three to four turbines would be located on~~the property is zoned Resource Protection (For/Ag-20)~~ and three to four turbines would be located on property zoned Residential 10, a transitional zone~~. The site proposed for the alternative Operations and Maintenance facility along West Pit Road, to the west of the project site, is on land zoned Residential 5. A conditional use permit would be required only for these two areas of the project.

Skamania County is in the process of considering amendments to its zoning code. In the current draft ordinance, the entire project area is proposed for Forest Land 20 (FL-20) zoning. This proposed zoning code amendment is being challenged by a variety of parties., including a pending appeal of the County's State Environmental Policy Act (SEPA) determination related to the proposed zoning code. Under the proposed FL-20 zoning, the code would allow "Large-Scale Wind Energy Facilities," subject to conditional use approval.

SECTION 2.2 LEGAL DESCRIPTIONS AND OWNERSHIP INTERESTS (WAC 463-60-135)

2.2.1 INTRODUCTION

The proposed Whistling Ridge Energy Project would be located on private land approximately 7 miles northwest of the City of White Salmon in Skamania County, Washington. 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 Columbia River Gorge National Scenic Area.

An alternative site is proposed for a maintenance and operations facility, located outside of and to the west of the project site along West Pit Road. This land is owned by the Broughton Lumber Company.

Whistling Ridge Energy LLC, a special purpose corporation operating in the State of Washington, is developing and would own the project.

The total project area encompasses 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.

The alternative operations and maintenance yard along West Pit Road would encompass approximately 5 acres in Section 1 of Township 3 North, Range 9 East.

2.2.2 LEGAL DESCRIPTION OF PROPERTY

Real property situated in the County of Skamania, State of Washington, hereby described as follows:

Township 3 North, Range 10 East of the Willamette Meridian:

Section 5: The West Half of the Southwest Quarter.
Section 6: All except for the West Half of the Southwest Quarter.
Section 7: The South Half of the Southwest Quarter, the Northeast Quarter of the Southwest Quarter, the West Half of the Southeast Quarter, the East Half of the Northwest Quarter and the Northeast Quarter excluding lands within the Columbia River Gorge National Scenic Area
Section 8: The West Half of the Northwest Quarter excluding lands within the Columbia River Gorge National Scenic Area
Section 18: The Northwest Quarter, and the Northwest Quarter of the Southwest Quarter excluding lands within the Columbia River Gorge National Scenic Area

Township 3 North, Range 9 East of the Willamette Meridian:

Section 13: The East Half of the Southeast Quarter excluding lands within the Columbia River Gorge National Scenic Area.

2.2.3 LEGAL DESCRIPTION OF ALTERNATIVE MAINTENANCE AND OPERATION FACILITY

Township 3 North, Range 9 East of the Willamette Meridian:

Section 1: Portions of The Southeast Quarter of the Southeast Quarter, and the Southwest Quarter

SECTION 2.3 CONSTRUCTION ON SITE
(WAC 463-60-145)

2.3.1 WHISTLING RIDGE ENERGY PROJECT SUMMARY

The Whistling Ridge Energy Project would be constructed 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. 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 Columbia River Gorge National Scenic Area. See Figure 2.1-1, Location of Proposed Whistling Ridge Energy Project.

Turbines would be located on the forested ridges of Saddleback Mountain. The final locations of wind turbine generators and other related and supporting facilities would be established during the final design process (see Section 2.1, Site Description for more information).

The planned facility would have an installed capacity of up to 75 megawatts (MW) of electricity.

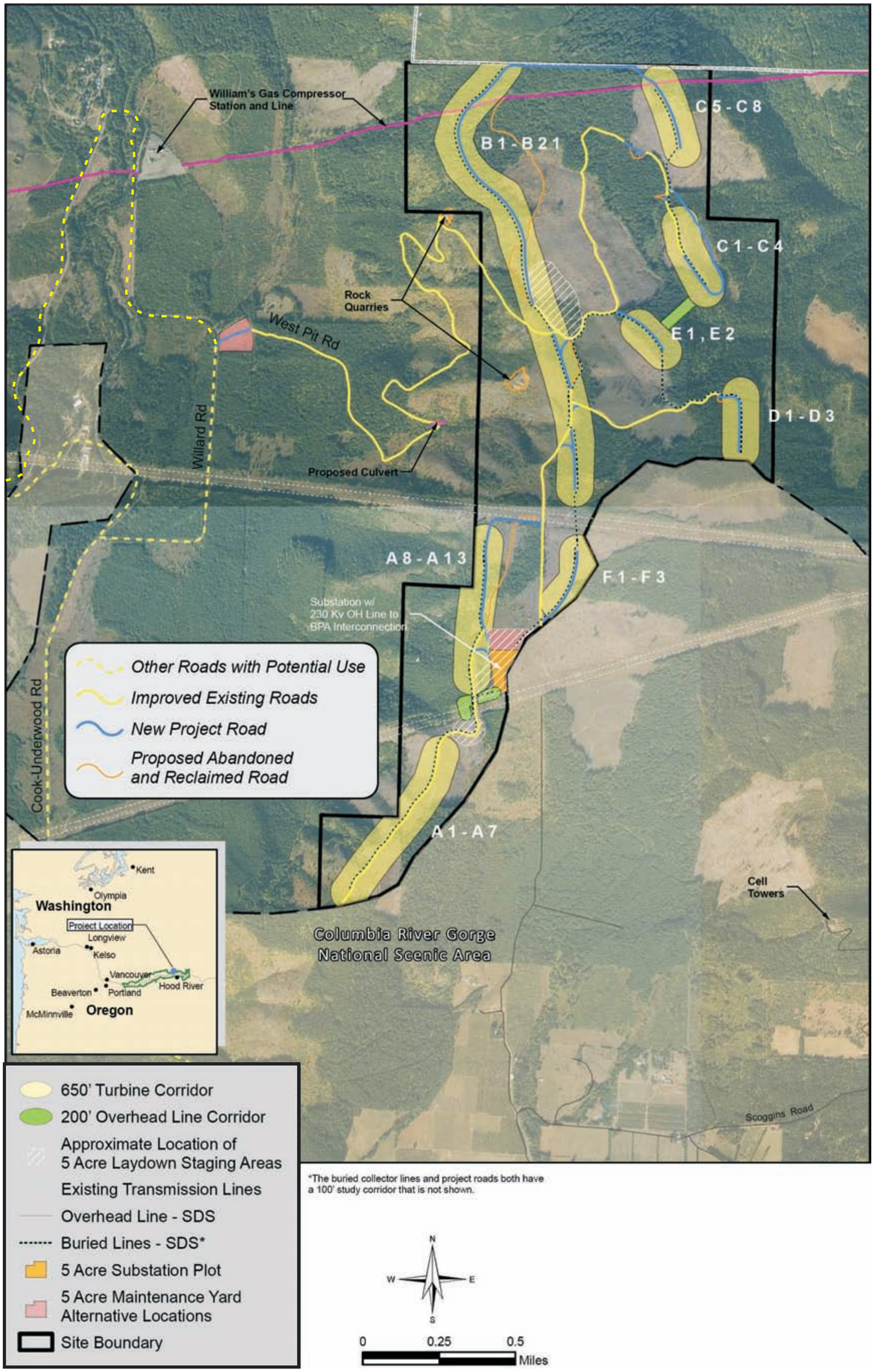
2.3.2 PROJECT OVERVIEW

The planned facility is shown on Figure 2.3-1, and would have:

- An installed capacity of up to 75 MW of electricity
- Up to fifty 1.2- to 2.5-MW wind turbines
- Electrical transformers
- 34.5 kilovolt (kV) collector lines and systems (primarily underground)
- Permanent meteorological towers
- Two alternative locations for an ~~An~~ Operations and Maintenance facility
- A substation located adjacent to BPA's existing North Bonneville to Midway 230-kV transmission line
- Approximately 2.4 miles of newly-constructed and ~~7.2~~7.9 miles of improved roads to provide access to the wind turbine locations during construction and for Operations and Maintenance

The project substation would be built on the project site adjacent to BPA's North Bonneville to Midway 230-kV transmission line, facilitating interconnection with the BPA grid. The proposed electrical interconnection to BPA would provide the access to the regional transmission grid for sales to the wholesale electric market. The development of the proposed interconnection requires a federal action, limited exclusively to the interconnection with the BPA grid.

33758687_17.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 2.3-1

Proposed Project Elements

URS

Whistling Ridge Energy Project
Skamania County, Washington

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. See Section 2.12, Construction and Operation Activities for more information.

The Whistling Ridge Energy Project is expected to function for at least 30 years.

2.3.3 PROJECT COMPONENTS

2.3.3.1 Wind Turbines

The project would consist of up to 50 wind turbines. Because of the heightened activity in the wind energy industry, pricing and availability of turbines are highly variable. Consequently, the specific turbine type and manufacturer has not been selected. However, it is likely that the turbines would be in the 1.2- to 2.5-MW range, and the range of key parameters (such as turbine height and diameter) can be anticipated, even if the turbine manufacturer is not yet known.

Each turbine would be up to approximately 426 feet tall (262-foot hub height and 164-foot radius blades, measured from the ground to the turbine blade tip), and would be mounted on a concrete foundation. 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 centrally located on the project site.

Wind turbines consist of four main aboveground components: the turbine tower (described below), the nacelle, the rotor hub, and the blades. The nacelle 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.

The wind turbines would operate at wind speeds from 9 to 56 miles per hour (mph), with a rotor speed range of 10 to 20 revolutions per minute (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.

2.3.3.2 Turbine Towers

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. 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 FAA.

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.

2.3.3.3 Electrical System

The project's electrical system would consist of two key elements: (1) a collector system, which would collect energy generated at approximately 575 volts from each wind turbine, transform the voltage to 34.5 kV using a pad-mounted transformer, and deliver the energy via underground cables to (2) the project substation, which would further transform the energy delivered by the underground collector system from 34.5 kV to 230 kV and deliver it to the adjacent BPA transmission line and into the regional transmission system.

2.3.3.4 Collector System

Each turbine's 575V/34.5kV transformer adjacent to each tower would be located on a transformer pad, or enclosed in the nacelle, depending on the turbine model. If required, the transformer pad would be approximately 9 feet by 9 feet square and 12 inches thick, constructed approximately 5 feet away from the tower pad. From there, power would be transmitted via underground 34.5-kV electric cables, buried directly in the soil approximately 3 to 4 feet bgs, in a trench up to 5 feet wide. In areas where collector cables from several strings of turbines follow the same alignment (for example, near the substation), multiple sets of cables would be installed within each trench where possible. A disturbed area approximately 30 feet in width is anticipated; however, impacts would be temporary, and the areas outside of roadways would be revegetated after the cable installation is completed. 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.

2.3.3.5 Substation

The substation site would occupy a portion of a fenced 5-acre area at the southwest end of the project site, immediately adjacent to the BPA 230-kV transmission line. A 50-foot cleared area would be maintained around substation. The substation site would be a graveled, fenced area with transformer and switching equipment and an area to park utility vehicles. Transformers would be non-polychlorinated biphenyl oil-filled types.

2.3.3.6 Operations and Maintenance Facility

A permanent Operations and Maintenance facility would be constructed on an approximately 25-acre area located at one of the following two alternative locations: (1) adjacent to the substation; or (2) to the west of the project site along West Pit Road. It would have approximately 3,000 square feet of enclosed space, including office and workshop areas, a kitchen, bathroom, shower, and utility sink. It 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. Water use would be less than 5,000 gallons per day. The bathroom and kitchen would drain into an on-site septic system. A graveled parking area for employees, visitors, and equipment would be located adjacent to the building. The entire area would be fenced and have a locked gate.

2.3.3.7 Access Roads

Access to the project site is provided by county and private logging roads that extend north from State Highway 14. From Highway 14, access would be provided via County roads (Cook-Underwood Road to Kollack-KnappWillard Road onto Scoggins 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 2.3-1, Proposed Project Elements). 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.

Because the project site already has a network of logging roads, relatively few new roads would have to be constructed. Approximately 7.27.9 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. Approximately 2.12.5 miles of roadway improvements would occur on West Pit Road, a gravel dirt road covered in light pit run, that connects the project site via Willard Road to the Cook-Underwood Road. West Pit Road is located entireltty outside oftraversing the Columbia River Gorge National Scenic Area. West Pit Road currently varies in width between 20 and 26 feet. To create a drivable surface of 25 feet with 5 feet of of clearing on each side, some widening would be required for the roadway, the existing culvert and some corners. Some of these construction roadsWest Pit Road would continue to be used during the project's operational phase.

Existing logging roads were originally built to enable 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 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 turbine and tower sections require a ~~40~~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 a central staging area 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, 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 (that would be determined only after final pole locations have been selected). These temporary access roads would be regraded 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.

2.3.4 TRANSMISSION INTERCONNECTION

Power generation resources typically require interconnection with a high-voltage electrical transmission system for delivery to purchasing retail utilities. BPA owns and operates the FCRTS, which includes more than three-fourths of the high-voltage transmission grid in the Pacific Northwest and includes extra-regional transmission facilities. BPA operates the FCRTS, in part, to integrate and transmit "electric power from existing or additional Federal or non-Federal generating units" (16 United States Code [USC] 838b). Interconnection with the FCRTS is essential to deliver power from many generation facilities to loads both within and outside the Pacific Northwest.

In summary, electrical consumers served by the Northwest Power Pool and in other western states need increased power production to serve increasing demand, and high-voltage transmission services to deliver that power. The project proponent has requested to integrate power from the Whistling Ridge Energy Project into the FCRTS that exists within the project area.

2.3.5 CONSTRUCTION

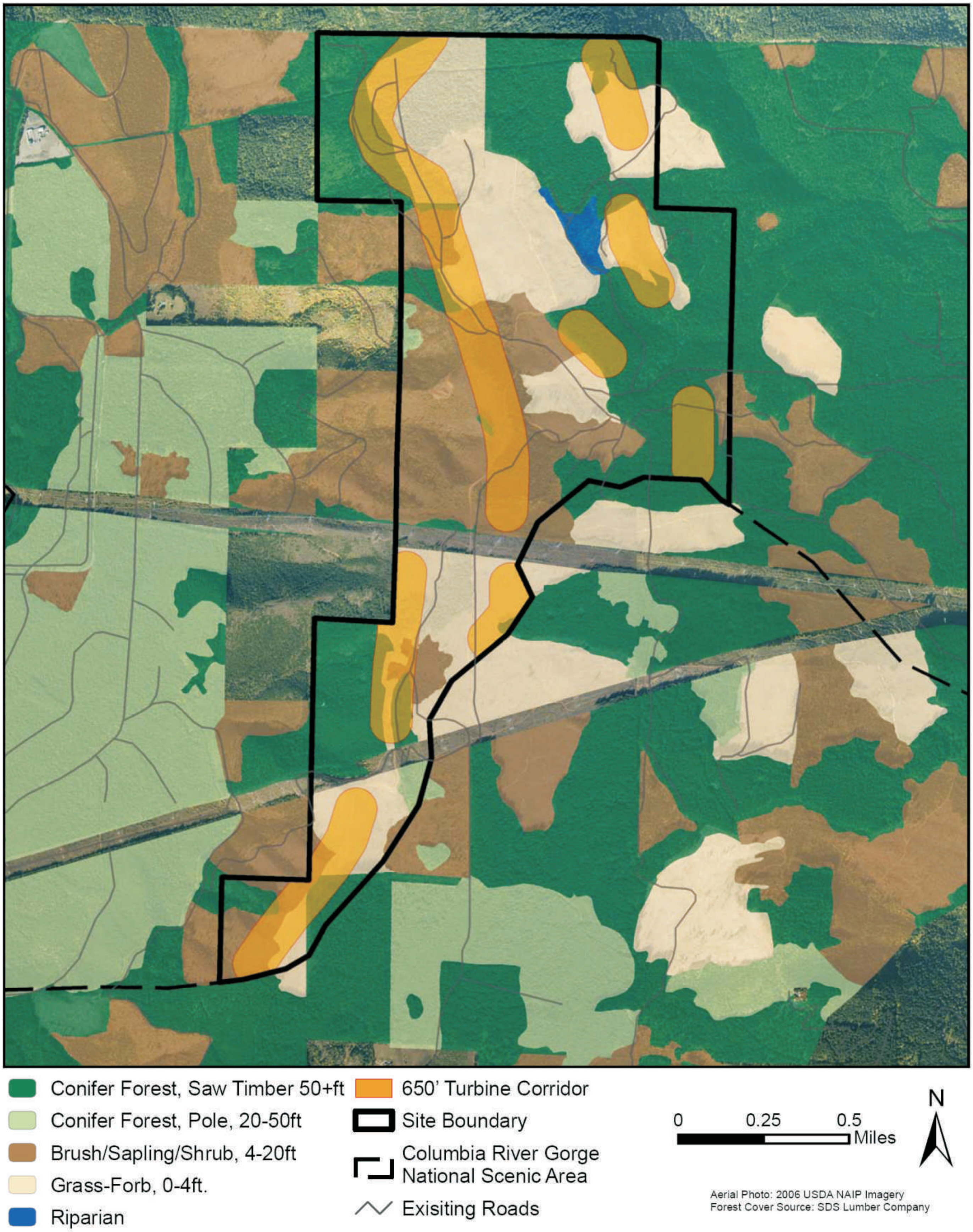
Construction is expected to take approximately one year, and would likely occur from early spring through late fall. Construction of the project would involve the following tasks:

- 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 substation
- Constructing interconnections between the substation and the existing BPA transmission line
- 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

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 Lumber Company staff, trees in the project area grow about 2 foot per year on average). Figure 2.3-2, Forest Management, shows the current forest types in the project area.

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 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.

33758687_98.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 2.3-2

Current Forest Types

URS

Whistling Ridge Energy Project
Skamania County, Washington

2.3.6 FOREST HARVEST

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 implemented timber harvest plans on portions recently. Harvests have occurred in the project area over time, pursuant to long-established harvesting schedules (Figure 2.3-3, Harvesting Schedule).

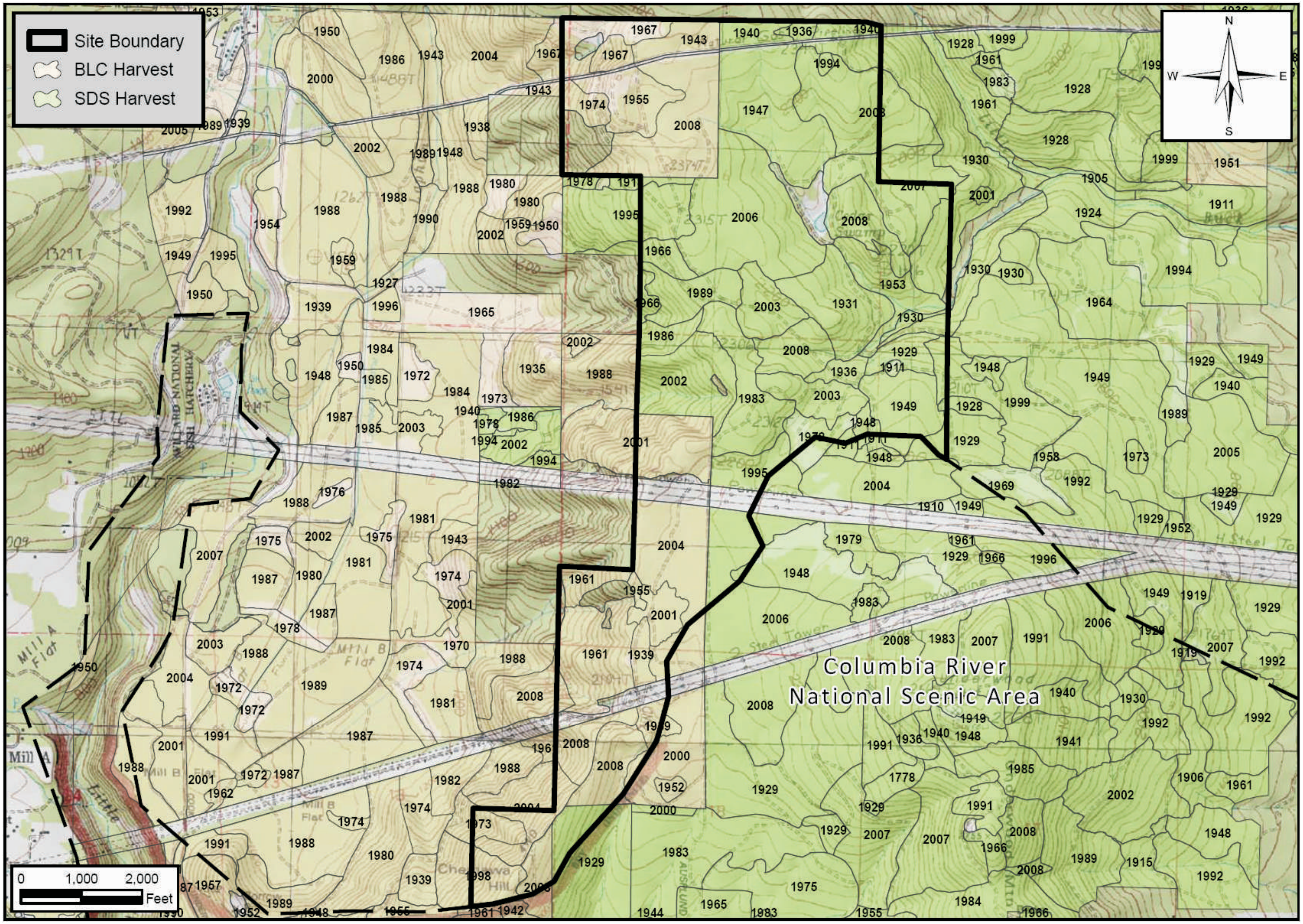
Harvests have typically occurred approximately every 50 years; however, the harvest periods vary depending on the market and the demand for the type of timber. As a result, some harvests have occurred as frequently as 40 years, and some have been up to 65 to 70 years. Additional harvests are planned, 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, 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 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 2.3-4, Turbine Timber Buffer)

In addition to the clearing around 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 (WFPA) 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.

33758687_104.cdr



Source: SDS Lumber

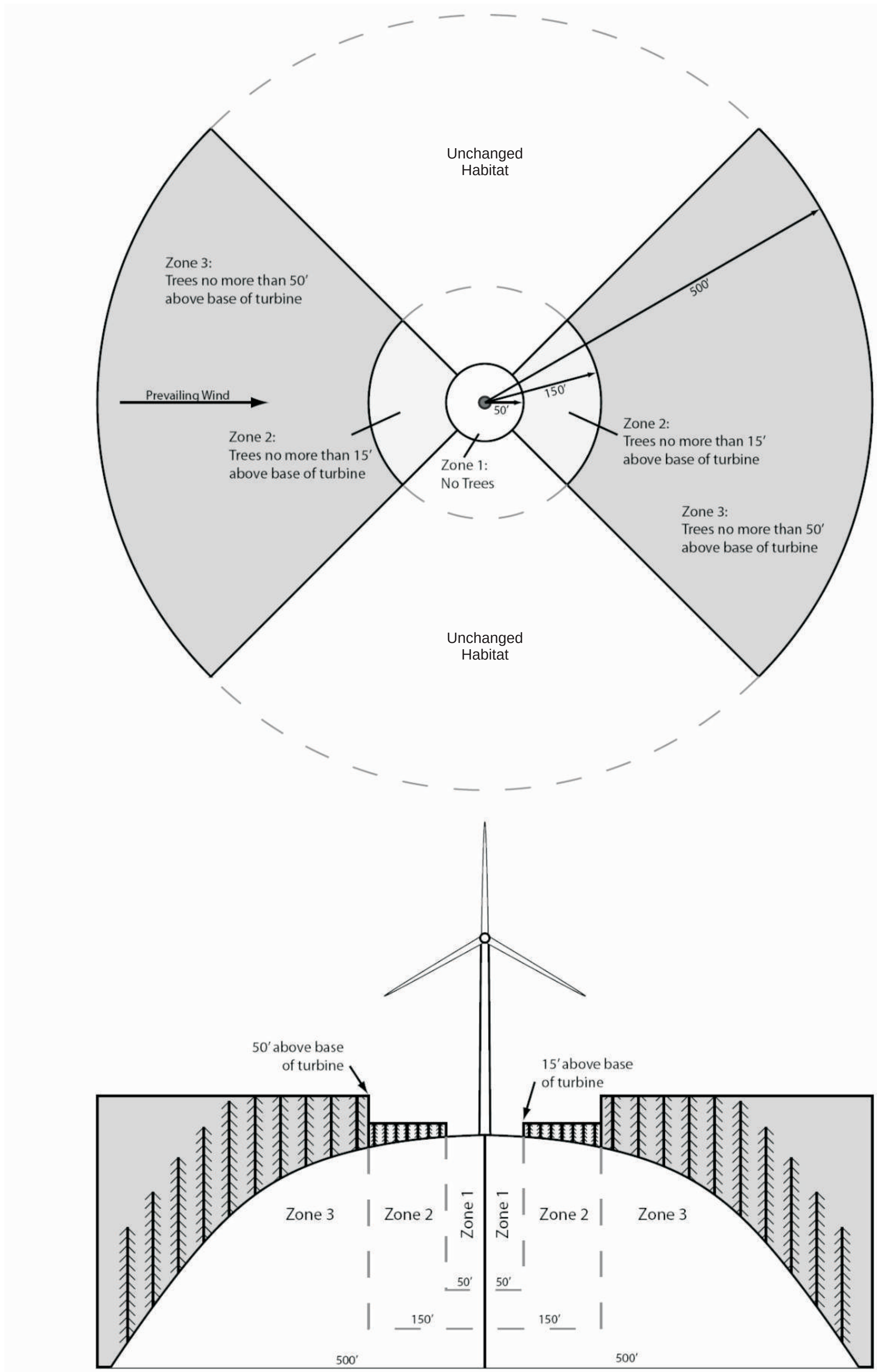
Job No. 33758687

Figure 2.3-3

Harvesting Schedule

URS

Whistling Ridge Energy Project
Skamania County, Washington



Source: GeoDataScape.

Job No. 33758687

Figure 2.3-4

Turbine Timber Buffer

URS

Whistling Ridge Energy Project
Skamania County, Washington

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 Lumber Company facilities in Bingen, Washington. Except for areas to be maintained and permanently cleared for the construction of permanent improvements and ongoing maintenance and operation 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 (note: tree planting is done in the spring of each year).

2.3.7 DECOMMISSIONING

For financial evaluation and contractual purposes, the Whistling Ridge Energy Project is expected to have a useful life of at least 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 is likely that the project would be upgraded with more efficient equipment, and therefore 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 three to four feet 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 regrading, adding topsoil, and replanting of 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.

2.3.8 CAPITAL AND OPERATING COSTS

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

Whistling Ridge Energy LLC estimates that the annual operating and maintenance costs would be approximately $3.75 million, including the following:

- Wages and salaries of operation, maintenance, and administrative personnel
- Procurement of goods and services
- Insurance
- Sales and other state and local taxes

SECTION 2.4 ENERGY TRANSMISSION SYSTEMS (WAC 463-60-155)

The project's electrical system would consist of two key elements: (1) a collector system, which would collect energy generated at 575 volts from each wind turbine, transform the voltage to 34.5 kV using a pad-mounted transformer, and deliver the energy via underground cables to (2) the project substation, which would further transform the energy delivered by the underground collector system from 34.5 kV to 230 kV and deliver it, via new interconnection facilities to be built by BPA, to the adjacent existing BPA transmission line and into the regional transmission system. The BPA transmission lines are outside the scope of this application. Please see Section 2.3.3.4 for a more detailed description of the collector system.

No transmission facilities would be constructed by Whistling Ridge Energy LLC.

SECTION 2.5 WATER SUPPLY SYSTEM
(WAC 463-60-165)

2.5.1 WATER INTAKE AND CONVEYANCE FACILITIES

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 facilities. There would be no industrial wastewater stream from the project. Wastewater discharge would come from the Operations and Maintenance building discharging to an on-site septic system. The anticipated use is expected to be less then 5,000 gallons per day for kitchen and bathroom use. Potable water intake would be in the form of a well accommodating the Operations and Maintenance facilities' needs. Whistling Ridge Energy LLC would seek and obtain approval for the new well from EFSEC, in consultation with Skamania County Environmental Health Department and the Washington State Department of Ecology (Ecology). No wastewater would be used, discharged or recycled for wind turbine operations.

2.5.2 WATER SUPPLY AND USAGE ALTERNATIVES

2.5.2.1 Water Supply Alternatives

Due to the low volume of water that would be required for operational use (approximately 5,000 gallons/day), Whistling Ridge Energy LLC did not consider alternatives to reclaim water or other water reuse projects.

2.5.2.2 Water Conservation Methods

The project would not generate process water or any point source discharge to surface waters or ground waters beyond the Operations and Maintenance facilities. The potable water well and septic system provide bathroom and shower facilities to the maintenance personnel. Additional water for daily operational use is minimal and would not result in a long-term increase on current demands. Where appropriate, water use for Operations and Maintenance, and daily operational needs would be minimized.

2.5.3 WATER RIGHTS AND AUTHORIZATIONS

Whistling Ridge Energy LLC is not requesting any new water rights or authorizations beyond the well for the Operations and Maintenance building described above. Operational daily water needs would be acquired from the well, and water needs related to construction would be purchased by the contractor from an off-site vendor with a valid water right and transported to the site in water-tanker trucks. This would be a short-term construction related impact on water use.

2.5.4 PROCESS WATER

No process water would be required for the project beyond daily water needs for the Operations and Maintenance building.

2.5.5 POTABLE WATER

Potable water would be supplied by the well that would be drilled for the Operations and Maintenance facilities.

2.5.6 MITIGATION MEASURES

Mitigation measures and best management practices (BMPs) have been incorporated in the project design features. These measures include avoidance of stream crossings to the maximum extent feasible; complying with federal, state, and local ordinances; and implementing a Stormwater Pollution Prevention Plan (SWPPP) and BMPs during and after construction.

SECTION 2.6 SYSTEM OF HEAT DISSIPATION (WAC 463-60-175)

Pursuant to WAC 463-60-115, Whistling Ridge Energy LLC requests a waiver of the information required by WAC 463-60-175, which calls for a description of the heat dissipation systems.

The heat dissipation from a wind turbine is minimal. Air cooling would be used to cool the operating machinery, such as the generator and gearbox inside the wind turbines, and no water resources would be used.

SECTION 2.7 CHARACTERISTICS OF AQUATIC DISCHARGE SYSTEMS (WAC 463-60-185)

Pursuant to WAC 463-60-115, Whistling Ridge Energy LLC requests a waiver of the information required by WAC 463-60-185, which calls for a description of the discharge to a watercourse. The project would use wind as its source of energy production only. There would be no discharge to a watercourse.

The water use of the proposed facility would be from a small well at the Operations and Maintenance building. This well would provide water for bathroom and kitchen use, as well as for some minor normal maintenance use, and would be expected to consume less then 5,000 gallons per day. Wastewater from the Operations and Maintenance facility would be discharged to a septic tank permitted and installed according to Skamania County Community Development Department standards.

SECTION 2.8 WASTEWATER TREATMENT
(WAC 463-60-195)

Pursuant to WAC 463-60-115, Whistling Ridge Energy LLC requests a waiver of the information required by WAC 463-60-195, which calls for a description of wastewater treatment. The project would use wind as its source of energy production only and no water or wastewater would be used or discharged in that process. There would be no wastewater treatment or discharge to a watercourse.

The water use and disposal of the proposed facility would be from a small well at the Operations and Maintenance building. This well would provide water for bathroom and kitchen use, as well as for some minor normal maintenance use, and would be expected to consume less then 5,000 gallons per day. Wastewater from the Operations and Maintenance facility would be discharged to a septic tank permitted and installed according to Skamania County Community Development Department standards.

SECTION 2.9 SPILLAGE PREVENTION AND CONTROL (WAC 463-60-205)

2.9.1 PURPOSE AND SCOPE

This section establishes requirements for a construction spill prevention, control, and countermeasure plan (SPCCP) for activities at the Whistling Ridge Energy Project, as required by the State of Washington Site Certification Agreement, and by state and federal requirements. A revised procedure would be issued as the project moves to operation, or if new requirements or organizational changes require revision. The procedure would be reviewed annually at a minimum, and updates made as needed.

2.9.2 SPILL PREVENTION PLAN

Responsibilities would be established for the construction period, in which the construction contractors would have primary responsibility for overseeing compliance with state and federal environmental regulations and compliance with environmental commitments made to EFSEC. Construction contractor personnel would oversee field activities; coordinate resolution of deviations from BMPs, commitments and regulations; and identify any process changes that could require revision to the environmental procedures.

Whistling Ridge Energy LLC shall have the overall responsibility to ensure compliance with state and federal environmental regulations and compliance with environmental commitments made to EFSEC.

2.9.2.1 Construction Spill Prevention

Fuel and lubricating oils from construction vehicles and equipment and the mineral oil used to fill the transformers are the only potential sources for a spill prevention control program during construction activities. The contractor would be responsible for training its personnel in spill prevention and control and, if an incident occurs, would be responsible for containment and cleanup.

During construction, the contractor would utilize fuel trucks for refueling of construction vehicles and equipment at existing licensed gas stations in nearby communities. There would be no fuel storage tanks used at the project site; instead, fuel trucks would refuel vehicles and equipment. The fuel trucks would be properly licensed.

The project would have up to 50 pad-mounted transformers (one at the base of each wind turbine) which arrive on site pre-filled with mineral oil. As part of the commissioning process of the main substation transformers, they would be filled and tested. The fuel and oil trucks would incorporate features in equipment and operation, such as automatic shut-off devices, to prevent accidental spills. Lubricating oils used during construction would mostly be contained in the vehicles and equipment for which they are used.

A Construction SPCCP would be submitted and approved by EFSEC prior to construction.

2.9.2.2 Operations Spill Prevention

Project operations would not require the use of a permanent fuel storage tank, as fuel use during operations is limited to maintenance vehicle fueling, which would be done at existing licensed gas stations in nearby communities (White Salmon and Hood River). The potential for accidental spills during operation is minimal, as the only materials used during project operations that present any potential for accidental spills are lubricating oils and hydraulic fluids used in the wind turbine generators and transformers.

Table 2.9-1 lists the fluids contained on site, including fluids for the turbines.

Table 2.9-1
Oils, Fuels and Hazardous Materials Anticipated to be Stored at the Whistling Ridge Energy Project Site

Oil (e.g., transformer, lubricating)
Solvents and thinners
Paints
Coatings and sealants
Corrosion inhibitors
Pesticides (herbicides, rodenticides, insecticides, etc.)
Batteries

It is anticipated that an Operation SPCCP would be submitted and approved by EFSEC prior to operation.

Wind Turbine Generator Fluids

Each turbine model has different specification for lubricating oil and hydraulic fluid quantities. There are three main types of fluid in a wind turbine generator: cooling fluid for the generator (a mix of glycol and water, similar to that used in automobile radiators), lubricating oil for the gearbox (typically a synthetic lubricating oil), and hydraulic oil for operating the blade pitch system, yaw mechanism, and brakes.

All of the wind turbine generators being considered for the project are equipped with sensors to automatically detect loss in fluid pressure and/or increases in temperature that enable them to be shut down in case of a fluid leak, as well as fluid catch basins and containment systems to prevent any accidental released from leaving the nacelle. Based on the limited quantities of fluids contained in the wind turbine generators and the leak detection and containment systems engineered into their design, the potential for an accidental spill from wind turbine generator malfunction is extremely limited. Furthermore, any accidental gear oil or other fluid leaks from the wind turbines would be contained inside the turbine towers, which are sealed around the base.

The fluids within the turbines are checked by staff periodically and must be replenished or replaced on an infrequent basis (generally less than once per year and sometimes only once every five years). When replacing these fluids, the typical current practice is for staff to climb up to the nacelle and remove the fluids in small (typically five-gallon) containers and lower them to the ground using a small maintenance crane built into the nacelle itself. The containers would then be transferred to a pickup truck for transport to the Operations and Maintenance facility for temporary storage (typically less than one month) before being picked up by a licensed transporter for recycling. Replacement fluids are added in the same method, only in reverse. Small quantities of replacement fluids, typically no more than a few 50-gallon drums, of lubricating oil and hydraulic oil may be stored at the Operations and Maintenance facility for replenishing and replacing spent fluids. These fluids would be stored in appropriate containers. All operations staff would be trained in appropriate handling and spill prevention techniques to avoid any accidental spills. Because only small quantities of fluids are transported, added, or removed at any one time and are stored for short periods of time, the potential for an accidental spill during routine maintenance is extremely limited.

Transformer Mineral Oil Coolant

Pad Mounted Transformers. As described in Section 2.3, Construction on Site, each wind turbine generator has a pad mounted transformer located at its base. These transformers contain mineral oil which acts as a coolant. Each pad mounted transformer contains up to 500 gallons of mineral oil. The transformer is designed to meet stringent electrical industry standards, including containment tank weldment and corrosion protection specifications.

Substation Transformer(s). As described in Section 2.4, Energy Transmission Systems, the entire project would be electrically connected to the grid at the BPA substation, which would be equipped with either one or two transformers. Each substation transformer contains up to 12,000 gallons of mineral oil for cooling. The transformer is designed to meet stringent electrical industry standards, including containment tank weldment and corrosion protection specifications. The substation transformers are equipped with an oil level sensor that detects any sudden drop in the oil levels, and sends an alarm message to the central supervisory control and data acquisition (SCADA) system. Finally, the substation transformers are supported by a concrete vault to ensure that any accidental fluid leak does not result in any discharge to the environment.

2.9.2.3 Spill Procedures

Procedures for what to do in the event of a spill shall be developed. These would include actions needed to contain the material in accordance with training received:

- Absorbent booms would be placed around the area of a spill if it is believed that the spill could travel outside immediate area. For spills to the ground, if appropriate for the material spilled, turn soil and use absorbent materials to collect additional spilled material. Contaminated absorbent materials shall be collected and disposed of in accordance with the SPCCP.

- If the spill is large enough to require a cleanup company’s assistance, or cleanup requires training beyond level provided to site personnel, a contractor for cleanup services would be hired to perform the work at the responsible party’s expense.

- Spills would be reported as required by the SPCCP

- All spills would be reported to EFSEC and Ecology using the guidance provided in the SPCCP.

2.9.2.4 Record Retention

All records pertaining to SPCCP shall be retained on site for a minimum of five years.

SECTION 2.10 SURFACE WATER RUNOFF
(WAC 463-60-215)

Surface water runoff without regulated controls can cause the erosion of topsoil, increase sediment load of surface water bodies, and increase the temperature and deteriorate the water quality of receiving creeks. These impacts are mitigated by the requirements of stormwater control programs.

The discharge of stormwater runoff from the Whistling Ridge Energy Project would be regulated by EFSEC based on Ecology's stormwater pollution control program. This program is based on federal regulations adopted to implement Section 402(p) of the Federal Clean Water Act and Chapter 90.48 RCW, the state of Washington's Water Pollution Control Act. The goal of the stormwater program is to reduce or eliminate stormwater pollution from municipal and industrial point sources, by requiring the implementation of a technology-based SWPPP and to eliminate violations of surface water quality standards caused by stormwater.

Whistling Ridge Energy LLC may be required by EFSEC to obtain coverage under the Construction Stormwater General Permit because it would disturb more than one acre of land. Unless if is instructed by EFSEC that it is not necessary to do so, Whistling Ridge Energy LLC would file a notice of intent (NOI) to obtain coverage under the Construction Stormwater General Permit and the Industrial Stormwater General Permit. Even if coverage under this general permit is not required, the Applicant proposes to design and implement the same BMPs to prevent and minimize the discharge of pollutants in its stormwater runoff, and to prepare SWPPPs for the construction and operation of the Whistling Ridge Energy Project in substantially the same form and content.

The final design would conform to the applicable Ecology Stormwater Management Manual in effect at the time or as instructed by EFSEC.

The NOI for construction activities would be filed with EFSEC prior to the start of construction. A SWPPP meeting the conditions of the Stormwater General Permit for Construction Activities also must be prepared and implemented prior to the start of construction activities. The content of the SWPPP for construction activities is addressed in Section 2.10.1.

The NOI for Industrial Activities would be filed with EFSEC if required.

2.10.1 STORMWATER EROSION CONTROL DURING CONSTRUCTION

This section cites specific procedures and requirements that would be implemented at the construction site to reduce the discharge of contaminated stormwater runoff. It includes information on the erosion control practices to be followed during construction at the site (Section 2.10.1.1). Site-specific erosion control plans would be submitted to EFSEC prior to construction.

The main categories of information to be included in the SWPPP are construction BMPs, operating BMPs, construction phase enforcement, and establishment of the Whistling Ridge Energy Project stormwater pollution prevention team.

The SWPPP is most appropriately prepared when design-level topographic surveying and mapping is available, and the final configuration of proposed improvements is overlain on the existing topographic map. The civil site design engineer would establish the locations and types of construction BMPs to be required of the construction contractor, and would include these on an overall map of the site. A narrative section of the SWPPP would describe the intended installation sequence and function of the selected BMPs, and present the sizing calculations. The report also would identify the selected minimum standard to which each of the BMPs are to be constructed or installed. When prepared at this level of detail, the document would meet the requirements of the Stormwater Construction Activity NPDES permit system, and also accurately describe, to the construction contractor, the improvements and actions to be required during construction. The document would be submitted to EFSEC for approval prior to construction. Implementation of the construction BMPs is carried out by the site work contractor, with oversight by environmental monitors.

2.10.1.1 Site Construction

During construction, all new and improved roads would have a 20-foot-wide buffer on one side of the roadway, the maintenance yard and substation plot would have a 50-foot perimeter buffer, turbines would have 300-foot circular buffers, overhead transmission lines would have 50-foot-wide buffers, and underground transmission lines would have 15-foot-wide buffers. Trenches up to 3 feet wide and 3 to 4 feet deep would be dug along access roads for the underground electric cables, with an anticipated 30-foot-wide disturbance area during construction. Trenching would occur simultaneously with roadway construction and improvements to minimize impacts.

Site-specific BMPs for temporary erosion and sedimentation control during construction would be identified on the construction plans submitted to EFSEC, to mitigate impacts associated with construction activities. BMPs would be selected from the applicable Stormwater Management Manual as appropriate for the site slopes, the construction activities, and weather conditions.

The sequence and methods of construction activities would be controlled to limit erosion. Clearing, excavation, and grading would be limited to the minimum areas necessary for construction of the project, and would not be performed far in advance of facility construction. Slopes would be graded to no steeper than 3 feet horizontal (H) to 1 foot vertical (V). Ground surface restoration shall be completed within fourteen days of the area’s final disturbance. Interim surface protection measures, such as erosion control blankets or straw matting, also may be required prior to final disturbance and restoration if warranted by the potential for erosion.

Sediment control measures used during construction would be based on a 10-year design storm. Water quality measures (other than sediment removal) would be based on the 6-month, 24-hour design storm.

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

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

- Timing grading operations to dry seasons
- Directing surface runoff away from denuded areas
- Keeping runoff velocities low through minimization of slope steepness and length
- Providing and maintaining stabilized construction entrances

In order to prevent erosion and control sediment migration, the following BMPs could be used.

Sediment Traps

Sediment traps are temporary or permanent basins used to intercept stormwater runoff and allow sediment to settle, thereby minimizing the amount of sediment flowing off site. Sizing criteria for the traps include inflow and sediment load. Sediment traps would be sized for the specific disturbed area, for bare soil conditions, and typically for 75 percent sediment removal efficiency.

Silt Fences

Slopes less than 3H:1V would be protected with silt fencing as appropriate. Silt fences would be installed in locations where they would trap silt eroded from slopes during construction and prior to reestablishing vegetation. The maximum flow path to each silt fence would be approximately 100 feet. No concentrated flows greater than 1 cubic foot per second would be directed toward any fence for the 25-year storm. Silt fences would be maintained throughout the construction period, and beyond until disturbed surfaces have been stabilized with vegetation. Silt fence construction specifications including fabric equivalent open size, support spacing, and total length would be determined by local construction conditions during final design of the facilities.

Grade Control Structures and Slope Ditches

Grade control structures such as rock check dams, hay bale check dams, dikes, and swales would be used where appropriate to reduce runoff velocity, as well as to direct surface runoff around and away from cut-and-fill slopes. Swales and dikes also would be used to direct surface water on top of the filled pad toward sediment traps and away from flowing over the bank, which may contribute to sheet and rill erosion.

Matting and Erosion Control Blankets

Depending on weather conditions during the construction period, straw or jute matting or other suitable erosion control blankets would be used on any disturbed slopes to prevent erosion and control sediment migration.

Quarry Spall Construction Entrances

Quarry spall construction entrances would be used to reduce migration of construction dirt to public roads. Placing the construction entrances is one of the first activities required at the site, but the rock bed also must be periodically replenished as it becomes dirty or migrates into the subgrade. All construction traffic would be directed to use the construction entrances.

Chemical Source Control

In addition to erosion and sedimentation control on the site, it is also important to reduce potential for chemical pollution of surface waters during construction. Since source control is the most effective method of preventing chemical water pollution, careful control must be exercised over potentially polluting chemicals used on site during construction. The EPC Contractor with oversight from Whistling Ridge Energy LLC would be responsible for planning, implementing, and maintaining BMPs for:

- Neat and orderly storage of construction chemicals and spent containers in lined, bermed areas
- Prompt cleanup of construction phase spills
- Regular disposal of construction garbage and debris

The SWPPP would identify all areas of potential chemical storage during construction, and provide appropriate control measures.

2.10.2 PERMANENT STORMWATER MANAGEMENT

Vegetation in the project area consists of Grass-forb Stand, Brushfield/Shrub Stand, Conifer-Hardwood Forest, Conifer Forest, and Riparian – Deciduous. The current vegetation conditions are heavily influenced by the commercial forest production activities that occur in the area. The total site area is approximately 1,152 acres; however, stormwater impacts from disturbed areas would be generated from less than 110 acres. Approximately 7.2 miles of gravel roads would be improved, and approximately 2.4 miles of gravel roads would be constructed. During operation, all roads would be maintained to a width of approximately 25 feet, with a 5-foot shoulder on each side, with the exception of roadways adjacent to turbine strings, which would be 40 feet wide with a 25-foot graveled corridor and 5-foot shoulder on each side. The maintenance yard would cover approximately 2 acres, which would include an approximately 3,000-square-foot Operations and Maintenance building and an adjacent gravel parking area for employees, visitors, and equipment. Other additions to the site include a 5-acre gravel substation site, a collector system transformer on a

9'x9' concrete pad, and concrete pads for the approximately 50 wind turbines. These permanently improved areas would cover approximately 55 acres (less than 5% of the total project area).

Permanent stormwater management requires construction of appropriate stormwater hydraulic and treatment facilities, routine maintenance thereof, and prevention of chemical pollution through source control. Whistling Ridge Energy LLC would be responsible for developing, implementing, maintaining, and modifying the SWPPP.

As described above, improvements to the site would cover only a small portion of the project area (less than 5%), most of which would be graveled surfaces. Completely impervious surfaces would be limited to the concrete pads for the turbines and the Operations and Maintenance building, totaling less than one acre. The majority of the improved area is composed of roads or parking surface, which are likely to be compacted over time due to vehicular traffic, causing a decrease in the infiltration capability of those areas. However, some infiltration in those areas is still expected, and they are not classified as impervious. Due to the relatively small areas of impact, site surface water runoff is expected to increase only slightly due to these activities, and considered to be negligible. Vegetated ditches would be installed along roads to provide for hydraulic and treatment facilities. Stormwater would be conveyed via these vegetated roadside ditches and pass through culverts prior to discharging to the natural drainage ways on site. Inlets and outlets of culverts would be stabilized to prevent scour.

Due to the steep nature of the site, some of the improved and constructed roadways would be relatively steep. After construction, until the site has been stabilized, these areas would be most susceptible to erosion and sediment migration. Steep slopes with exposed soil would be seeded with a native mix and protected with mulch or something equivalent until the vegetation is established. Vegetation of disturbed areas and roadside ditches, as well as stabilization of inlets and outlets to culverts, would be the primary permanent stormwater management control measures.

The SWPPP would contain pre-design level of detail for these permanent stormwater BMPs, and would establish the permanent operations stormwater pollution prevention team from appropriate employee categories. Final designs for the permanent BMPs would be incorporated into the final construction plans and specifications prepared by the civil site design engineer. An operations manual for the permanent BMPs would be prepared by the civil site design engineer, if necessary, and the stormwater pollution prevention team members.

The constructed permanent stormwater BMPs would include:

- Vegetated drainage ditches
- Culverts with stabilized inlets and outlets
- Permanent erosion and sedimentation control through site landscaping, grass, and other vegetative cover

Due to the small area of impervious surface in the project area, no detention storage is required.

Runoff treatment BMPs facilities would be designed to conform to the applicable Stormwater Management Manual.

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

Examples of good operational housekeeping practices that would be employed at the Whistling Ridge Energy Project site include:

- Neat and orderly storage of chemicals under cover in the Operations and Maintenance facilities
- Prompt cleanup and removal of spillage
- Regular pickup and disposal of garbage and rubbish
- Prevention of accumulations of liquid or solid chemicals on the ground or the floor

At least annually, facility operators would receive spill response training and training in the applicable pollution control laws and regulations. Additional support staff would be trained in the following spill response procedures:

- Recognizing areas that may be affected by a spill and potential drainage routes
- Reporting spills to appropriate individuals
- Employing appropriate material handling and storage procedures
- Implementing spill response procedures

Whistling Ridge Energy Project site operators must periodically review the SWPPP against actual practice. They must confirm that the controls identified in the plan are adequate, and that employees are following them. They must further test and confirm that non-permitted discharges to the stormwater system are not occurring. A summary of these in-house compliance inspections shall be kept with the SWPPP, along with any notifications of non-compliance and reports on incidents such as spills. If the SWPPP has been followed but still proves inadequate to prevent stormwater pollution, Whistling Ridge Energy LLC would amend the SWPPP and seek EFSEC concurrence with the improvements.

2.10.3 PERMANENT WATERWAYS

No perennial streams are located in or adjacent to the Whistling Ridge Energy Project. Five intermittent drainage ways have been identified on site, ultimately draining to the east of the project site. Runoff is conveyed via these drainage ways, and additional ditches in the southwest portion of the site downslope to perennial streams outside the project site that eventually drain to the Columbia River. Additional details regarding water sources and pathways are identified in Sections 3.3, Water and Section 3.5, Wetlands.

SECTION 2.11 EMISSION CONTROL
(WAC 463-60-225)

2.11.1 INTRODUCTION

Pursuant to WAC 463-60-115, Whistling Ridge Energy LLC requests a waiver of the information required by WAC 463-60-225 for operation, which calls for a demonstration that the highest and best practicable treatment for control of emissions would be utilized. The air quality impacts from construction of the project would be temporary and minor, and would be limited to vehicle emissions and fugitive dust emissions. No air emissions would be generated from operation of the Whistling Ridge Energy Project, as the operation of wind turbine generators does not involve the combustion of any fuels. The project site is located outside of any air quality non-attainment areas, according to Ecology.

2.11.2 CONSTRUCTION

During construction of the project, the use and operation of construction equipment and vehicles would result in minor air emissions. The main sources of these emissions are expected to be:

- Earth-moving equipment for road construction and site preparation
- Excavating equipment for turbine foundation excavation
- Transport vehicles for delivery of construction materials and equipment
- Worker vehicles
- Small electric generators for on-site power during construction

Fugitive dust emissions would be caused by disturbing the land for construction of project facilities and construction traffic.

The primary types of air emissions are expected to be those typically associated with internal combustion engines, e.g., carbon dioxide, nitrogen oxides, sulfur oxides, carbon monoxide and particulate matter.

2.11.3 OPERATION

The generation of electricity using wind turbines does not produce air emissions. During project operation, small amounts of fugitive dust emissions would be caused by occasional maintenance vehicles traveling on the gravel access roads. However, the number of vehicle trips associated with ongoing Operations and Maintenance would be minor and it is unlikely that the resulting dust would reach nuisance levels or would be substantially different in quantity or type from dust caused by existing logging operations and related traffic.

Operation of the proposed project would not result in emissions that exceed that significant emission rates and would not contribute to violations of the National Ambient Air Quality Standards (NAAQS). Impacts to air quality from project operation would be insignificant.

2.11.4 MITIGATION

All construction and operations vehicles and equipment would comply with all applicable state and federal emissions standards. Measures to control dust during construction would include the use of a dust control agent such as magnesium chloride, or possibly wetting down roadbeds and controlling construction vehicle speeds. Use of a dust control agent would be the preferred method over the use of water as it would also minimize water truck traffic.

The certificate holder would instruct the contractors to minimize the idling of engines when not in active use to minimize emissions.

SECTION 2.12 CONSTRUCTION AND OPERATION ACTIVITIES (WAC 463-60-235)

Whistling Ridge Energy LLC would be responsible for the construction of the Whistling Ridge Energy Project.

2.12.1 INTRODUCTION

The construction of the Whistling Ridge Energy Project would be performed in several stages and would include the following main elements and activities:

- Grading the field construction office area (also used for Operations and Maintenance facilities)
- Constructing site roads, turn-around areas, and crane pads at each wind turbine location
- Constructing the turbine tower foundations and transformer pads
- Installing the electrical collection system – underground and some overhead lines
- Assembling and erecting the wind turbines
- Constructing and installing the substation
- Plant commissioning and energization

The Applicant intends to enter into two primary agreements for the construction of the project: (1) an agreement for the supply, erection and commissioning of the wind turbines, and (2) an Engineering, Procurement, and Construction (EPC) contract for the construction of the balance of the project, which includes all other project facilities and infrastructure such as the roads, electrical collection system, substation, Operations and Maintenance facility, etc. The turbine supplier and the EPC Contractor would be selected during the EFSEC Application review process.

The construction schedules discussed below are based on obtaining a site certificate from Washington EFSEC by ~~April 1,~~October 2010.

The construction schedule would closely follow the construction methodologies discussed in Section 2.14, Construction Methodology.

2.12.2 CONSTRUCTION SCHEDULE AND MILESTONES

Table 2.12-1 identifies the major schedule milestones, engineering and procurement, construction and start-up. Assuming the Governor's approval of the Site Certification agreement in ~~April~~ October 2010, Whistling Ridge Energy LLC anticipates beginning design and construction in ~~2010~~ 2011 and operation by ~~2011~~2012. The construction schedule would be revised according to the actual approval of the Site Certification Agreement, and a copy provided to EFSEC at least sixty (60) days prior to the start of construction.

Table 2.12-1
Proposed Project Construction Schedule

Task	Start	Finish	Approximate On-Site Manpower
Site Certification Agreement Approved	Target Date	~~4/1/2010~~10/1/2010	
Engineering/Design/Specifications/Surveys	~~2/1/2010~~8/1/2010	~~4/1/2010~~10/1/2010	15
Order/Fabricate Wind Turbines	~~4/1/2010~~10/1/2010	~~8/15/2010~~1/15/2011	0
Order/Fabricate Substation Transformer	~~4/1/2010~~10/1/2010	~~12/1/2010~~5/1/2011	0
Road Construction	4/1/~~2010~~2011	10/1/~~2010~~2011	50
Foundations Construction	6/1/~~2010~~2011	9/1/~~2010~~2011	50
Electrical Collection System Construction	6/1/~~2010~~2011	11/15/~~2010~~2011	50
Substation Construction	4/1/~~2010~~2011	11/15/~~2010~~2011	40
Wind Turbine Assembly and Erection	8/15/~~2010~~2011	2/15/~~2011~~2012	75
Plant Energization and Commissioning	11/15/~~2010~~2011	4/1/~~2011~~2012	25
Plant Substantial Completion	Target Date	4/1/~~2011~~2012	0
Construction Punchlist Clean-Up	2/15/~~2011~~2012	5/15/~~2011~~2012	25

2.12.3 CONSTRUCTION WORKFORCE

During the estimated one-year construction period, approximately 330 workers would be employed. The typical average workforce headcount and construction skills required for the construction of the project is shown in Table 2.12-2.

Table 2.12-2
Construction Staff Breakdown

Task	Project Management and Engineers	Field Technical Staff	Skilled Labor and Equipment Operators	Unskilled Labor	Total Approximate On-Site Manpower
Engineering/Design/Specifications/Surveys/ QAQC	5	10	0	0	15
Road Construction	5	5	30	10	50
Foundations Construction	5	5	25	15	50
Electrical Collection System Construction	2	2	31	15	50
Substation Construction	5	3	28	4	40
Wind Turbine Assembly and Erection	5	6	44	20	75
Plant Energization and Commissioning	3	5	17	0	25
Construction Punchlist Clean-Up	1	1	10	13	25
TOTAL	31	37	185	77	330

Table 2.12.3-3 presents the estimated total workforce resource loading, by month, for the construction of the project. At peak, it is expected that approximately 265 personnel would be on site at once as multiple disciplines of contractors complete their work simultaneously.

Table 2.12-3
Construction Labor Resource Loading

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**

See Section 4.4, Socioeconomic Impact for a discussion of where the construction labor force would likely be hired from.

2.12.4 OPERATION

When the project is operational, there would be eight to nine permanent full-time and/or part-time employees on the Operations and Maintenance staff. Table 2.12-4 provides a breakdown of labor categories.

Table 2.12-4
Operations and Maintenance Staff Breakdown

Staff Positions	Number of Operating Personnel
Plant Site Manager	1
Operations Manager	1
Operating Technicians	4 - 5
Administrative Manager	1
Administration Assistant	1
TOTAL FOR WHISTLING RIDGE ENERGY PROJECT	**8-9**

SECTION 2.13 CONSTRUCTION MANAGEMENT (WAC 463-60-245)

2.13.1 CONSTRUCTION MANAGEMENT ORGANIZATION

Whistling Ridge Energy LLC would enter into two primary agreements for the construction of the project: (1) agreement for the supply, erection and commissioning of the wind turbines, and (2) an EPC contract for the construction of the balance of the project, which includes all other Project facilities and infrastructure such as the roads, electrical collection system, substation, Operations and Maintenance facility, etc.

2.13.1.1 Project Construction Management

The project management organizational structure would include two support groups: an engineering and design specifications team and the field site management team. Figure 2.13-1 illustrates the construction management organizational structure for the project. The Project Manager would handle contractual aspects of the agreements with the project managers of the wind turbine vendor and the EPC contractor. This organization chart represents a typical structure for wind power projects. The exact organization may change after award of the turbine supply contract, EPC contract, or other subcontracts.

2.13.1.2 Engineering and Design Specifications Team

The engineering and design specifications team would be responsible for establishing the design and construction specifications for the various portions of the project. The engineering team acts as a third party verification group in conjunction with the project's field quality assurance/quality control (QA/QC) team. The engineering team would review proposals from the various turbine suppliers and EPC contractors for equipment supply and construction work. The turbine supplier and EPC contractor would be responsible for the detailed design work for the project and for submitting these designs and equipment specifications to the project engineering team for review. Review by the project engineering team would ensure that the detailed construction plans would meet the required design specifications, codes, and standards for the project.

2.13.1.3 Field Site Management Team

The field site management team would oversee construction on site and ensure that construction on site is performed in accordance with the engineering plans and specifications, environmental requirements and good industry practice. The field site team would generally be involved in day-to-day issues that arise throughout the construction phase. The Project Site Manager would have a support team consisting of QA/QC specialists, environmental inspectors, and site safety officers. The site team also would rely on the engineering team for support in the field during critical operations such as energizing of the substation and any technical issues that arise during project construction.

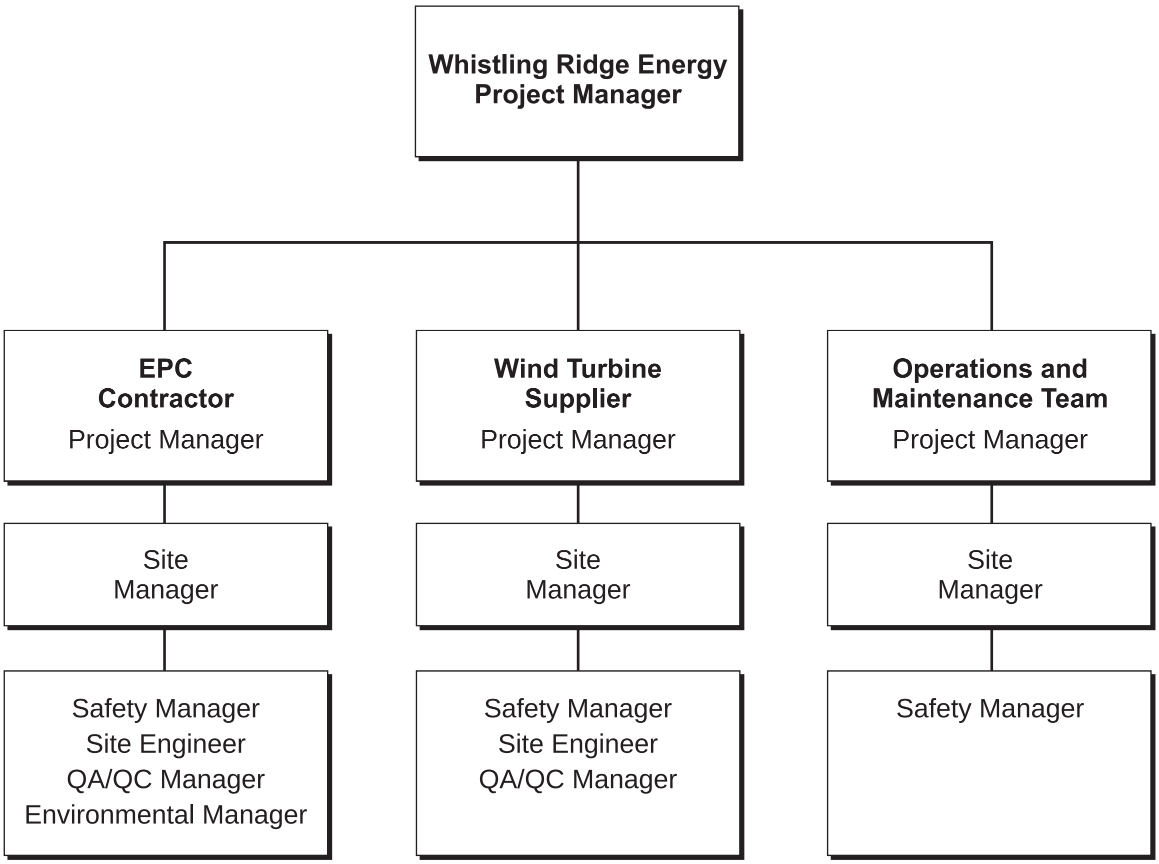


Figure 2.13-1

Project Construction Management Organizational Structure

2.13.1.4 EPC Contractor's Construction Management Team

The EPC Contractor would be responsible for managing several construction subcontractors including those for the balance of plant items, such as the roads, electrical and communications system infrastructure, substation and Operations and Maintenance facility. The EPC Contractor would have a lead Project Manager, a Project Engineer, and a Site Manager supported by their field engineering team, QA/QC specialists, environmental monitors, and site safety officers. The EPC Contractor would be required to implement and perform a safety plan, a QA/QC plan and an environmental protection plan, including the SWPPP.

2.13.1.5 Wind Turbine Vendor's Construction Management Team

The wind turbine supplier would be responsible for the supply, delivery, erection and commissioning of the wind turbines. The turbine supplier's construction team would include a lead Project Manager, a Site Manager, transportation specialists, and several lead technicians. The turbine vendor's site team would be supported by their own QA/QC specialists and site safety officers. The EPC Contractor would be required to implement and perform a safety plan, a rigorous QA/QC plan, and a detailed commissioning plan.

2.13.1.6 Project Operations and Maintenance Team

The project Operations and Maintenance group would be on site during the commissioning and start-up phase of construction. Once a turbine is commissioned, it is turned over to the Operations and Maintenance group control. The Operations and Maintenance team generally consists of a Project Site Manager, a team of wind turbine field technician specialists, and an administrative support staff.

2.13.2 SAFETY PROGRAM

Prior to the commencement of any construction work, the EPC Contractor would be required to prepare a safety plan that would apply to EPC Contractor personnel and all subcontractor personnel working at the site. The plan would be designed to ensure compliance with all laws, ordinances, regulations, and standards concerning health and safety. The EPC Contractor would have a safety manager with the authority to issue a "stop work" notice when health and safety issues are violated, including any subcontractor safety issues, and the health and safety of construction personnel are in danger. Upon identification of a health and safety issue, the safety manager would work with the responsible department or subcontractor to correct the issue.

2.13.3 ENVIRONMENTAL PROTECTION PROGRAM

The environmental compliance program would ensure that construction activities meet the conditions, limits, and specifications set in environmental standards established in the Site Certification Agreement and all other environmental regulations.

Copies of all applicable construction permits would be kept on site. The lead project construction personnel and construction Project Managers would be required to read, follow, and be responsible for all required compliance activities. A project Environmental Monitor would be responsible for ensuring that all construction permit requirements are adhered to, and that any deficiencies are promptly corrected. The Environmental Monitor also would have the authority to stop work. The environmental compliance program would cover avoidance of sensitive areas during construction, waste handling and storage, stormwater management, spill prevention and control, and other components required by State and County regulations.

2.13.4 TRAINING PROGRAMS

Each EPC Contractor would be required to have a training program to ensure that safety and environmental regulations and permits are followed. The program would include training on:

- Drug and alcohol free workplace policy
- Personal health and safety
- Fall safety
- Confined space
- Excavation
- Crane and rigging
- Equipment and operations safety
- Fire prevention
- Electrical safety
- Emergency response
- Hazards communication
- Stormwater pollution prevention
- SPCCP
- Uptower rescue plan

During operations, personnel would receive initial and annual training. In addition to training to support proficiency on the Operations and Maintenance required for the facility, personnel would receive training related to health and safety, hazards communication, stormwater pollution prevention, and SPCCP.

2.13.5 QUALITY CONTROL SYSTEMS AND RECORD KEEPING

A QA/QC program would be implemented during all phases of the project to ensure that the engineering, procurement, construction, and startup of the facility are completed as specified. The elements of the QA/QC program would include:

- A formal QA/QC program would be in place to ensure that the equipment suppliers deliver their components as designed and specified and that the installation of equipment is completed as specified.

- A procedures manual would be developed that describes Whistling Ridge Energy Project activities from the initiation of final design activities through startup of the plant.

- The EPC Contractors would describe the activities and responsibilities within their organizations, and measures taken to assure quality work. Some of the topics would include design control, configuration management, and drawing control.

- Independent QA/QC personnel would review all documentation and witness field activities as a parallel organization to that of the construction organization to assure compliance with the specifications.

- Field inspectors' acceptance would be required for the installation, alignment, and commissioning of all major equipment.

Typical QA/QC checks include:

- Factory QA/QC
  - Inspection of major equipment at manufacturer's facilities
  - Review and inspection of third party test verification reports
  - Review and inspection of manufacturer's QA/QC procedures
  - Manufacturing drawing review and verification
  - Visual inspection
  - Witness and/or review of testing
  - Verification of welding procedure specifications compliance
  - Inspection of flange interface flatness measurements, finishing, and protection
  - Witness or review of turbine run-in load testing
  - Inspection of paint finishing and protection
  - Shipment packaging and handling, tracking, and identification
  - Pre-commissioning field testing and verification

- Field Inspection QA/QC
  - Reviewing equipment and material delivery acceptance inspection procedures
  - Inspection of all critical interfaces
  - Verification of all mechanical assembly work including erection of major components

- Verification of field wiring and tagging
- Pre-commissioning field testing and verification

- Concrete/Structural
  - Inspection of forms, structural steel, and rebar prior to backfilling and prior to casting
  - Field engineer's witness of concrete pouring
  - Inspection of concrete testing during pour (slump) and verification of break test results

- Roads
  - Field verification of road locations to site plan and survey markings
  - Review of clearing process (if necessary)
  - Verification of adequate road materials and compaction to engineer's specifications
  - Verification of road grade to plans

- Electrical Collection System
  - Inspection of cables and trenches prior to burial and backfilling
  - Witness of proper backfilling procedures
  - Inspection of terminations and termination hardware
  - Witness and/or review of polarity, cable marking, and phase rotation tests
  - Witness and/or review of grounding system resistance measurements
  - Inspection of all lock-out/tag-out locations and energizing sequences and plan

- Transformers
  - Inspection of transformers at manufacturer's facilities
  - Witness and/or review of winding resistance, polarity and phase displacement tests
  - Witness and/or review of no load losses and excitation current at rated voltage and frequency
  - Witness and/or review of impedance voltage and load losses at rated current and rated frequency
  - Witness and/or review of high potential and induced potential tests
  - Witness and/or review of impulse tests, reduced full wave, chopped wave and full wave tests
  - Witness and/or review of regulation and efficiency calculations
  - Verification of compliance to engineering specifications
  - Inspection of painting/tagging/preparation for shipment
  - Verification of field wiring and tagging

- Breakers
  - Witness and/or review of rated continuous current and short circuit tests
  - Witness and/or review of dielectric withstand tests

- Witness and/or review of switching tests
- Witness and/or review of insulator tests
- Witness and/or review of mechanical life tests
- Witness and/or review of terminal loading tests
- Witness and/or review of partial discharge tests
- Verification of compliance to engineering specifications
- Inspection of painting/tagging/wiring/preparation for shipment
- Verification of field wiring and tagging

Whistling Ridge Energy LLC would periodically audit the EPC Contractor, including reviews of documentation and surveillances of field activities, to ensure compliance with the specifications and with the requirements of the QA/QC plan. Checks may include:

- Verification of drawings
- Verification of materials
- Verify compliance to engineering specifications
- Verify compliance with environmental permits and regulations
- Verify compliance with health and safety program

Records would be maintained at the on-site Operations and Maintenance building in accordance with Whistling Ridge Energy LLC's records management program and state archivist requirements.

SECTION 2.14 CONSTRUCTION METHODOLOGY (WAC 463-60-255)

2.14.1 CONSTRUCTION SUMMARY

The proposed Whistling Ridge Energy Project would be located on private commercial forestland owned by S.D.S Co., LLC and Broughton Lumber Company in an unincorporated area of Skamania County, approximately 7 miles northwest of the City of White Salmon. Several private logging roads exist around the site. The project site is composed of complexes of very deep soils that formed in alluvium, colluvium, and residuum weathered primarily from basalt and mixed with volcanic ash (USDA NRCS 2003). The land is in commercial forest production and has been harvested.

Stormwater pollution prevention activities would occur prior to any clearing and site preparation. Measures would include installation of a stabilized construction entrance, wheel wash, silt fences, hay bales, temporary and/or permanent water conveyance systems, and installation of temporary and/or permanent retention ponds.

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

Once the surveys are complete, a detailed geotechnical investigation would be performed to identify subsurface conditions which would dictate much of the design work of the roads, foundations, underground trenching and electrical grounding systems. Typically, the geotechnical investigation involves a drill rig which bores to the engineer's required depths (typically 8 inch diameter drill to 30-40 feet deep) and a backhoe to identify the subsurface soil and rock types and strength properties by sampling and lab testing. Testing is also done to measure the soil's electrical properties to ensure proper grounding system design. A geotechnical investigation is generally performed at each turbine location, the substation location and at the Operation and Maintenance building location.

During construction, foundations would be installed, followed by installation of the equipment and construction of the Operations and Maintenance building. Approximately 5,000 amperes of 480-volt, three-phase temporary power would be installed within the site boundary to supply construction power. Startup power would be obtained by a step down transformer located adjacent to the high voltage switching station.

Field toilets and temporary holding tanks would be placed on site for use by construction personnel. During construction, potable water would be provided in containers until the potable water supply system is installed.

Construction worker parking would be provided primarily at the Operations and Maintenance/construction office area and throughout the project area where major activities are occurring. Materials to be used during construction are expected to be staged primarily at the

Operations and Maintenance building complex within a fenced storage yard and in two to three other areas to be determined after site surveys are completed.

2.14.2 SITE PREPARATION AND ROAD CONSTRUCTION

Preliminary analysis by URS Corporation indicates that the potential for liquefaction is very low at this site. Based on test pits and field observations, unconsolidated soils extend up to 3 feet below ground surface. The surficial soils are primarily characterized as soft, moist sandy silt, clay and sand. Immediately beneath the unconsolidated soils, rock with variable strength and weathering properties is present. It is anticipated that rock quality of the basalts would improve with depth but that weaker interflow zones consisting of volcaniclastic material and paleosols are possible at any depth. Prior to final design and location of the tower foundations, additional subsurface investigations (boreholes) would be required to provide geotechnical data at foundation and anchor depths. The final determination of foundation type would be determined by the EPC contractor's geotechnical engineer in consultation with the turbine manufacturer.

During site preparation, the contractor would install storm water pollution prevention measures. Dust would be controlled as needed by spraying water on dry, exposed soil. A Certified Erosion and Sediment Control Lead would be responsible for ensuring that storm water pollution prevention measures meet BMPs in accordance with the most recent version of Ecology's applicable Stormwater Management Manual.

Roadway access would be provided using Cook-Underwood Road to Willard Road. A new connection would be made directly from Willard Road to West Pit Road and West Pit Road would be improved. West Pit Road is an existing private logging road of approximately 2.5 miles in length. West Pit Road was originally built to enable large trucks and logging equipment to access the project site for ongoing commercial logging purposes. This road was generally 8 to 12 feet wide, however improvements were made during summer 2009 for logging purposes to widths between 20 and 26 feet. Improvements to allow use by construction vehicles generally would involve additional widening to the roadway and the existing culvert, widening of some corners, and providing a gravel all-weather surface. West Pit Road would be widened to approximately 25 feet (width of finished road), with an additional 5 feet of shoulder on either side to provide access to the site by construction vehicles, and to continue to provide access for logging activities.

The project roads would be gravel surfaced and generally designed with a low profile. Road construction would be performed in multiple passes starting with the rough grading and leveling of the roadway areas, if necessary. Once rough grade is achieved, a fabric layer would be installed, base rock would be trucked in, spread and compacted to create a road base. A capping rock would then be spread over the road base and roll-compacted to finished grade.

There are two existing quarry pits, one located on site and one on the project boundary along West Pit Road (see Figure 2.3-1). Both are under 3 acres in size and were established to support the commercial forestry use. There is a potential that some rock used for roadway surfacing of West Pit Road may come from one or both of these quarry pits. The quarries will remain at or below 3 acres in size, and West Pit Road will continue to be used for forest access. Alternatively, rock would be hauled in from off-site commercial quarries.

Excavated soil and rock that arises through grading would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind. Approximately 50 percent of excavated soils are anticipated to be too large for re-use as backfill at foundations. These larger cobbles would be crushed into smaller rock for use as backfill or road material or disposed of off-site. Those materials that cannot be reused on site would be disposed of in accordance with Skamania County and Ecology regulations for clean fill materials.

2.14.3 FOUNDATION CONSTRUCTION

The Project would require several foundations including bases for each turbine and pad transformer, and the Operations and Maintenance facility. Often, separate subcontractors are mobilized for each type of foundation they specialize in constructing.

Foundations and buildings would be designed for Seismic Zone 2. The initial phase of foundation construction would include foundations for all heavy equipment except for transformers and other electrical switchyard foundations, which would be constructed at a later time.

The presence of relatively shallow rock indicates that the proposed structures would be supported on rock anchored mat-slab foundations. Foundation construction would occur in several stages including drilling, blasting and hole excavation, outer form setting, rebar and bolt cage assembly, casting and finishing of the concrete, removal of the forms, backfilling and compacting, construction of the pad transformer foundation, and foundation site area restoration.

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

Based on preliminary calculations and depending on the type of foundation design used, approximately 20 cubic yards of excavated soil would remain from each turbine foundation excavation. The excess soils not used as backfill for the foundations would be used to level out low spots on the crane pads and roads consistent with the surrounding grade and reseeded with a designated mix of grasses and/or seeds around the edges of the disturbed areas. Larger cobbles would be disposed of off-site, or crushed into smaller rock for use as backfill or road material. All excavation and foundation construction work would be done in accordance to a formal SWPPP for the project as outlined in Section 2.10, Surface Water Runoff.

Construction of foundations would require the use of a number of types of heavy equipment, including excavation equipment, concrete-pumping equipment, and concrete finishing equipment. In addition, light and medium duty trucks, air compressors, generators, and other internal combustion engine driven equipment are anticipated.

The EPC contractor, in consultation with the Applicant, would determine the need for an on-site concrete batch plant, rock quarries, and rock crushers.

2.14.4 ELECTRICAL COLLECTION SYSTEM CONSTRUCTION

Once the roads and turbine foundations and transformer pads are complete for a particular row of turbines, underground cables would be installed on the completed road section. If any unanticipated environmental, geological, or historic constraints are discovered, limited portions of above-ground electrical collection lines may be proposed. A trench is cut to the required depth with a rock trencher. Clean fill would be placed above and below the cables for the first several inches of fill to prevent cable pinching. All cables and trenches would be inspected before backfilling. Once the clean fill is covering the cables, the excavated material would then used to complete the backfilling. Blasting would be used in areas where solid rock is encountered close to the surface, or a shallower trench would be cut using rock cutting equipment and the cables may be covered with a concrete slurry mix to protect the cables and comply with code and engineering specifications if site conditions warrant such coverage.

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

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

Excavated soil and rock that arises through grading would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind. Approximately 50 percent of excavated soils are anticipated to be too large for re-use as backfill at foundations. These larger cobbles may be crushed into smaller rock for use as backfill or road material or disposed of off-site. Those materials that cannot be reused on site would be disposed of in accordance with Skamania County and Department of Ecology regulations for clean fill materials. All excavation, trenching and electrical system construction work would be done in accordance to a SWPPP for the project as outlined in Section 2.10, Surface Water Runoff.

The electrical construction work would require the use of several pieces of heavy machinery including a track-hoe, a rock trencher, rock cutting equipment, front-end loaders, drill rigs for the pole-line, dump trucks for import of clean back fill, transportation trucks for the materials, small cranes and boom trucks for off-loading and setting of the poles and pad transformers, concrete trucks, cable spool trucks used to un-spool the cable, man-lift bucket trucks for the pole-line work and a winch truck to pull the cable from the spools onto the poles.

2.14.5 WIND TURBINE ASSEMBLY AND INSTALLATION

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

Turbine erection is performed in multiple stages including: setting of the bus cabinet and ground control panels on the foundation, erection of the tower (usually in 3-4 sections), erection of the nacelle, assembly and erection of the rotor, connection and termination of the internal cables, and inspection and testing of the electrical system prior to energization.

Turbine assembly and erection involves mainly the use of large truck or track mounted cranes, smaller rough terrain cranes, boom trucks, rough terrain fork-lifts for loading and off-loading materials and equipment, and flat bed and low-boy trucks for transporting materials to site.

In sequence with the installation of component equipment, support systems would be installed, including electrical equipment, control equipment, piping installation, wiring cable, and conduits. Typical construction activities would include mechanical fastening, welding, preparation, and painting.

2.14.6 STARTUP TESTING

At the completion of the construction sequence, each system would be energized and operational testing undertaken. This would include testing of each of the major component systems in a predetermined sequence and completion of QA/QC checks to ensure that each system is ready for full operation. At the end of the startup testing phase, each unit would be separately certified for commercial operation.

2.14.7 PROJECT CONSTRUCTION CLEAN-UP

Since project clean-up generally consists of landscaping and earthwork, it is very weather and season sensitive. Landscaping clean-up is generally completed during the first allowable and suitable weather conditions after all of the heavy construction activities have been completed. Disturbed areas outside of the graveled areas would be reseeded to control erosion by water and wind. To the extent feasible for the Project, cleared areas would be reforested in accordance with typical commercial forestry management practices. All construction clean-up work and permanent erosion control measures would be done in accordance to a SWPPP for the Project as outlined in Section 2.10, Surface Water Runoff.

Other project clean-up activities may include interior finishing of the Operations and Maintenance building, landscaping around the substation area, washing of towers, painting of scratches on towers and exposed bolts as well as other miscellaneous tasks that are part of normal construction clean-up. Construction clean-up would require the use of a motor grader, dump trucks, front-end loaders, and light trucks for transportation of any waste materials, packaging, etc.

SECTION 2.15 PROTECTION FROM NATURAL HAZARDS (WAC 463-60-265)

2.15.1 INTRODUCTION

This section describes conditions that exist on site or measures that are planned as part of the Whistling Ridge Energy Project design to protect the facility from natural hazards.

2.15.2 EARTHQUAKE HAZARD

Earthquake-related damage to industrial facilities, such as the Whistling Ridge Energy Project facility, typically arises from surface fault rupture, liquefaction and lateral spreading of soils, slope failures, or ground shaking. In addition, tsunamis or seiches may impact facilities located near the Pacific Coast or adjacent to other water bodies in seismically active areas. Due to the project site location and elevation, impacts from tsunamis or seiches are not expected to occur.

The Pacific Northwest has four types of seismic sources due to the presence of the Cascadia subduction zone: (1) the subduction zone megathrust, which represents the boundary (interface) between the subducting Juan de Fuca plate and the overriding North American plate; (2) faults located within the Juan de Fuca plate (referred to as the intraplate or intraslab region); (3) crustal faults principally in the North American plate; and (4) volcanic sources beneath the Cascade Range (Wong and Silva 1998). Each of these events has different causes, and therefore produces earthquakes with different characteristics (that is, peak ground accelerations, response spectra, and duration of strong shaking).

Because of their proximity, crustal faults are possibly the most significant seismic sources to inland sites. Studies by Pezzopane (1993) and Geomatrix Consultants (1995) show that at least 70 crustal faults with earthquake potential exist in southwest Washington and northwest Oregon. Many of these faults were unknown or not recognized as being seismogenic a decade ago. Although the largest known crustal earthquake in southwest Washington and western Oregon is only about moment magnitude ($M_{w)}$ 6 (Wong and Bott 1995), potential exists for events of M_w 6.5 or greater along several recognized faults including the Portland Hills and the recently discovered East Bank faults in Portland and the Gales Creek-Mt. Angel fault zone.

2.15.2.1 Surface Fault Rupture

Coseismic surface rupture occurs when a fault breaks to the land surface during an earthquake. Surface rupture is usually associated with moderate to large earthquakes (magnitude 6.5 or greater) or, rarely during smaller, very shallow events. Surface rupture is highly unlikely at the project site because of the absence of known faults beneath the site and the absence of evidence of historical or geologically recent surface rupture in the project site area. No surface fault movement has been recorded in Washington within historic time (McCrumb et al. 1989, Rogers et al. 1996, Lidke et al. 2003). In general, faults that have had a surface rupture during the Holocene epoch (last 10,000 years) or multiple ruptures during the Pleistocene epoch of the Quaternary period (last 10,000 to 1.8 million years) are considered to have a potential for future surface rupture. The known faults with Holocene or late Pleistocene surface displacement within the Puget Sound and Willamette lowlands are distant from the site. No Quaternary faults have been previously mapped or inferred within the site boundaries (Walsh et al. 1987, Noson et al. 1988, Rogers et al. 1996, Lidke et al. 2003). Due to the lack of recognized Quaternary faults at the project site, the potential for surface fault rupture is considered remote.

2.15.2.2 Strong Ground Motion

The southwestern Washington and northwestern Oregon region, in which the project site is situated, is an area of low to moderate historical seismicity but characterized as one of high seismic hazard due to the potential for strong earthquake ground motion (see Section 3.1.3, Seismicity) from regional potential seismic sources. These sources include the Cascadia Subduction Zone (CSZ) located offshore of the west coast of the US, deep intraplate earthquakes beneath the site vicinity within the subducted plate slab, and shallow crustal faults from the Puget Sound and Willamette lowlands and eastward. According to the US Geological Survey (USGS) probabilistic Seismic Hazard Maps published in 2008 (Peterson et al. 2008 and http://earthquake.usgs.gov/research/hazmaps/), the estimated peak ground acceleration for the site is on the order of 0.18g for a 475-year return period earthquake (10 percent chance of being exceeded in 50 years). For a 2,475-year return period earthquake (2 percent of being exceeded in 50 years), the estimated peak acceleration for the site is on the order of 0.40g. Design of facilities for the USGS estimated levels and potentially higher levels of ground shaking can be accommodated within the current level of earthquake engineering design practice and applicable building codes.

2.15.2.3 Liquefaction and Lateral Spreading

Liquefaction is a phenomenon whereby soils undergo significant loss of strength and stiffness when they are subjected to vibration or large cyclic ground motions produced by earthquakes. Typically, cyclic loading of saturated soils leads to the buildup of excess pore-water pressure as a result of soil particles being rearranged with a tendency toward denser packing. Under undrained conditions (such as during earthquake shaking), loads are transferred from the soil skeleton to the pore-water with consequent reduction in the soils' shear strength.

Saturated granular soils without cohesive fines (i.e., gravels, sands, and silts) are most susceptible to liquefaction. Other factors affecting the potential for liquefaction in soils are density, amplitude of loading, confining pressure, past stress history, age of soil deposit, the size, shape and gradation of particles, and the soil fabric structure. Liquefaction-induced ground settlement and lateral spreading have been the primary cause for extensive damage to aboveground structures, foundations, and pipelines during many earthquakes.

Test pits excavated at the project site encountered shallow bedrock covered with a combination of cohesive and cohesionless soil. No groundwater was observed in any of the test pits. Based on the soils encountered during the field explorations, it is URS's opinion that the potential for liquefaction at this site is very low.

The risk of seismically inducted settlement and lateral spreading is low due to the low liquefaction potential. It is URS's opinion that settlements and lateral spread induced by a seismic event would be minimal. If, during additional subsurface investigations at the site, liquefiable soils and high groundwater are observed, design of the facilities can be accommodated within the current level of earthquake engineering design practice and applicable building codes.

2.15.2.4 Tsunamis and Seiches

Tsunami waves may enter the Columbia River from distant circum-Pacific earthquakes, local offshore earthquakes on the CSZ, or submarine landslides in the adjacent Pacific Ocean offshore area. The project site is located on a series of north-trending ridges that range in elevation from approximately 2,100 to 2,300 feet above msl and would be above the area potentially affected by a tsunami wave.

Although seiches have been observed in the Pacific Northwest during the 1949 Queen Charlotte Islands, Canada, and the 1964 and 2002 Alaskan earthquake of approximately M_w 8 or greater, seiches have not been reported in the Columbia River, except in the reservoir directly behind the Grand Coulee Dam farther upstream. In our judgment, the seiche potential in this river near the site is minimal, and, due to the elevation of the site, the potential for damage from any seiche that might occur is considered to be remote.

2.15.2.5 Mitigation Measures for Earthquake Hazards

All structures on the site would be built in accordance with the seismic design provisions presented in the 2006 version of the International Building Code (IBC), and the American Society of Civil Engineers 07-05 standard. The site soil is best represented as Stiff Soil (Soil Site Class D). Based on the site location and site conditions described above, we recommend that the values listed in Table 2.15-1 be used for seismic design of the project in accordance with Section 1613.5.3 of the 2006 IBC. The occupancy category of the proposed structure is assumed III as per Section 1613.5.6 of the 2006 IBC.

Table 2.15-1
2006 IBC Seismic Design Values

Parameter	Value	2006 IBC/ASCE 7-05 Reference
Soil Profile Site Class	C	Table 1613.5.2
0.2 Second Spectral Acceleration S_s	0.60 g	Figure 1613.5 (1)
1.0 Second Spectral Acceleration S_l	0.20 g	Figure 1613.5 (2)
Peak Ground Acceleration ($0.4S_{Ds}$)	0.186 g	ASCE 7-05 equation 11.4-5
Site Coefficient F_a	1.16	Table 1613.5.3 (1)
Site Coefficient F_v	1.6	Table 1613.5.3 (2)
Seismic Design Category[a]	D	Tables 1613.5.6 (1) & (2)

a. Assumes Seismic Use Group III

A visual inspection would be conducted following abnormal seismic activity. These inspections would look for signs of incipient mass movement in those areas identified as potentially susceptible to such failures.

2.15.3 SLOPE FAILURE AND MASS WASTING

Pursuant to Skamania County Code (SCC) Title 21A, Chapter 21A.06 - Landslide Hazard Areas, URS has conducted a preliminary landslide hazard evaluation of the proposed Whistling Ridge Energy Project wind turbine site. The project location is shown in Figure 3.1-1, Site Geology.

A URS Licensed Engineering Geologist conducted a site-specific landslide hazard investigation. The investigation consisted of:

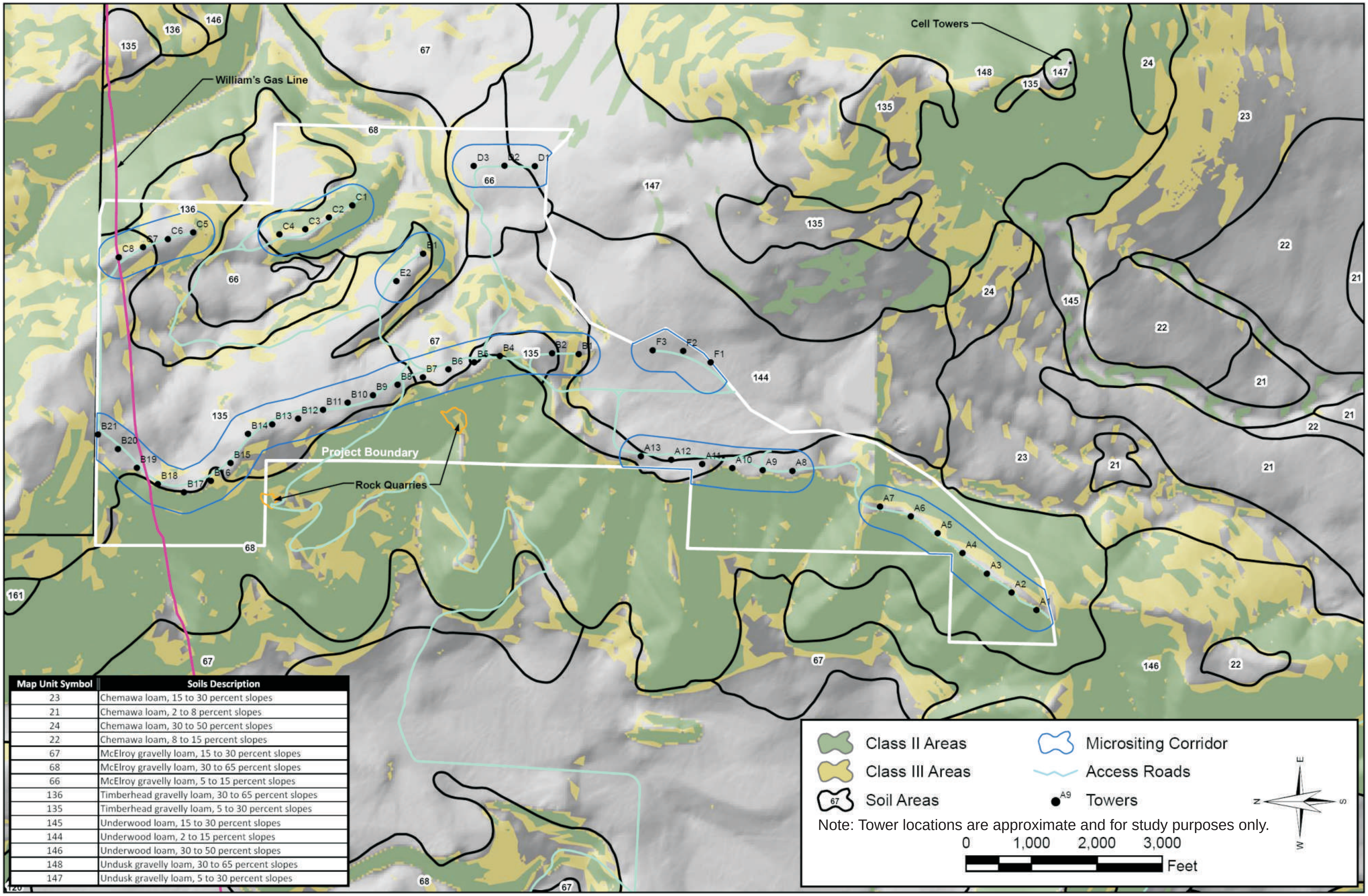
- Review of Sections of the County Code that address Geologically Hazardous Areas
- Review of existing available topographic, geologic and soils literature and maps
- Analysis of project-specific stereo aerial photographs
- Review of project test pit logs and soil samples
- A one day site reconnaissance

According to the County Code, the primary criteria for landslide hazard designations are: presence of pre-existing, known mappable landslides; slope angle; and/or composition of the near-surface soils or rock.

URS has created a color-coded map of the study area using an existing USGS 10 meter digital terrain model (DTM) to segregate slopes into three categories: slopes less than 20%; slopes between 20% and 30%; and slopes greater than 30%. We then superimposed the Natural Resources Conservation Services (NRCS) soil survey map onto the slope map to provide soil type information. The resulting Landslide Hazard Map is presented herein as Figure 2.15-1.

2.15.3.1 Landslide Hazard Area Delineation

Skamania County recognizes three classes of landslide hazard areas (LHAs). Class I (Severe) LHAs are considered to present a severe landslide hazard and are distinguished as areas of known mappable landslide deposits which have been designated landslide hazard areas by the local legislative body. Class II (High) LHAs are areas with slopes between twenty and thirty percent that are underlain by soils that consist largely of silt, clay or bedrock, and all areas with slopes greater than thirty percent. Class III (Moderate) LHAs are areas with slopes between twenty percent and thirty percent not included in Class II.



Map Unit Symbol	Soils Description
23	Chemawa loam, 15 to 30 percent slopes
21	Chemawa loam, 2 to 8 percent slopes
24	Chemawa loam, 30 to 50 percent slopes
22	Chemawa loam, 8 to 15 percent slopes
67	McElroy gravelly loam, 15 to 30 percent slopes
68	McElroy gravelly loam, 30 to 65 percent slopes
66	McElroy gravelly loam, 5 to 15 percent slopes
136	Timberhead gravelly loam, 30 to 65 percent slopes
135	Timberhead gravelly loam, 5 to 30 percent slopes
145	Underwood loam, 15 to 30 percent slopes
144	Underwood loam, 2 to 15 percent slopes
146	Underwood loam, 30 to 50 percent slopes
148	Undusk gravelly loam, 30 to 65 percent slopes
147	Undusk gravelly loam, 5 to 30 percent slopes

Source: GeoDataScape.

Job No. 33758687

Revised Figure 2.15-1

Landslide Hazard Classifications

URS

Whistling Ridge Energy Project
Skamania County, Washington

URS reviewed available geologic and soils literature to develop a landslide hazard classification for the proposed Whistling Ridge Energy Project. An existing published regional geologic map (partially recreated in Figure 3.1-1 of this report) indicates a large landslide in the northeast corner of the study area underlying Tower Line C. Review of stereo photographs of the area where the landslide deposits are mapped, coupled with a site reconnaissance, indicate that there is little geomorphic evidence for landslide activity such as obvious scarps, hummocky or benched terrain, lobate toe areas, or redirected watercourses. No deep subsurface investigations have been carried out at the site to date, but future explorations in support of design for the turbine tower foundations would provide subsurface information regarding the presence of landslide deposits in the area. Based on our preliminary investigation, there does not appear to be any area of the site that meets Skamania County's criteria for a Class 1 LHA.

Class II LHAs are shown in green on Figure 2.15-1. The Class II LHAs at the site are predominantly associated with the steep slopes to the west of proposed Tower Lines A and B. There are also steep slopes east of the seven southernmost Tower Line A towers, and on both sides of Tower Line C.

2.15.3.2 Impacts

Although none of the proposed turbines are located within Class II LHAs, several of the towers along the western side of the project site (Tower Lines A and B) are located along ridgelines with descending slopes that are locally greater than 35 degrees (70%). The heads of some of the drainages along these slopes are arcuate, indicating possible mass wasting activity such as landslides, debris flows, and / or earthflows.

Based on aerial photo and field observations, the primary mass wasting process below the ridgelines appears to be debris flows and soil creep. No evidence for deep-seated, block failure type landslides was observed. Local surficial creep of near-surface soils is indicated by the presence of pistol-butted trees on some of the slopes, primarily on the descending slope west of the northern portion of Tower Line A. Other slopes have mature conifer stands that indicated little or no soil creep. Further subsurface investigation in support of final tower foundation design would help determine if there are weak rock or soil layers that could contribute to more deep-seated failure of the ridges and provide information on the quality of the rock mass underlying the ridgelines.

It appears that the primary concern for towers located adjacent to the Class II LHAs is the potential for headward erosion of the steep drainages by debris or earth flow processes. Erosion rates of these drainages are unknown, but no obvious recent mass wasting features were observed in the aerial photos or during the site reconnaissance.

Class III LHAs have been delineated adjacent to proposed wind turbines along the southern Tower Line A, and Tower Line C. Class III LHAs are not anticipated to have any impact on the proposed facilities, due to the robust nature of the proposed foundation designs.

The Landslide Hazard Evaluation identified several areas where the proposed wind turbine generators are located adjacent to slopes that meet Skamania County's criteria for Class II and Class III Landslide Hazard Areas. The primary hazard to the proposed towers appears to be the potential for exposure to headward erosion of steep drainages on the slopes below some of the tower locations. Exposure of the towers to headward erosion of the steep slope drainages can be minimized by providing maximum possible setbacks from the tops of the steep slopes and/or by siting the turbines along portions of the ridgelines that are above intervening spur ridges. The most critical area of exposure to Class II LHAs is the narrow ridge at the southern portion of Tower Line A.

It is URS's opinion that the proposed project can be constructed and operated without danger to human life or the surrounding environment due to landslide hazards.

2.15.3.3 Mitigation Measures

No mitigation measures are required.

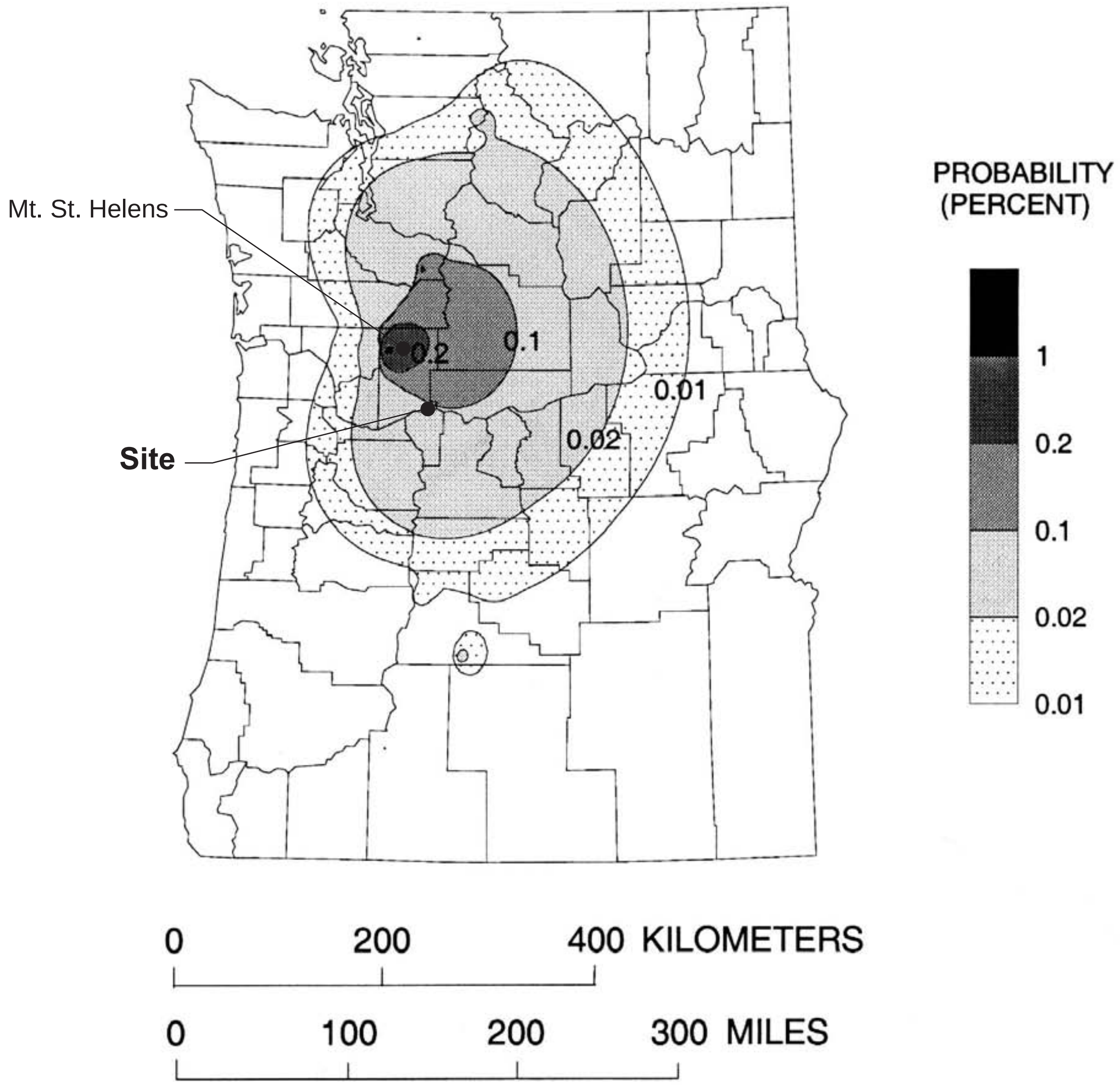
2.15.4 VOLCANIC ERUPTION

The Cascade Mountains of the Pacific Northwest region contain sixteen major volcanoes which extend from Mount Garibaldi in British Columbia to Lassen Peak in California (Harris 1988). Four of the volcanoes within Washington and Oregon have experienced activity within historic time: Mount Baker, Mount Rainier, Mount Hood, and Mount St. Helens. Mount Adams is the closest volcano to the project site, situated approximately 30 miles due north, but is not historically active. Mount St. Helens is the closest historically active volcano to the project site, situated approximately 42 miles to the northwest (see Figure 2.15-2).

Effects of volcanic activity may include lava flows, mudflows, pyroclastic flows, and ash-fall. Volcanic flows are typically limited to the flanks of the volcano and major drainage channels extending from the volcano. The USGS has estimated the areas most likely to be affected by future eruptions of Mount St. Helens. The site is not situated in an area identified as having a potential hazard from a pyroclastic flow or lahar (Wolfe and Pierson 1995). Of greatest impact in terms of area affected by an eruption is the tephra, or ash, carried aloft that subsequently falls to the land surface. Modern meteorological records show that both high altitude wind directions and speeds in Washington have been more prevalent and stronger toward east than toward the west in the site region. The USGS (Wolfe and Pierson 1995) estimates that there is between a 0.02% and 0.1% annual probability that there would be 4 inches (10 cm) or more of ash deposited at the site from eruptions throughout the Cascade Range (Figure 2.15-2). Therefore, no mitigation measures are proposed for direct volcanic hazards.

Secondary processes associated with volcanic eruption, such as lahars, flooding and sediment loading can result in more serious damage. The Whistling Ridge Energy Project site is not located within the modern floodplain of rivers within the watershed of Mt. St. Helens or Mount Adams.

33758687_10.cdr



Explanation

Annual probability of accumulation of ten or more centimeters (four or more inches) of tephra in Washington and Oregon from eruptions throughout the Cascade Range. Probability distribution reflects the frequency of explosive eruptions at each major Cascade volcano, the variability in the thickness of tephra that could be deposited at various downwind distances, and the variability in wind direction.

SOURCE: Wolfe and Pierson, 1995

Job No. 33758687

Figure 2.15-2

Annual Probability of 10 cm of Volcanic Ash

URS

Whistling Ridge Energy Project
Skamania County, Washington

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

2.15.5 FLOODING

The Whistling Ridge Energy Project site is not located within any 100-year floodplains as currently mapped by the Federal Emergency Management Agency (FEMA). The current elevation of the site is above the 100-year floodplain of the Little White Salmon and Columbia Rivers, and mitigation measures for flooding are not planned.

SECTION 2.16 SECURITY CONCERNS
(WAC 463-60-275)

2.16.1 SECURITY PLAN

The Whistling Ridge Energy Project site is located on private land approximately 7 miles northwest of the City of White Salmon in Skamania County, Washington. The project would consist of a substation, an Operations and Maintenance building, and graveled site access roads which lead to the wind turbines. Security is primarily a function of controlled access to the project site and lock-out provisions to major equipment and controls.

A thorough review with WindPro Insurance of Palm Desert, CA, a major insurer of wind power projects around the world, found no recorded cases of terrorism, sabotage, or other similar security threats in the past 15 years of their knowledge for more than 17,000 wind turbines operating in 14 different countries. Vandalism has occurred on some wind power projects, which generally has been limited to petty theft of tools and/or equipment.

A full time security plan would be implemented during project construction. Once construction is completed, a comprehensive operations security plan would be prepared along with a detailed emergency plan.

2.16.1.1 Construction Phase

The Site Project Manager would work with a security contractor to develop a plan to effectively monitor the overall site during construction including drive-around security and specific check points. The security inspection and monitoring plan would be changed throughout the course of construction based on the level of construction activity and amount of sensitive or vulnerable equipment and materials in specific area. Much of the security monitoring activities would be straightforward since all site access ways would be accessible from private logging roads.

Security

All site staff and subcontractors would be required to wear an identity badge and display vehicle clearance tags at all times. Newcomers to the project site would be required to check in, log in, and log out at the main site construction trailers. The main site construction trailers would be equipped with outdoor lighting and motion sensor lighting as required.

Parking for the construction contractor employees would be in an assigned parking area. A barrier or other device would be erected around protected areas to exclude vehicles and pedestrians until protection is no longer required.

Secured Lay-Down Areas

Construction materials would be stored at the individual turbines locations, or at the lay-down area around the perimeter of the Operations and Maintenance facility and site construction trailers. Temporary fencing with a locked gate would be installed for a roughly 1.5-acre area adjacent to the site trailers for the temporary storage of any special equipment or materials. After construction is completed, the temporary fencing would be removed and the area re-seeded with an appropriate seed mix.

2.16.1.2 Operation Phase

Site visitors including vendor equipment personnel, maintenance contractors, material suppliers and all other third parties would be required to obtain permission for access from authorized Whistling Ridge Energy Project staff prior to entrance. The Plant Operations Manager, or designee, would grant access to any critical areas of the site on an as-needed basis.

Access ways to the main Operations and Maintenance facility area, site trailers, and all wind turbine roads would be constructed with lockable access gates. The access gates would be open during working hours and be secured by project site security personnel after working hours.

Both the Operations and Maintenance facility and the main substation would be equipped with outdoor lighting and motion sensor lighting. The substation would be surrounded by an eight-foot-tall chain-link fence with razor wire along the top. All wind turbines, pad transformers, pad mounted switch panels and other outdoor facilities would have secure, lockable doors.

The plant operations group would prepare a detailed security plan to be implemented to protect the security of the project and project personnel.

2.16.2 EMERGENCY RESPONSE PLAN

Whistling Ridge Energy LLC would establish an emergency response plan for the plant to ensure employee safety from the following emergencies: on-site chemical release, medical emergency, major power loss, fire, extreme weather, earthquake, volcano, and bomb threat. The plan would be established prior to completion of construction. The plan would follow the requirements of WAC 296-24-567 and 296-62-3112 and 29 Code of Federal Regulations (CFR) 1910.38, Emergency Action Plan. All hourly and salaried employees, including administrative staff as well as contractors and visitors, would be covered by the plan. The Emergency Response Plan would be administered by the Plant Manager who would be responsible for overall coordination of the plan. See Section 4.1.6, Emergency Response Plans.

The plan elements would include:

- General evacuation
- Downed power system hazards with specific attention to power lines and the substation
- Personnel injury
- Uptower rescue
- Construction emergencies
- Fire/explosion on-site

- Natural gas release off-site
- Chemical release
- Oil release
- Tornado
- Earthquake
- Emergency freeze protection
- Volcanic eruption (ashfall)
- Injury
- Facility blackout
- Facility bomb threat

SECTION 2.17 STUDY SCHEDULES
(WAC 463-60-285)

2.17.1 INTRODUCTION

Surveys of the project site have been completed in full consultation with wildlife agencies. Habitat areas have been fully mapped and included in this Application. Additional surveys are planned for northern goshawks and bats to augment information already obtained, as described in Section 2.17.2. Subsequent to the March 2009 submittal of the Application for Site Certification, aAdditional surveys are plannedwere performed for the roadway corridor within the Columbia River Gorge National Scenic Area in the spring of 2009, and existing surveys will bewere confirmed. All will be included in the information prepared for the environmental impact statement.

2.17.2 ADDITIONAL STUDIES

Additional northern goshawk and anabat surveys will be made in the project area:

- The northern goshawk is not listed as "threatened" or "endangered" by either the state of Washington or federal agencies. The applicant completed northern goshawk surveys in accordance with protocols accepted and recommended by the Washington Department of Fish & Wildlife (WDFW). The surveys were conducted during the relevant seasons in 2004, 2005, 2008 and again in 2008spring and summer, 2009, in accordance with agreed upon protocols. No goshawks were found on the project site, nor were any observed on any surrounding properties. It is highly unlikely that goshawks will be found on the project site or in areas to the north, owned and managed by Washington State Department of Natural Resources (WDNR). The applicant will conduct an additional survey on the project site in spring 2009 to confirm these findings, in accordance with agreed protocols. The WDNR property near the project site has similar habitat characteristics to the project site, and was recently logged. While no goshawks are expected on the area to the north, due to the proximity of turbines to the WDNR property to the north, the Applicant will conduct an intensive survey effort on approximately 360 acres to the north of the project site to confirm that the project does not present any significant impact to this species.

- Anabat detection surveys proposed for 2009 were started in July and will be implemented during the months of Julycontinue through October, and will augment our understanding of bat activity within the vicinity of the proposed micrositing corridors. Anabat detectors also will be elevated to gain a better understanding of bat activity at rotor swept height.

The access roadway has been revised to use West Pit Road, that would traverse the Scenic Area is an existing road in a developed area managed for commercial forestry that connects the project area to the Cook-Underwood Road (via Willard Road), entirely outside of the Columbia River Gorge National Scenic Area. The roadway would be widened to provide access for construction vehicles. The following sPlant and wildlife surveys are planned forwere performed in June spring 2009 and the results have been incorporated into this amended application:.

- ~~Scenic Area Wetland and Habitat Survey~~
- ~~Scenic Area Sensitive Plant Field Survey~~
- ~~Scenic Area Wildlife Survey~~
- ~~Scenic Area Cultural Resource Reconnaissance Survey~~

SECTION 2.18 POTENTIAL FOR FUTURE ACTIVITIES AT THE SITE (WAC 463-60-295)

2.18.1 EXPANSION OF WHISTLING RIDGE ENERGY PROJECT

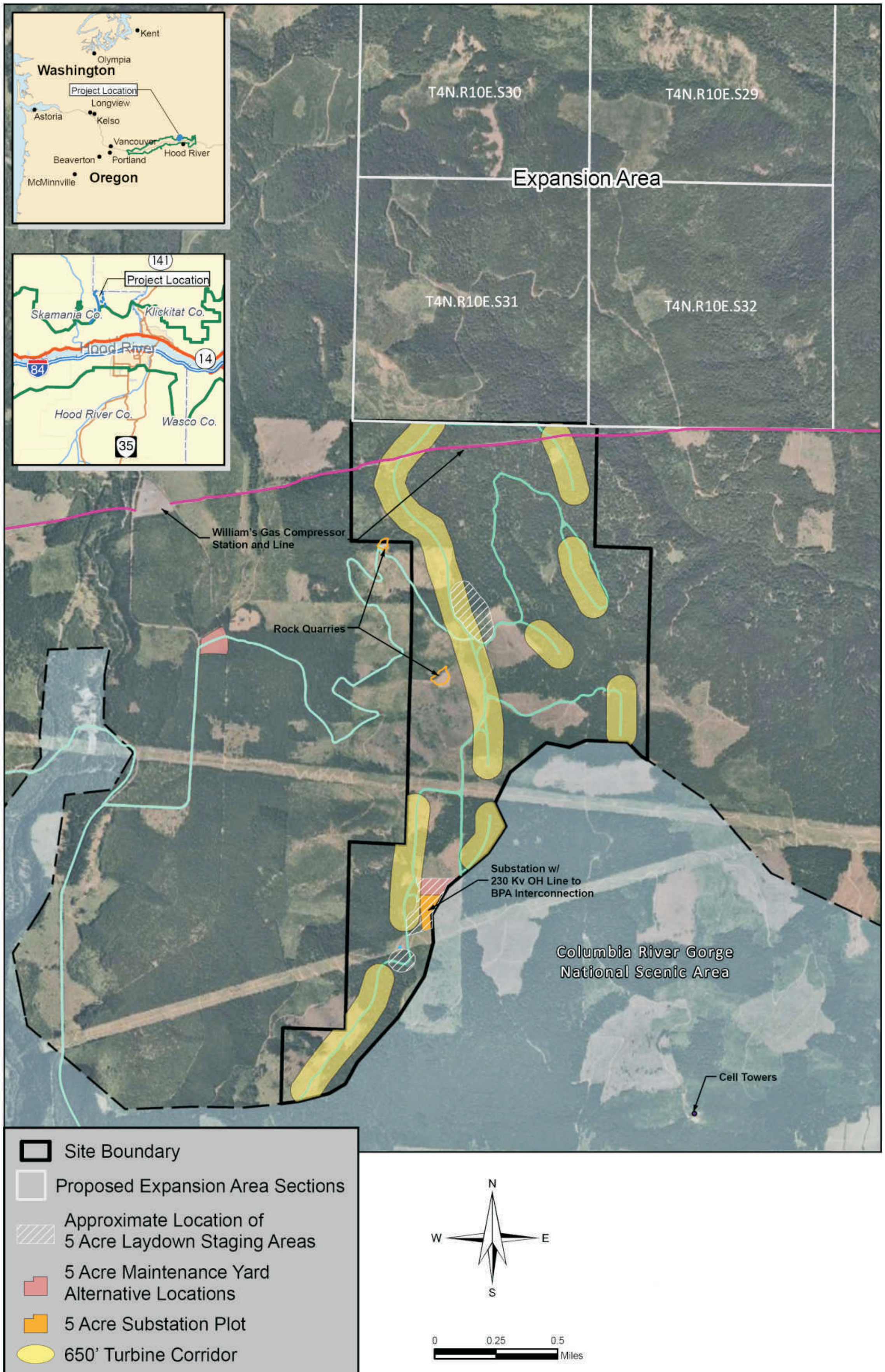
Depending on market conditions and the ability to lease land from the WDNR, there is a potential that the Whistling Ridge Energy Project could be expanded in the future. The potential expansion area would be directly north of the existing project site and consist of the lease of up to four sections[1] from WDNR for the placement of approximately 50 additional wind turbines. The potential expansion would be located in Klickitat County in an area studied during that County's Energy Overlay Zone process. See Figure 2.18-1, Potential Expansion Area.

At this time, such expansion is speculative, and sufficient environmental and engineering information and analyses are not available to pursue permitting. If the project is ultimately expanded to include the WDNR property, revenues generated from these lands would benefit the State School Trust, including local public schools.

The expanded site and the existing and planned facilities (both the transmission and the Operations and Maintenance facilities) would support an expansion in the future, should the expected demand for clean renewable energy continue to grow.

[1] A "section" is one square mile, consisting of 640 acres.

33758687_86.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 2.18-1

Potential Expansion Area

URS

Whistling Ridge Energy Project
Skamania County, Washington

SECTION 2.19 ANALYSIS OF ALTERNATIVES (WAC-463-60-645)

2.19.1 INTRODUCTION

This section summarizes the alternatives that were explored during the development of the Whistling Ridge Energy Project.

2.19.2 SITE SELECTION

The Whistling Ridge Energy Project would be a wind-powered energy facility constructed by Whistling Ridge Energy LLC. Whistling Ridge Energy LLC is a special-purpose corporation formed to develop, permit, finance, construct, own and operate the Whistling Ridge Energy Project. Whistling Ridge Energy LLC is a Washington corporation formed under Title 23B of the RCW. It is wholly-owned by S.D.S Co., LLC and proposed to be constructed on land owned by S.D.S. Co., LLC and Broughton Lumber Company. The project site, north of the Columbia River Gorge, is optimally suited for wind energy, and is crossed by two BPA high voltage transmission lines. The project site already has a network of logging roads, requiring the construction of relatively few new roads. Approximately ~~7.2~~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. Some of these construction roads would continue to be used during the project's operational phase.

As described in the Introduction, the objective of the Whistling Ridge Energy Project is to construct and operate a wind energy generation resource to meet a portion of the projected growing regional demand for new energy resources. The Energy Information Administration projects total electricity demand growth between 1.8% and 1.9% per year from 2001 through 2025. The Western Electricity Coordinating Council forecasts that, due to cooler than normal temperatures, peak demand requirement will increase at a compound rate of 2.4% per year (WECC 2005). Based on data published by the Northwest Power and Conservation Council, electricity demand for the Council's four-state Pacific Northwest planning region (Washington, Oregon, Idaho, and Montana) was 20,080 average MW in 2000 and is estimated to grow to 22,105 average MW by 2015, based on medium demand (NWPCC 2005). The Northwest Power and Conservation Council's Sixth Electric Power and Conservation Plan is expected to be published in draft in August 2009.

Washington and the Northwest region face a growing medium and long-term demand for power. Many regional utilities are seeking to acquire new generating resources to meet their loads. More specifically, several regional utilities, including Avista, Puget Sound Energy, and PacifiCorp (doing business as Pacific Power in Washington) have all completed detailed studies and demand forecasts of their own systems as part of their Integrated Resource Plan or Least Cost Plan process with oversight from the Washington Utilities and Transportation Commission. As a result of their formal Integrated Resource Plan or Least Cost Plan processes, these three utilities have issued Requests for Proposals specifically for wind power and/or other renewable resources. Finally, Washington now requires that utilities meet the state's Renewable Portfolio Standards requirements, which will likely be confirmed nationally.

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

The project is not considered a reasonable alternative to any other wind energy facility or wind energy facility site. No project, on its own, can meet the forecasted or immediately requested demand for power in the region.

EFSEC has previously supported the application of certain criteria for the evaluation of wind energy project sites. While Whistling Ridge Energy LLC is not a developer of multiple sites, and only proposes the site described in this application, the selection of this site conforms to accepted site selection criteria:

- Commercially viable wind resource
- Access to high voltage (115kV or 230 kV) transmission lines within a reasonable distance to a project site, with sufficient available capacity to carry the project's output
- Absence of significant environmental constraints (i.e., no threatened or endangered species, major archeological resources, critical wetlands, etc.)
- Willing landowner(s) with sufficient undivided acreage to support a project
- Accessible site with sufficient road access to permit delivery of large wind turbine components and allow construction of project infrastructure
- Appropriate and compatible zoning designation and/or lack of conflicting land uses

The Whistling Ridge Energy Project site appears to meet all of the above criteria. Other potential sites are not owned and controlled by the Applicant, and they are not deemed to be viable alternatives to the proposed project. Because the site is optimally suited for the production of wind energy, has been used for forestry, has existing roads suitable for wind turbine placement and maintenance, is adjacent to BPA transmission lines, and is owned by the Applicant, no additional sites were considered.

2.19.3 ELECTRICAL TRANSMISSION ROUTING ALTERNATIVES

The project site is crossed by two BPA high voltage transmission lines. A substation with a 230 kW overhead line is proposed to be located immediately adjacent to the BPA right-of-way. The proposed location of the substation was selected to be placed in a relatively clear and low level area adjacent to the planned Operations and Maintenance facility. The elevation was selected to minimize impacts from winter snow. To minimize the need for creating new transmission corridors, no alternative transmission routing corridors were considered.

2.19.4 ALTERNATIVE TECHNOLOGIES AND FUEL

Whistling Ridge Energy LLC has proposed the project to provide an alternative source of energy that does not generate air or water emissions and does not produce hazardous waste. Wind energy is considered a renewable resource, and its operation does not deplete natural resources such as coal, oil, or gas; cause environmental damage through resource extraction and transportation; or require significant amounts of water during operation. Because of the environmental benefits of wind energy, and the suitability of the site already owned by the Applicant for wind energy, no alternative technologies or fuel sources were considered.

2.19.5 ALTERNATIVE CONSTRUCTION ACCESS

There are ~~only two~~three potential ways to access the project site. ~~Both~~ All are via County roads from SR 14 to Cook-Underwood Road. From Cook-Underwood Road the project site can ~~either~~ 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. ~~(See Figures 4.3-1 and 4.3-2 in Section 4.3 Transportation for the location of CG2930.)~~

- ***Route 3:*** Cook-Underwood Road to Willard Road to a new connection to West Pit Road. West Pit Road is a private logging road that is currently used for commercial timber production and harvest. (See Figures 4.3-1 and 4.3-2 in Section 4.3 Transportation for the location of West Pit Road.)

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.

Route 2~~, on the other hand,~~ would require~~s~~ minor roadway improvements that would not directly impact any non-project landowners. However, these roadway improvements would require construction within the Columbia River Gorge National Scenic Area (CRGNSA). Therefore, Route 2 ~~is the preferred, and perhaps the only practicable,~~has been eliminated as a construction roadway access alternative.

Route 3 would require a new direct connection from Willard Road to West Pit Road, and improvements to the West Pit Road. The roadway is located entirely on private property outside of the CRGNSA. Route 3 is the preferred, and perhaps only practicable, access alternative.

2.19.6 ALTERNATIVE HAUL ROUTES AND METHODS OF TRANSPORT

All wind energy components, including tower sections, the nacelle and turbines, and blades would be shipped to either the Port of Longview or Port of Vancouver and then be transported by any or all of the following three modes of travel:

- Specialized trucks along State, County, City, and private roadways
- Burlington Northern Santa Fe (BNSF) rail lines running parallel to SR 14
- Barge and tug boat up the Columbia River and through the lockage facility at the Bonneville Dam to the SDS Lumber Company industrial dock in Bingen

Wind energy components transported on specialized trucks from either of the Ports would be delivered directly to the proposed project site. Components transported either by rail or barge from either of the Ports could be delivered to the SDS Lumber Company industrial facility in Bingen, loaded onto specialized trucks, and then transported to the proposed project site. Fuel would be delivered to the proposed site by truck as needed.

Trucks transporting wind energy components could have loads as high as 17.5 feet measured from the ground to the highest point of the load, as wide as 14.5 feet or as long as 150 feet. Specialized trucks may be used to transport wind energy components from either the Port of Longview or the Port of Vancouver to the west junction of Cook-Underwood Road with SR 14 at MP 56.28. East of that intersection ~~Trucks~~ trucks traveling along SR 14 ~~between Vancouver, Washington and Cook-Underwood Road~~ would be physically constrained by a series of three very narrow tunnels with height restrictions as low as 13 feet 9 inches measured vertically from the edge of the roadway. Over-size loads that would include transport of the tower sections, the nacelles and turbines, and blades would encounter restrictions and/or prohibitions along SR 14 between Vancouver, Washington and the junction of SR 14 and Cook-Underwood Road at MP ~~63.32~~56.28 due to the length and/or width of the loads. Cook-Underwood Road near its northern most point at approximate MP 5.5 contains a bridge that crosses the Little White Salmon River. Crossing this bridge with specialized trucks transporting wind energy components would require special provisions agreed upon between S.D.S Co., LLC and Skamania County.

An alternate route for transport of wind energy components from either of the Ports to the east junction of SR 14 and Cook-Underwood Road at MP 63.32 would include trucks traveling on Interstate 84 (I-84) through Oregon to the Boardman junction, then along SR 730 to the junction of I-82 with SR 395, across the Columbia River back into Washington State, and then to SR 14. Trucks traveling on SR 14 between the junction of I-82/SR 395 and Cook-Underwood Road would be physically constrained by one very narrow tunnel with a height restriction of 13 feet 3 inches measured vertically from the edge of the roadway.

The option of using rail to transport the wind energy components from either of the Ports to the SDS Lumber Company facility also was analyzed. Wind energy components on rail cars can be up to 14.5 feet in width, up to approximately 15 feet in height, and as long as 150 feet. The BNSF rail line between Vancouver, Washington and the SDS Lumber Company facility in Bingen, Washington may not be able to accommodate loads with widths in excess of 14 feet.

This may preclude transport of the bottom tower sections using rail. The wind energy nacelles, turbines, and blades could be transported along the BNSF line to the SDS Lumber Company facility. BNSF could transport the wind energy components on standard or heavy-duty 89-foot long flat rail cars. The wind energy components would be off-loaded at the SDS Lumber Company industrial facility to a staging location to be determined and loaded onto specialized trucks for transport to the proposed project site. Transport of wind energy components using specialized trucks from the SDS Lumber Company industrial facility to SR 14 would require the use of Maple Street in the City of Bingen, Washington for approximately 0.25 mile.

The third option analyzed for transporting the wind energy components from either of the Ports to the SDS Lumber Company industrial facility was by using barges. The wind energy components would be off-loaded from a ship at either of the Ports, loaded onto barges, and then transported upriver to the Bonneville Dam using tug boats. The barges and tugs would by-pass the Bonneville Dam via the lockage facility, and continue upriver to the SDS Lumber Company industrial facility. There would be no over-size or over-weight restrictions using barges as a transport mode for wind energy components at either of the Ports, on the Columbia River, or at the lockage facility at the Bonneville Dam. Coordination with the Bonneville Dam Project Office would be required to determine optimal times for lockage use. The Bonneville lockage facility accommodates commercial, government, and recreational vessels. The heaviest lockage traffic on average occurs during the month of August. Vessel traffic is typically heaviest on Thursdays, Fridays, Saturdays, and Sundays. The wind energy components would be off-loaded at the SDS Lumber Company industrial facility to a staging location to be determined and loaded onto specialized trucks for transport to the proposed project site. Transport of wind energy components using specialized trucks from the SDS Lumber Company industrial facility to SR 14 would require the use of Maple Street in the City of Bingen, Washington for approximately 0.25 mile. There are currently no over-size or over-weight restrictions for this roadway. Like the use of rail, this option would still require using specialized trucks to transport the wind energy blades from the SDS Lumber Company industrial facility to the junction of SR 14 and Cook-Underwood Road at milepost (MP) 63.32, and this section of SR 14 has a length restriction of 125 feet.

In Section 4.3 Transportation, there is a detailed description of the limitations on area roadways in terms of the width, height, length and weight of the loads to be transported, and the needed roadway improvements.

2.19.7 ALTERNATIVE SITE FOR OPERATIONS AND MAINTENANCE FACILITY

Two sites are being considered for the operations and maintenance facility, either adjacent to the substation on site or along West Pit Road to the west of the project site. Both sites would be approximately 5 acres in size and include an approximately 3,000 square foot enclosed space, including office and workshop areas, a kitchen, bathroom, shower and utility sink. The building would be constructed of sheet metal, and would be approximately 16 feet tall (to the rook peak). The site along West Pit Road provides the advantage of being at a lower elevation than the site adjacent to the substation which would make it more accessible during winter months. The West Pit site is located on land zoned Residential 5, whereas the alternative site is Unmapped (UNM).

The maintenance and operations use would be allowed by conditional use approval in the Residential 5 zone and is allowed outright in the UNM area.

~~2.19.7~~2.19.8 NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed Whistling Ridge Energy Project would not be constructed or operated, and the environmental impacts described in this Application would not occur. The No Action Alternative assumes that future development would comply with existing zoning requirements for the project area, which include Unmapped, Forest/Agriculture 20 and Residential ~~10~~5. The project area is designated in the County's Comprehensive Plan as "Conservancy." According to the County's Comprehensive Plan, the Conservancy land use is intended to provide for the conservation and management of existing natural resources in order to achieve a sustained yield of these resources, and to conserve wildlife resources and habitats (Skamania County 2007). Logging, timber management, agricultural and mineral extraction are the main activities that take place in this area. Among the uses identified in the 2007 Comprehensive Plan as appropriate in the Conservancy designation are: public facilities, utilities, utility substations, forest management (including temporary logging and mining camps) and surface mining (by conditional use). Wind energy is considered to be a utility and could be proposed by another applicant.

If the proposed project is not constructed, Washington electrical utilities would lose an important non-polluting renewable resource alternative close to the region's major metropolitan areas. The economic benefits associated with this capital investment and the economic activity associated with construction and operation of the facility would be foregone.

It is likely that the region's need for power would be addressed by some combination of user-end energy efficiency and conservation measures, by existing power generation sources, or by the development of new renewable and non-renewable generation sources. Base load demand would likely be filled through the expansion of existing thermal generation or development of new thermal generation, such as gas-fired combustion turbine technology. Such development could occur at appropriate locations throughout the state of Washington.

A base load natural gas-fired combustion turbine would have to generate approximately 41 average MW of energy to replace an equivalent amount of power generated by the project (75 MW at 33% net capacity). An average MW (aMW) is the average amount of energy supplied over a specified period of time, in contrast to MW, which is the maximum or peak output or capacity that can be supplied for a short period.

SECTION 2.20 PERTINENT FEDERAL, STATE AND LOCAL REQUIREMENTS (WAC 463-60-297)

2.20.1 APPLICABLE FEDERAL, STATE AND LOCAL PERMIT REQUIREMENTS

Table 2.20-1 lists all applicable federal, state, and local permits and related requirements that would apply to construction of the Whistling Ridge Energy Project if Whistling Ridge Energy LLC had not elected to request approval under EFSEC jurisdiction. The table lists the permits or requirements, identifies the permitting agency, and cites the authorizing statute or regulation. The table also identifies the section(s) in the application relating to each permit or requirement.

Table 2.20-1
Applicable Federal, State and Local Requirements

Permit or Requirement	Agency/Statute & Regulation	Application §§
Federal		
National Environmental Policy Act (NEPA)	BPA; it is anticipated that there will be a NEPA/SEPA process.	
BPA Interconnection Agreement	BPA	
Threatened or Endangered Species Assessment; Migratory Bird Treaty Act	NEPA lead agency (BPA, USACE and EPA) Endangered Species Act, §7; 16 U.S.C. § 1531 et seq.; 50 CFR Pt 402 Migratory Bird Treaty Act, US Fish & Wildlife Service	§ 3.4.2
Historic Preservation/Landmark Review	National Historic Preservation Act, § 106; 16 U.S.C. § 470 et seq.; 36 CFR §§ 60-63, 800; Historic Sites, Buildings, Objects, and Antiquities, 16 U.S.C. § 469 et seq.; 36 CFR §§ 296.1; 43 CFR §§ 7.1 et seq.	§ 4.1
No Hazard Determination	Federal Aviation Authority	§ 4.2.2
State of Washington		
State Environmental Policy Act (SEPA)	Skamania County would have been lead agency absent EFSEC jurisdiction. Washington Environmental Policy Act, Chapter 43.21C RCW; Chapter 197-11 WAC Washington Department of Ecology SEPA Rules, which establishes uniform requirements for compliance with SEPA.	Parts 3,4,and 5
Temporary air permit for the concrete batch plant Temporary air permit for the rock crushing for roadways	South West Clean Air Agency RCW 70.94; Ch. 173-401 WAC	§§ 3.2 and 5.1
Forest Practices Application	Washington State Department of Natural Resources Ch. 76.09 & 76.13 RCW; Ch 222 WAC	§ 4.2.1

Table 2.20-1 (continued)
Applicable Federal, State and Local Requirements

Permit or Requirement	Agency/Statute & Regulation	Application §§
Construction Stormwater General Permit	Ecology, Water Quality Program Federal Clean Water Act, 40 CFR Parts 122, 123 & 124, Subchapter D; Chs. 80.50 & 90.48 RCW; Chs. 173-216 & 220 WAC	§ 2.10; 5.2
Approval for Over Height and Over Length Loads on State Highways	WSDOT Goldendale Office 509-427-3920	§ 4.3
Possible WSDOT right of way approval	WSDOT Goldendale Office 509-427-3920	§ 4.3
Approval of Industrial Water Well (Notice of Intent to Construct a Water Well; Water Well Report)	Ecology, Water Quality Program Ch. 18.104, 70-119A & 90.44 RCW; Ch 173-160 and 246-291 WAC Federal Safe Drinking Water Act, 42 USC § 300(f) Parts B & C	§ 2.5; 3.3
Archaeology and Historic Preservation	Washington State Office of Archaeology and Historic Preservation Archaeological Sites and Resources, Chapter 27.53 RCW.	
Electrical Construction Permit	Department of Labor & Industries Ch. 296-746 WAC	
Skamania County		
Building Permit (Civil, Structural, Mechanical, Plumbing)	Skamania County Building Official Title 15 SCC (adopting the IBC, UPC, UFC, and UMC)	§ 4.2.1
Zoning (Conditional Use Permit; Consistency with Skamania County 2007 Comprehensive Land Use Plan)	Skamania Community Development Title 21 SCC Ch. 36.70; Ch 36.70A RCW	§ 4.2.1
Compliance with Noise Regulations	Skamania County Sheriff Department Ch. 8.22 SCC Ch. 70.107 RCW; Ch. 173-60 WAC;	§ 4.1.1
Critical Areas Variance and Development Review	Skamania Community Development Ch. 21A SCC Ch. 36.70; 36.70A RCW	§ 3.1
Clearing and Grading Permit	Skamania Community Development Ch 36.70; 36.70A RCW	§ 3.1
Water Availability Verification Evaluation (WAVE); Group B Water System Approval	Skamania Community Development Ch 50.56 and 70.119A; Ch 246-291 WAC; Chapter 15 and 8.68 SCC Federal Safe Drinking Water Act, 42 USC § 300(f) Parts B & C	§ 3.3
On-Site Septic System Site Evaluation and Design Review	Skamania Community Development Ch. 70.118 RCW; Ch. 246-272A WAC	§ 2.7

Table 2.20-1 (continued)
Applicable Federal, State and Local Requirements

Permit or Requirement	Agency/Statute & Regulation	Application §§
Road Approach Permit, Haul Route Agreement and Negotiated Private Road Requirements	Skamania County Department of Public Works Ch. 12.03 SCC; Skamania County Road Approach and Private Roads Standards Development Assistance Manual	§ 4.3
Columbia Gorge National Scenic Area Approval	Skamania Community Development Ch. 22.14 SCC Federal National Scenic Area Act; 16 USC § 544-544p	§ 4.2.3

2.20.2 FEDERAL PERMITS

2.20.2.1 National Environmental Policy Act (NEPA)

Due to the interconnect with the BPA system, and the need for a Large Generator Interconnection Agreement, the project must undergo National Environmental Policy Act (NEPA) review. The Applicant anticipates that BPA and EFSEC will undergoare jointly preparing a joint NEPA/SEPA processEnvironmental Impact Statement.

Interconnection Agreement

The Applicant filed for an interconnection on in June 2002 and it is presently under study.

2.20.2.2 Threatened or Endangered Species Assessments

National Environmental Policy Act (federal) lead agency
Endangered Species Act, § 7; 16 U.S.C. § 1531 et seq.; 50 CFR Pt 402

The Endangered Species Act (ESA) provides for the conservation of endangered and threatened species and the ecosystems upon which they depend. The ESA establishes, for federal agency actions, a "procedural obligation to consult" with the US Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS).

The consultation process generally involves three steps. First, a federal agency proposing to take action inquires with USFWS and NMFS as to whether a protected species may be present in the area affected by the project. Second, if there is reason to believe the federal action will likely affect a protected species the agency must consult with USFWS and NMFS and avoid jeopardizing the species. The agency prepares a Biological Assessment to determine whether the species (if present) or its habitat would likely be affected by the action. USFWS and NMFS will review the Biological Assessment for completeness and determine whether the federal action will jeopardize the species or not, and will suggest alternatives to reduce or eliminate impacts of the action on the species.

With regard to potential mortalities to avian species, under the Migratory Bird Treaty Act, the USFWS has jurisdiction over the taking of migratory birds. The applicability of the Migratory Bird Treaty Act to wind energy facilities has been debated. However, enforcement under the Migratory Bird Treaty Act has not been initiated for projects like this one that have undergone extensive pre-application avian survey work, have conferred with wildlife agencies, and can show that potential impacts are insignificant through sound protocols and efforts to minimize and mitigate impacts, including through compliance with voluntary wind energy siting guidelines.

Compliance Plan

The Applicant has completed extensive pre-application habitat and wildlife surveys, conducted pursuant to best industry standards, in consultation with wildlife agencies. A Biological Assessment will be prepared and consultation initiated with the USFWS concurrent with the preparation of the NEPA/SEPA EIS. Compliance is further documented in Section 3.4 Habitat, Vegetation, Fish and Wildlife.

2.20.2.3 Historic Preservation/Landmark Review

National Environmental Policy Act (federal) lead agency (OFE)
National Historic Preservation Act § 106; 16 U.S.C. § 470 et seq.; 36 CFR §§ 60-63, 800; Historic Sites, Buildings, Objects, and Antiques, 16 U.S.C. § 469 et seq.; 36 CFR § 296.1; 43 CFR § 7.1 et seq.

The National Historic Preservation Act authorizes the Secretary of the Interior to expand and maintain a National Register of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering and culture. Federal agencies having authority to license any undertaking must, prior to approval of funds or issuance of any license, take into account the effect of the undertaking on any district, site, building, structure or object that is included in, or eligible for, inclusion in the National Register.

The purpose of the Natural Landmarks program is to identify and encourage the preservation of nationally significant examples of the full range of ecological and geological features that constitute the nation's natural heritage. Federal agencies are responsible for considering the existence and location of natural landmarks when assessing the effects of their actions on the environment pursuant to NEPA.

Compliance Plan

A survey for potential historic sites has been prepared and a new survey will be performed and included in the EIS. No evidence of prehistoric activity was observed during the cultural resource survey. No archaeological sites or historic properties were identified, although two historic archaeological isolates were found and documented (Section 4.2.5, Historic and Cultural Preservation). Federal and state regulations require consideration of project effects on historic and/or cultural resources. Cultural resources must undergo a Section 106 Review Process for projects with a federal nexus under the National Historic Preservation Act. Section 106 review will be included in an EIS as a part of the NEPA compliance documentation

2.20.2.4 No Hazard Determination

Pursuant to Title 14 of the CFR, Part 77 Objects Affecting Navigable Airspace, notice shall be made to the FAA of any construction of more than 200 feet above the ground level at its site. The wind turbines, estimated at approximately 426 feet in height (262-foot hub height and 164-foot radius blades, measured from the ground to the turbine blade tip), would exceed the 200-foot measure. If a structure exceeds obstruction standards but does not result in a substantial adverse effect, a determination of no hazard would be required to be obtained from FAA prior to construction.

Compliance Plan

Whistling Ridge Energy LLC will send one executed form set (four copies) of FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area within which the construction or alteration will be located. The notice required under Sec. 77.13(a) (1) through (4) will be submitted at least 30 days before the earlier of the following dates: (1) the date the proposed construction or alteration is to begin; or (2) the date an application for a construction permit is to be filed.

All no hazard determinations shall address or include:

1. ***Full Description.*** A full description of the structure, project, etc., including all submitted frequencies and effective radiated power shall be included. Use exact information to clearly identify the nature of the project (e.g., microwave antenna tower; FM, AM, or TV antenna tower; suspension bridge; four-stack power plant; etc.).

2. ***Latitude, Longitude, and Height.*** Specify the latitude, longitude, and height(s) of each structure. When an obstruction evaluation study concerns an array of antennas or other multiple-type structures, specific information on each structure should be included.

3. ***Marking and/or Lighting.*** A marking and/or lighting recommendation shall be a condition of the determination when aeronautical study discloses that the marking and/or lighting are necessary for aviation safety.

2.20.3 STATE PERMITS

2.20.3.1 State Environmental Policy Act

EFSEC
Ch. 463.47 WAC

Compliance with SEPA is required before any state or local permits or approvals can be issued for the construction or operation of the facility. Skamania County would be the SEPA lead agency for local compliance absent EFSEC review at the State level. EFSEC is lead agency according to Chapter 463-47 WAC. The SEPA process is generally the same, regardless of lead agency.

Compliance Plan

On April 6, 2009 EFSEC ~~will make~~ issued a Determination of Significance, a threshold determination requiring the preparation of a SEPA EIS~~, likely a Determination of Significance~~. This will be followed by the preparation and issuance of a Draft EIS. The Final EIS will be published following the close of adjudicatory hearings.

~~It is anticipated that~~ EFSEC ~~will~~ has joined with BPA in the preparation of a joint NEPA-SEPA EIS that will suffice for both Federal and State permitting decisions. It is further anticipated that EFSEC and BPA will coordinate this effort with Skamania County to ensure that the County has ample opportunity to participate in the process, potentially as a cooperating agency.

2.20.3.2 Temporary Air Permit (for Concrete Batch Plant and for Rock Crushing)

Southwest Clean Air Agency (SWCAA)
Ch. 70.94 RCW; Chs. 173-400; 173-460 WAC

Ecology has regulations governing the operation of portable rock crushers and concrete batch plants. Both may be utilized during the construction of roadways and wind turbine foundations.

Compliance Plan

A temporary air permit would have been required for rock crushing for roadbeds and for one or more portable concrete batch plants (for mixing material for foundations) absent EFSEC jurisdiction. Whistling Ridge Energy LLC will comply with all substantive requirements of such permits. It is anticipated based on past practice that EFSEC would coordinate with the Southwest Clean Air Agency and Ecology as appropriate to ensure compliance with local, state and federal air pollution standards and regulations for the construction phase.

2.20.3.3 Forest Practices Application

Washington State Department of Natural Resources (WDNR)
Ch. 76.09 and 76.13 RCW; Ch 222 WACA

Forest Practices Application/Notification (FPA/N) would be required for activities on forest lands including timber harvest, construction of forest roads, installation or replacement of culverts or bridges on forest roads, and constructing or expanding gravel pits on forest land for forestry use absent EFSEC jurisdiction. Chapter 222-20-050 WAC and RCW 76.09.060(3) regulates portions of forest lands that are permanently removed from forestry use within three years of harvest, the forest practice as a Class IV General conversion. Reforestation of permanently converted areas is not required. The harvest must comply with applicable water typing, riparian management zone, and channel migration zone standards limiting the amount and location of timber removed in or near streams. A WDNR-approved Road Maintenance and Abandonment Plan would be required to inventory all existing and constructed forest roads, and to schedule any needed road work. All boundaries would be marked in the field prior to submittal of the FPA/N to WDNR.

Compliance Plan

The Whistling Ridge Energy LLC will comply with the substantive requirement and it is anticipated that EFSEC will coordinate with WDNR.

EFSEC will issue a SEPA ~~determination~~ EIS specifying areas to be temporarily and permanently converted to non-forestry use because of the wind energy facility, and areas that are to remain in commercial forest production.

2.20.3.4 Construction Stormwater General Permit

Washington Department of Ecology
Federal Clean Water Act; 40 CFR Parts 122, 123 & 124, Subchapter D; Chs. 80.50 & 90.48 RCW; Chs. 173-216 & 220 WAC

Coverage under the 2005 Construction Stormwater General Permit will be required for stormwater discharges resulting from construction of the Whistling Ridge Energy Project. Construction activities that disturb more than five acres of land and certain industrial activities typically must file a notice of intent with Ecology and comply with the conditions of the general permits. Permit conditions include the preparation of SWPPPs to implement BMPs to prevent or control stormwater pollution, monitoring of discharges during construction, and regular reporting to Ecology.

Compliance Plan

EFSEC has jurisdiction regarding the NPDES Permit over the project, pursuant to WAC Chapter 463-38. Construction of the facility would disturb more than five acres of land, and EFSEC may require that the Whistling Ridge Energy Project obtain coverage under Ecology's Stormwater General Permit for construction activities.

If coverage is deemed necessary by EFSEC, at least 30 days prior to beginning construction, Whistling Ridge Energy LLC would develop and submit to EFSEC a notice of intent to be covered by Ecology's 2005 Construction Stormwater General Permit for discharges associated with construction. Pursuant to the general permit, Whistling Ridge Energy LLC would prepare SWPPPs that identify appropriate BMPs to reduce the pollution loadings resulting from construction activities and industrial operations. These BMPs would be incorporated into project design, and Whistling Ridge Energy LLC would ensure that they are observed during construction of the project. Monitoring and reporting would be carried out in accordance with permit requirements.

2.20.3.5 Approval for Over-Height and Over-Length Loads on State Highways

Department of Transportation
Road and Bridge Restrictions
Goldendale Office 509-773-4533

WSDOT has restrictions in place for portions of state highways that may be used for the transport of wind turbine equipment to the site. These load restrictions include limits on width, height, length, and weight, and vary depending on the specific roadway.

Compliance Plan

Whistling Ridge Energy LLC will work with WSDOT to select the preferred route for the transport of equipment from either the Port of Longview or the Port of Vancouver to the site. Options include trucking, rail, and/or use of barges on the Columbia River. Depending on the option selected, the Applicant would comply with the requirements imposed by EFSEC and WSDOT.

2.20.3.6 Right of Way

Department of Transportation
Road and Bridge Restrictions
Goldendale Office 509-773-4533

There may be a need to improve and widen the turning radius of the intersection of SR 14 and Cook-Underwood Road for the deliver of turbines. Widening may require use of WSDOT right of way.

Compliance Plan

The Applicant will work with the WSDOT Goldendale Office to determine optimal intersection design and obtain right of way approval if necessary.

2.20.3.7 Water Well

Department of Ecology
Federal Safe Drinking Water Act; 42 USC § 300(f) Parts B & C
Ch. 18.104, 70.119A, and 90.44 RCW; Ch 173-160 and 246-291 WAC

Absent EFSEC jurisdiction, these matters would have been enforced by Ecology and Skamania County. Groundwater withdrawal wells for industrial use, including irrigation, of up to a maximum of 5,000 gallons per day are exempt from Ecology's water right permit requirements. However, these permit-exempt wells must still comply with the minimum construction standards set forth in Chapter 18.104 RCW and the "first in time, first in right" clause of Washington State Water Law. The well/property owner and the well driller share responsibility for ensuring compliance with the standards. A Notification of Intent to Construct a Water Well form would be submitted to Ecology at least 72 hours prior to well construction. The well driller must file a copy of a Water Well Report with Ecology upon completion of well construction and must attach a well identification tag to the well. Wells must be located at least 100 feet from septic tanks, privies, and other sources of contamination as specified in Chapter 173-160-171 WAC.

Wells to be used for potable water must receive an approved Water Availability Verification Evaluation (WAVE) from Skamania County Community Development Department in accordance with SCC 8.68 and SCC Title 15. Permit-exempt wells not meeting the elimination conditions in Chapter 246-291 WAC are classified as Group B Public Water Systems and subject to standards in SCC 8.68 as administered by Skamania Community Development.

Compliance Plan

Whistling Ridge Energy LLC will comply with the substantive requirements. It is anticipated based on past practice that EFSEC would coordinate with Ecology and Skamania County.

2.20.3.8 Archeological Sites

Washington State Office of Archaeology and Historic Preservation

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

Compliance Plan

The project will comply with Chapter 27.53 RCW. The Applicant has researched state and federal registries along with all archaeological and historical files and maps located at the Washington State Office of Archaeology and Historic Preservation in Olympia.

2.20.3.9 Electrical Construction Permit

Department of Labor and Industries
Ch. 296-46 WAC

The Department of Labor and Industries is responsible for inspection of electric wires and equipment within the Whistling Ridge Energy Project, and requires that electric wires and equipment comply with National Energy Code standards.

Compliance Plan

Whistling Ridge Energy LLC will design and construct the project in compliance with the applicable electrical regulations and standards to ensure that the project complies with Department of Labor and Industries inspection requirements. Whistling Ridge Energy LLC will coordinate with EFSEC to ensure all necessary Department of Labor and Industries inspections and approvals are obtained.

2.20.4 SKAMANIA COUNTY

2.20.4.1 Skamania County Building Permit

Skamania County Building Official
Title 15 SCC

Absent EFSEC jurisdiction, a building permit is required for construction of the turbine foundations and permanent buildings, including the Operations and Maintenance building, and placement of identifying signs.

Compliance Plan

Whistling Ridge Energy LLC will comply with the substantive requirements for the building permit. It is anticipated based on past practice that EFSEC would coordinate with Skamania County.

2.20.4.2 Zoning

Skamania County Community Development Department
Title 21 SCC

SCC Title 21 governs all unincorporated areas of Skamania County except those portions located within the General and Special Management Areas of the Columbia River Gorge National Scenic Area. The proposed project lies within three zones designated in the existing SCC Title 21 (Figure 4.2-1, Zoning Map). No portion of the project or roads requiring improvements are located~~lies~~ within the Scenic Area (Figure 2.1-1). ~~However, some of the proposed improvements to existing roads are proposed in the General Management Area (GMA) of the Scenic Area (see Figure 2.1-1). Scenic Area compliance for the road improvements is discussed in Section 4.2 of this Application.~~

Turbine corridor A1-A7 falls ~~into two zoning classifications. The south portion of the corridor, which could include up to a maximum of four turbines, is proposed in the Residential 10 (R-10) zone under SCC Title 21. The north portion of corridor A1-A7 will be in~~ within the Resource Production Zone (For/Ag 20).~~ A maximum of three turbines could be located in this zone.~~ The remaining turbine corridors are proposed in the unmapped zone. The alternative site for the Operations and Maintenance facility would be on land zoned Residential 5. Table 2.20-2 identifies the existing comprehensive plan designation and the zoning for each proposed turbine corridor in the project.

Table 2.20-2
Skamania County Zoning and Comprehensive Plan Designations for Proposed Turbine Corridors

Turbine Corridor	2007 Comprehensive Plan Designation	Zone Designation
A8-A13, B1-B21, C1-C8, D1-D3, E1-E2 and F1-F3	Conservancy	Unmapped (UNM)
~~North portion of~~ A1-A7 ~~(maximum 3 turbines)~~	Conservancy	Resource Production Zone (For/Ag-20)
~~South portion of A1-A7 (maximum of 4 turbines)~~	~~Conservancy~~	~~Residential 10 (R-10)~~
Alternative Operations and Maintenance Site Along West Pit Road	Rural II	Residential 5 (R-5)

Compliance Plan

Turbines located within the unmapped zone are permitted outright by the County, limited only by an inquiry concerning whether the use would constitute a "nuisance." Turbines located within the Resource Production Zone~~ and Residential Zone~~ are allowed by Conditional Use approval. The alternative location for the Operations and Maintenance facility would be on land zoned Residential 5, and would also be allowed by Conditional Use approval. Standards in SCC 21.40.050 and 21.56.050 include limitations as to lot size, density, setbacks, a 35-foot building height limit, off-street parking requirements, and prohibition of building location within easements. As proposed, the project meets all these requirements.

While EFSEC's jurisdiction and authority over local land use requirements and determinations is now well established, the analysis contained in Section 4.2.1 of this application demonstrates that, as of the date of this application, the project can and does comply with the 2007 Comprehensive Plan, and both the zoning code in effect at the time of this Application (SCC Title 21). The Applicant anticipates this project will be fully consistent with the Skamania County Code and that it will meet local requirements.

2.20.4.3 Noise Regulations

Skamania County Sheriff Department
Ch. 8.22 SCC; Ch. 70.107 RCW; Ch. 173-60 WAC

Although no permit is required, absent EFSEC jurisdiction the Skamania County Sheriff Department would be responsible for noise control and abatement under SCC Title 8. SCC Title 8 relies on State standards established for maximum environmental noise levels. Permissible noise levels established by state and local regulation vary depending on the source of the noise (which in this case is "industrial") and the nature of the receiving environment (in this case, largely industrial and agricultural with some residential). Noise performance standards established by state regulation must be met during the construction and operation of the project.

Compliance Plan

The project will be designed to ensure that all noise generated will be below the applicable standards with noise mitigation measures. Modeling indicates that the Whistling Ridge Energy Project will meet all applicable noise regulations which will be enforced by EFSEC. See Section 4.1.1, Noise.

2.20.4.4 Critical Areas Ordinance

Skamania County Community Development Department
Ch. 21A SCC; Ch 36.70; 36.70A RCW

The Skamania County Critical Areas Ordinance would apply absent EFSEC Jurisdiction. SCC 21A.03.010 states that "no building, structure or land shall be used, and no building, structure or road shall be hereafter erected, altered or enlarged, including those proposed by State or Federal agencies, in any designated critical area governed by this title, except as allowed by this title." The Critical Areas Ordinance includes a number of exemptions that may be applicable. Proposed improvements to existing private roads will extend outside previously-disturbed areas within critical areas ~~outside the Scenic Area~~, so that they do not meet any of the allowed exemptions. SCC Title 21A would apply to the project. Two application types are established under SCC 21A.03.030:

1. Variances to buffers established under SCC 21A.04 governing watershed protection areas

2. Development reviews under SCC 21A.05 (Fish and Wildlife Protection Areas) and SCC 21A.06 (Geologically Hazardous Areas)

Compliance Plan

~~Title 21A does not apply in the Scenic Area.~~ West Pit Road crosses one unnamed drainage in the Lapham Creek watershed. This stream had observed flow through the existing culvert under West

Pit Road at the time of the July 2009 field visit. However, the surface flow and the channel disappear downstream of the culvert. West Pit Road and the underlying culver would be widened to allow access to the site by construction vehicles ~~No new construction will occur within streams or their buffers outside the Scenic Area.~~ The planned road improvements that will occur within stream buffers will result in expansion of existing roads to an extent that is less than 100% of the original footage. Thus, no variance would be required under SCC Title 21A.03.030(1) to complete the project according to SCC SCC 21A.020(B)(2)(g and i).

Critical area mitigation requirements, if necessary, are site-related, and may be implemented by EFSEC. EFSEC requirements related to critical areas would be similar to the substantive requirements resulting from the implementation of SCC Title 21A.03.030(2). Watershed protection areas (streams and wetlands) are addressed in Sections 3.3 Water, 3.4 Habitat, Vegetation, Fish and Wildlife, and 3.5 Wetlands. Fish and Wildlife Protection Areas are addressed in Section 3.3, Water. Geologically Hazardous Areas are addressed in Section 3.1, Earth.

2.20.4.5 Clearing and Grading Permit

Skamania County Community Development Department
Ch. 24 SCC; Ch 36.70; 36.70A RCW

Absent EFSEC jurisdiction, a Skamania County Clearing and Grading Permit would be required. A new Chapter of SCC, Title 24 Clearing and Grading, was adopted by the Skamania Board of County Commissioners in February 2008. All grading activity not exempted under SCC 24.02.060 would be prohibited without first obtaining a Clearing and Grading Permit under SCC Title 24.

Compliance Plan

Detailed clearing and grading plans prepared by an Engineer licensed in the State of Washington will be prepared and submitted to EFSEC for review and approval prior to the start of construction. These plans will substantively comply with SCC Title 24 standards.

2.20.4.6 Water Availability Verification Evaluation and Group B Public Water System Approval

Skamania County Community Development Department
Ch. 8.68 and 15 SCC; Ch 50.56 and 70.119A; Ch 246-291 WAC

Absent EFSEC jurisdiction, a Group B Public Water System Approval would be required for permit-exempt industrial water wells that may be used as a drinking water source. The Operations and Maintenance facility proposed in conjunction with the project would be used as such a source.

To document proof of potable water, a WAVE approval would be required from Skamania Community Development.

Compliance Plan

The project will comply with applicable potable water and Group B Water System Standards. Based on past practice, it is anticipated that EFSEC will coordinate with Skamania County and Ecology.

2.20.4.7 On-Site Septic System Site Evaluation and Design Review

Skamania County Community Development Department
Ch. 70.118 RCW; Ch. 246-272A WAC; Federal Safe Drinking Water Act 42 USC § 300(f) Parts B & C

Absent EFSEC jurisdiction, Skamania Community Development would be responsible for ensuring site and design standards identified in WAC 246-272A are met. Generally, a Site Evaluation is requested to determine the type of system required prior to installation of a new on-site septic system. A Site Evaluation Results Letter is issued, which is valid for one year. The project proponent must then hire a qualified on-site septic system designer to design a system for the site in accordance with the Site Evaluation Results Letter. The design must then be submitted for Design Review. An approved Design Review is valid for five years from the date of issuance. Extensions may be granted under certain circumstances.

Compliance Plan

The project site will be evaluated as to applicable on-site septic system design standards and all systems will comply with these standards. It is anticipated that EFSEC will coordinate with Skamania County.

2.20.4.8 Road Approach Permit and Private Road Requirements

Skamania County Public Works Department
Ch 12.03 SCC; Skamania County Road Approach and Private Roads Standards Development Assistance Manual

The proposed road improvements to West Pit Road required to access and construct the project include modifications to existing logging roads and new construction outside the Scenic Area. ~~Improvements to an unnamed private road within the Scenic Area also are proposed. County Assessor's maps identify the existing road in the Scenic Area as CG2930 (County Assessor maps 3-10, 3-10-19, 3-10-20). Figure 4-1 of the 2007 Skamania County Comprehensive Plan does not include the CG2930 road as part of the system of County roads.~~ West Pit Road is an existing private logging road. All private roads in Skamania County must comply with guidelines in the Private Road Guidelines and Development Assistance Manual adopted by County Resolution in 2008 (SCC Title 12.03.030) "where a proposed change in use converts a private driveway (Category 1 road) to a higher category road (SCC 21.03.070)." Also, a road approach permit is required where a private road enters a County road.

SCC 12.03 classifies private roads by use (12.03.030). Current use of the ~~CG2930~~ West Pit Road ~~road~~ is for access to ongoing forest operations taking place ~~in and~~ outside the Scenic Area. No homes are accessed via this road. Because it accesses fewer than four homes, ~~the CG2930 road~~West Pit Road is a Category 1 road under SCC 21.03.030. ~~Existing logging roads outside the Scenic Area are also currently Category 1 roads.~~

The Applicant's proposed wind energy facility would establish a new use on property outside the Scenic Area. It is not likely this change in use will convert the existing Category 1 roads to

Category 6 roads (SCC 21.03.030). However, construction of the project would have impacts to existing County roads and to existing Category 1 private roads that would require road upgrades and repair before, during and after construction. The specifics of this work would be determined through negotiation of a Haul Route Agreement with the County Engineer, which will be approved by the Board of County Commissioners.

A Road Approach Permit ~~would~~ may be required where the ~~CG2930 road~~ new connection of West Pit Road enters ~~Scoggins~~ Willard Road. The specific requirements of this permit would be negotiated with the County Engineer and would likely exceed Category 6 (commercial) private road approach requirements due to the nature of the project. However, it is also likely the project's access road would not be required to meet Category 6 standards for its full length as traffic volumes will remain very low.

Compliance Plan

Whistling Ridge Energy LLC will comply with Skamania County Private Road Requirements as administered through EFSEC. A Haul Route agreement and Road Approach permit will be negotiated to protect and repair Skamania County roads.

~~2.20.4.9 Columbia Gorge National Scenic Area Permit~~

~~*Skamania County Community Development Department*~~
~~*Chapter 22.14 SCC*~~

~~The Applicant proposes minor upgrades to access roads located on private lands (owned and controlled by S.D.S. Co., LLC), situated within the Columbia River Gorge National Scenic Area. No portion of the wind turbine generator corridors or any related facilities are proposed within the Scenic Area, and the Scenic Area does not regulate any development activity proposed outside the Scenic Area boundary.~~

~~Columbia River Gorge National Scenic Area Permit Requirements~~

~~The Columbia River Gorge National Scenic Area Act places restrictions on development within the Scenic Area. The boundaries of the Scenic Area are defined in the Act by reference to a "map entitled 'Boundary Map, Columbia River Gorge National Scenic Area,' numbered NSA-001 sheets 1 and 2, and dated September 1986," which is on file with the Commission. Additionally, S.D.S. Co., LLC had the Scenic Area boundary surveyed by Terra Surveying, a licensed land surveyor, in 2006 and 2007. This survey was reviewed for accuracy by USFS Surveyor Don Karsch, who is responsible for reviewing such surveys to establish the Scenic Area boundaries. The survey was accepted by the USFS and recorded in Skamania County with an Auditor's File Number of 2007167932. Certain uses are allowed without review, but some uses require prior approval and others are prohibited. The restrictions depend, in part, on whether the proposed use will take place in the General Management Area (GMA) or a Special Management Area (SMA). The boundaries of the SMAs are defined in the Act by reference to a "map entitled 'Special Management Areas, Columbia River Gorge National Scenic Area,' numbered SMA-002 sheets 1 through 17, and dated September 1986," which is on file with the Commission.~~

~~The proposed access to the site would be via an existing private logging road, listed as CG2930, connecting to Scoggins Road, which is a County road. CG2930 is currently narrow, approximately 10 to 12 feet wide, and will require permanent widening to a minimum drivable section width of 16 feet with allowance for side slope and drainage from Scoggins Road to the proposed project site (see Figures 4.3-17 through 4.3-25 in Section 4.3). Widening would require possible removal of trees, and possible engineered fill and embankment cut sections. The engineered fill and embankment cut sections would not require paving, but would require an all-weather driving surface. There are two sharp left hand turns in the roadway enroute to the proposed project site (Figures 4.3-17, 4.3-23, and 4.3-24) that will require additional special considerations to accommodate the required truck turning radii for transport of the wind energy blades to the site. Road CG2930 is located within the CRGNSA and approval would be required under applicable standards in conjunction with SEPA and building permit approvals before making roadway improvements.~~

~~Certain uses are allowed without review in both the GMA and SMAs, including repair, maintenance and operation of roads. A person can also resurface or overlay existing paved roads and grade and gravel existing road shoulders, provided that the activity does not: (i) increase the width of the road; (ii) disturb the toe of adjacent embankments, slopes or cut banks; or (iii) change the existing structures or add new structures. Forest practices, including the construction of roads, are also allowed in the GMA as long as the practices do not violate conditions of approval for other approved uses and developments. However, a forest practice must relate to growing, harvesting, or processing timber.~~

~~The road improvements proposed within the Scenic Area do not fall within any of these exemption categories. The Applicant needs to improve, rather than repair, maintain, or operate, the road. Further, the necessary improvements include widening the existing road. While "forest practices" is a broad category that includes road construction, the improvement of roads for wind energy facility construction does not fall within the definition because wind energy facilities do not relate specifically to growing, harvesting, or processing timber.~~

~~The Applicant's road improvements fall within the category of uses that "may be allowed subject to review by the County Administrator for compliance with all applicable provisions protecting scenic, cultural, natural and recreation resources." In SMAs, the use must also be sited to minimize the loss of land suitable for the production of forest products. Uses the Administrator may allow subject to review on GMA lands designated as large-scale agriculture, commercial forest, large woodlands, or small woodlands include construction, reconstruction or modification of roads, not in conjunction with forest use or forest practices. Uses the Administrator may allow subject to review on SMA lands designated as forest include road and railroad construction and reconstruction. Therefore, but for EFSEC consideration of the ASC, the improvements would subject to an administrative review and approval, regardless of whether the road is located in the GMA or SMAs.~~

~~Compliance Plan~~

~~The Applicant proposes minor upgrades to access roads located on private lands (owned and controlled by S.D.S. Co., LLC) and County rights of way, all of which are situated within the Scenic Area GMA. No portion of the wind turbine generator corridors or any related facilities are proposed within the Scenic Area, and the Scenic Area does not regulate any development activity proposed outside the Scenic Area boundary. In a non-EFSEC application, applicable approvals for road~~

~~improvement work within the Scenic Area would be administered through Skamania Community Development, with appeal to the Columbia River Gorge Commission, and ultimately resolved through the State of Washington judicial appeals system. Pursuant to RCW Ch. 80.50, in this Application, the EFSEC process preempts the local process for approval of the road improvements within the Scenic Area. However, the Applicant plans to comply with all requirements set forth below by satisfying the EFSEC that all Scenic Area requirements can be met through the EFSEC application process.~~

~~Whistling Ridge Energy LLC has included information within this Application that demonstrates project compliance with the requirements of the Scenic Area for the proposed roadway improvements. See Sections 3.1 Earth, 3.3 Water, 3.4 Habitat, Vegetation, Fish and Wildlife, 3.5 Wetlands, 4.2 Land and Shoreline Use, and 4.3 Transportation.~~

SECTION 3.1 EARTH
(WAC 463-60-302)

3.1.1 INTRODUCTION

The proposed Whistling Ridge Energy Project would be located approximately 7 miles west of the town of White Salmon and approximately 2 miles east of the Little White Salmon River in Skamania County, Washington. The project area is located on private land immediately north of the Columbia River Gorge National Scenic Area boundary. Existing conditions, potential impacts, and, where appropriate, mitigation measures are discussed below. The following sections include detailed evaluation of geology, soils, topography, unique physical features, and erosion/enlargement of the land area.

URS conducted a preliminary geotechnical investigation in 2007, including review of aerial photographs, geologic reconnaissance, test pit analyses, field soil resistivity testing, dynamic cone penetration tests, laboratory testing of soil samples, data analyses, and preparation of design and construction recommendations for the wind energy tower foundation systems and design of approach roadways. See Appendix A for an updated version of the November 2007 geotechnical report.

Site-specific measures have been identified to mitigate potential hazards. With standard and site-specific mitigation measures, impacts on the natural earth environment from the construction and operation of the Whistling Ridge Energy Project are expected to be minor.

3.1.2 GEOLOGY

The White Salmon, Washington area is located within the Cascade Range and the Columbia Intermontane Physiographic Province. The project area is located just within the western boundary of the Columbia Plateau, which is located at the western edge of the Columbia Intermontane Physiographic Province (Freeman et al. 1945). This lowland province is surrounded on all sides by mountain ranges and highlands, and covers a vast area of eastern Washington and parts of northeastern Oregon and western Idaho. The Columbia Plateau is underlain by a series of layered basalt flows extruded from vents (located mainly in southeastern Washington and northeastern Oregon) during the Miocene epoch (between 5.3 and 23.8 million years BP). Collectively, these basalt flows are known as the CRBG. Individual basalt flows range in thickness from a few millimeters to as much as 300 feet. Where significant time elapsed between successive flows, interflow zones developed. The interflow zones are characterized by the presence of highly weathered basalt and paleosols. These interflow zones are generally significantly weaker than the surrounding basalt and sometimes form basal failure surfaces for large landslide complexes within the CRBG.

A variety of younger volcanic rocks and sedimentary materials that range from Pliocene (1.8 to 5.3 million years BP) to Holocene (less than 10,000 years BP in age) overlie the CRBG in the project area. Sedimentary rocks are generally thought to underlie the basalts in the project area.

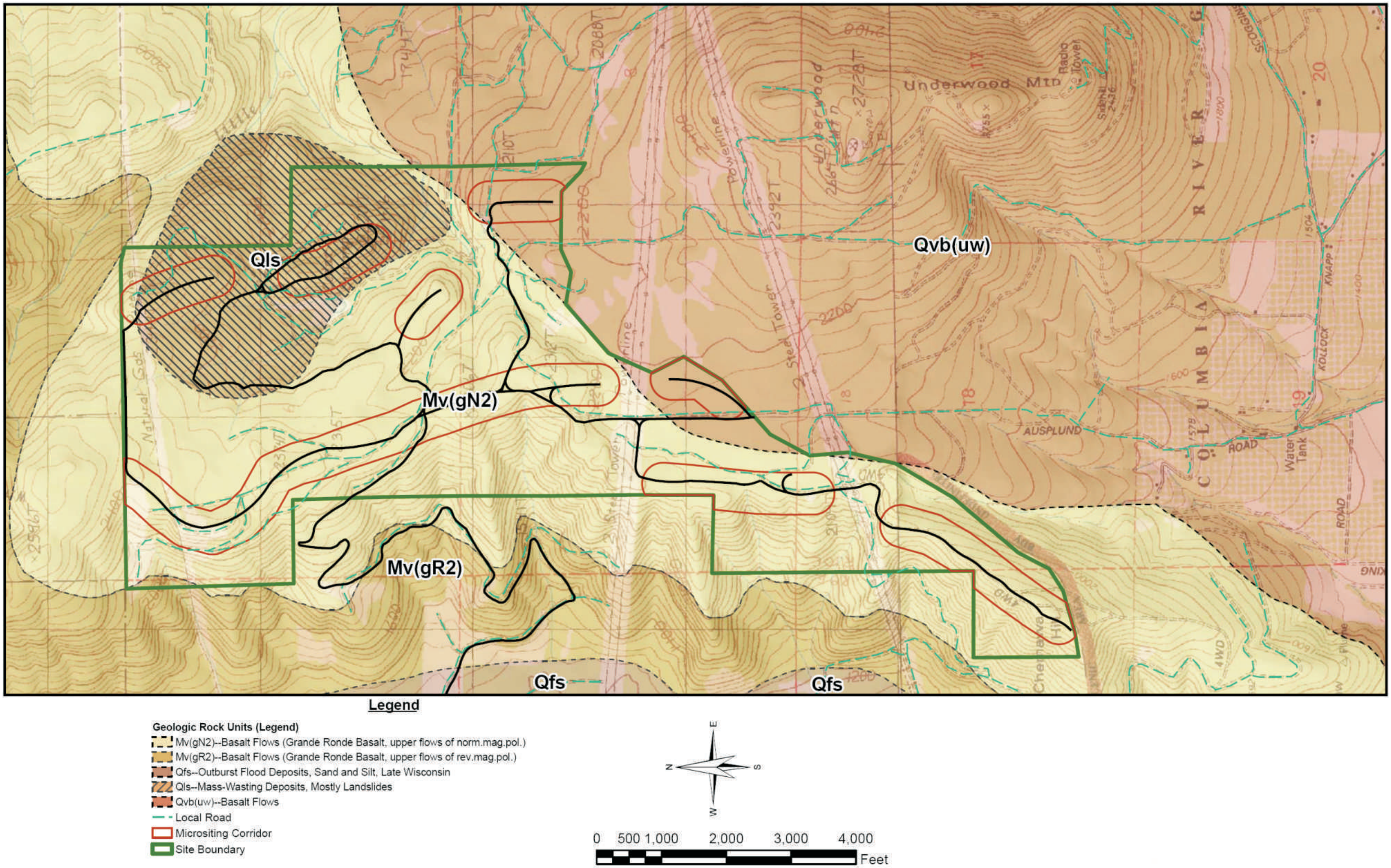
The proposed project site is located within the northern boundary of the structural Hood River Valley, which extends a few miles into southern Washington. In general, the geology of the area consists of basalt flows extruded from local vents, layered with conglomerate, tuff, tuff breccias, and other volcanoclastic deposits. These formations are typically overlain by silt and clay soil of varying thickness in the project vicinity.

The bedrock underlying the proposed project site consists of Grande Ronde Basalt of the CRBG and Quaternary basalt of Underwood Mountain—a shield volcano that lies approximately midway between the lower reaches of the Little White Salmon and White Salmon Rivers. Its southern slopes drain to the Columbia River. Site geology excerpted from Korosec (1987) is presented on Figure 3.1-1.

Underwood Mountain Basalt Unit: The Pleistocene-epoch (1.8 million years to 10,000 years BP) basalts and cinders erupted from the Underwood Mountain vents and overlie the Tertiary CRBG Grande Ronde and Wanapum basalts. Public records of wells located within the Underwood volcanic field indicate a 310-foot-thick repetitive sequence of thin lava flows (two to eight feet thick), cinders and silty-clays overlying a productive confined aquifer consisting of intensely fractured Grande Ronde basalt. The Miocene-epoch Grand Ronde Basalt consists of multiple basalt flows that are a subgroup of the CRBG, and has been described to have a thickness of up to 1,000 feet, although the thickness in the project vicinity is not known.

Field observations of rock outcrop and test pits excavated during a geotechnical investigation at the proposed site indicate that the near-surface rock consists of yellow-gray volcanoclastic rocks, medium to dark gray, fine-grained to medium-grained basalt and andesite, which is fractured into angular gravels, cobbles, and boulders. The basalt observed in the test pits was most commonly vesicular, very soft to moderately hard, and decomposed to slightly weathered. Some zones displayed non-vesicular characteristics and were generally harder. In most exposures the basalt was moderately to highly weathered, with fractures and vesicles filled by clayey residual soil. In most of the test pits excavated in this basalt, the rock is weathered into varying layers of residual (clay) soil, and clayey gravelly cobble-sized basalt. The residual soil layers often exhibit remnant rock structure.

Unconsolidated Deposits: Unconsolidated deposits are thin to absent in the project vicinity. Based on observations made during field reconnaissance, the surficial materials consisted primarily of a thin veneer of brown, silty topsoil that is likely derived from forest duff and wind-blown deposits. The thickness of this material varied across the site from a few inches to three feet, based on test pit observations. In several areas, bedrock and talus were observed at the ground surface.



Source: Korosec, 1987.

Job No. 33758687

Revised Figure 3.1-1

Site Geology

URS

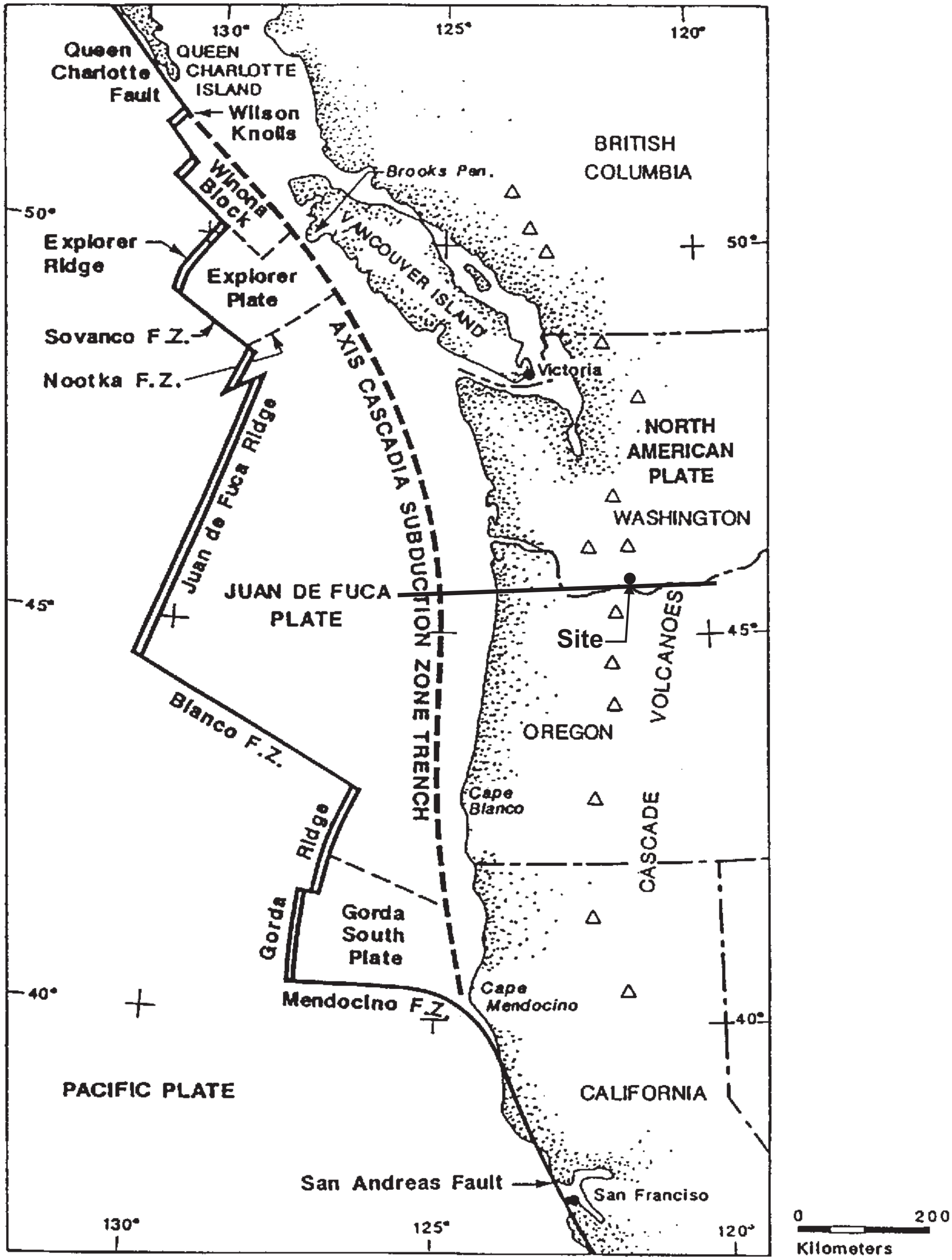
Whistling Ridge Energy Project
Skamania County, Washington

Landslide Deposits: Regional geologic maps indicate the presence of Quaternary-age mass wasting landslide deposits located to the north of Underwood Mountain (Figure 3.1-1). These deposits are mapped as a large landslide, estimated to be approximately 1/3 square mile in area and almost a mile long. A URS engineering geologist reviewed stereo aerial photographs that were flown specifically for this project in 2007 and performed a one-day site reconnaissance. There is no obvious evidence, based on the review, to suggest the presence of a landslide as mapped on the 1:100,000 scale geologic map. If landslide deposits are present, they are so old that most or all of the geomorphic evidence has been removed by erosion.

During the current subsurface exploration, groundwater was not encountered in the site up to a depth of 16 feet bgs. It should be noted that these observations reflect groundwater levels at the time of the field investigation and actual groundwater levels may fluctuate significantly in response to seasonal effects, regional rainfall, and other factors not observed during this investigation. There may be regional or perched water tables at greater depth. Prior to final design of the tower foundations, additional subsurface investigations (boreholes) would be required to provide geotechnical data at foundation and anchor depths. Future deep foundation investigations would include observation of groundwater, if encountered.

3.1.3 SEISMICITY

Strong ground motions potentially affecting the site can be generated from earthquakes on several regional seismic sources. Earthquakes are the result of sudden releases of built-up stress within the tectonic plates that make up the earth’s surface. The stresses accumulate because of friction between the plates as they attempt to move past one another. Earthquakes in the Pacific Northwest can originate from four different types of sources: (1) interplate earthquakes on the CSZ, (2) intraplate earthquakes within the subducting Juan de Fuca plate as it sinks and breaks up below the North American plate, (3) shallow crustal earthquakes on faults within the North American plate, and (4) volcanic earthquakes such as those associated with the eruption of Mount St. Helens. These sources are depicted on Figures 3.1-2 and 3.1-3. The largest historical earthquakes in Washington, southern British Columbia, and northern Oregon are shown on Figure 3.1-4 and summarized in Table 3.1-1.



△ Cascade Volcano

▬ Line of Cross Section on Figure 3.1-3

Modified from Washington Public Power Supply System (1988) (after Riddihough, 1984).

Job No. 33758687

Figure 3.1-2

Tectonic Setting of the Cascadia Subduction Zone

URS

Whistling Ridge Energy Project
Skamania County, Washington

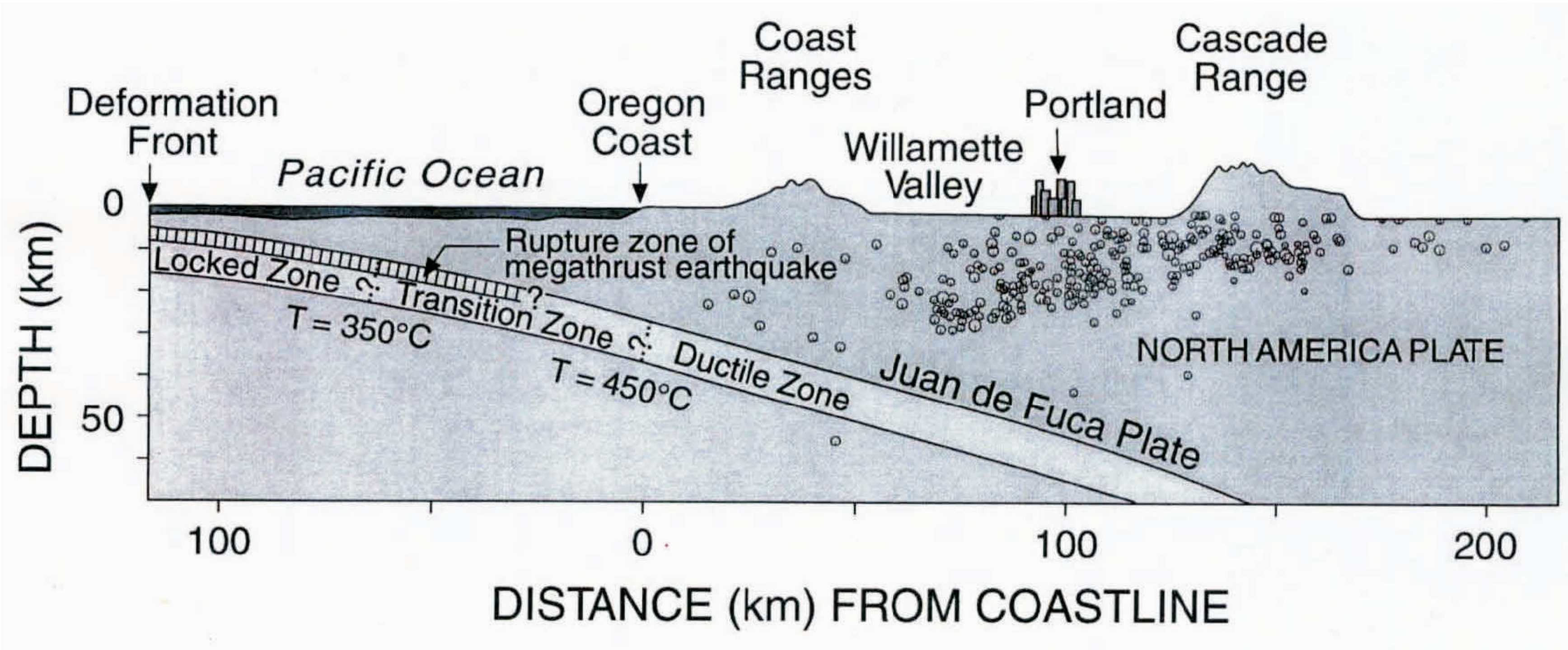
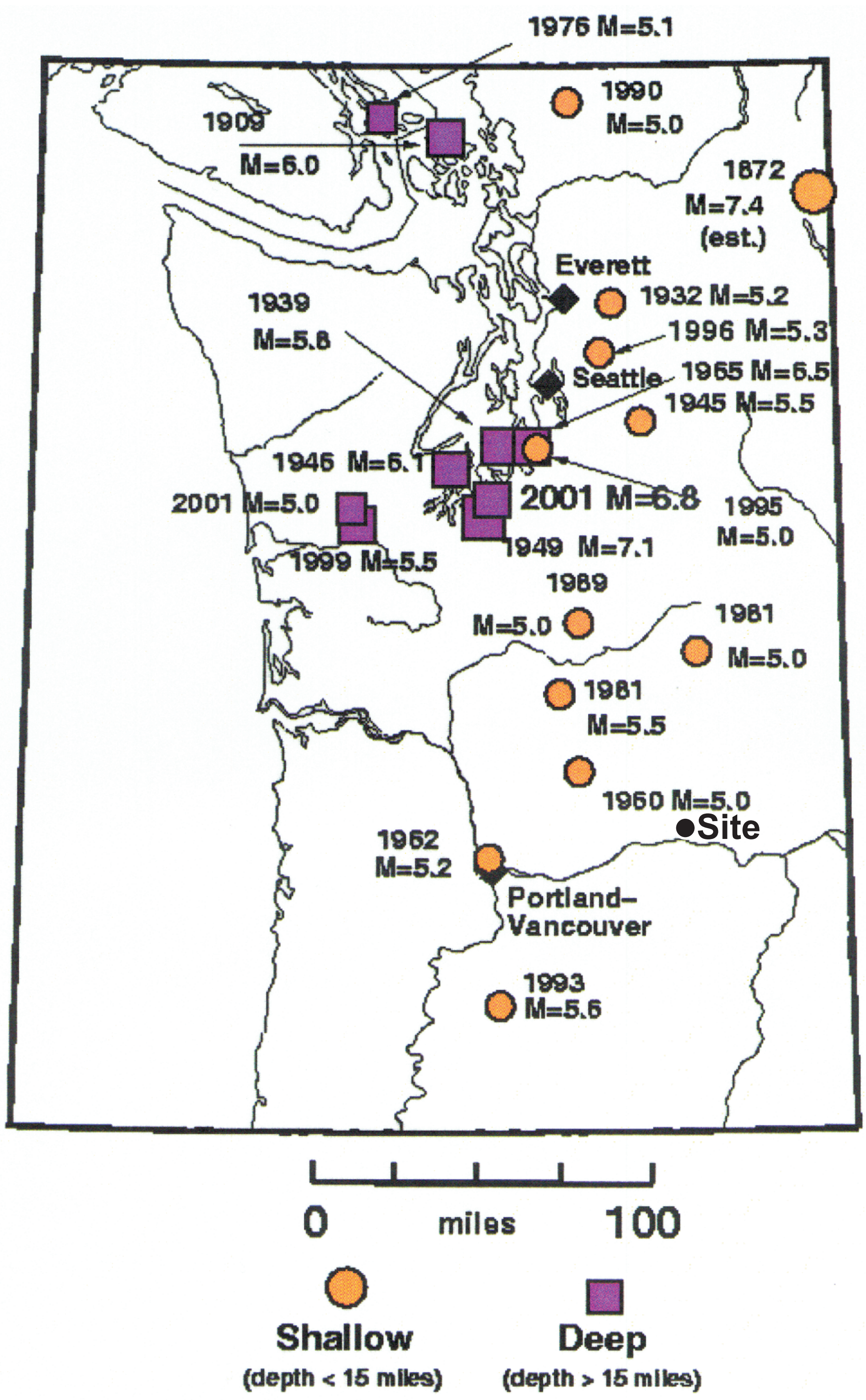


Figure 3.1-3
Cascadia Subduction Zone

33758687_12.cdr



Source: University of Washington

Figure 3.1-4

Epicenters and Dates of
M 5.0 Pacific Northwest Earthquakes

Job No. 33758687

URS

Whistling Ridge Energy Project
Skamania County, Washington

Table 3.1-1
Largest Known Earthquakes Felt in Washington

Year	Date	Time (PST)	North Latitude	West Longitude	Depth (km)	Mag (felt)[a]	Mag (inst)[b]	Max. Mod. Mercalli Intensity	Location[c]
1872	12-14	2140	48°48'00"	121°24'00"	shallow	7.3	None	IX	North Cascades (Chelan area[d])
1877[e]	10-12	1353	45°30'00"	122°30'00"	shallow	5.3	None	VII	Portland, Oregon
1880	12-12	2040	47°30'00"	122°30'00"			None	VII	Puget Sound
1891	11-29	1521	48°00'00"	123°30'00"			None	VII	Puget Sound
1893	3-6	1703	45°54'00"	119°24'00"	shallow	4.7	None	VII	Southeastern Washington
1896	1-3	2215	48°30'00"	122°48'00"		5.7	None	VII	Puget Sound
1904	3-16	2020	47°48'00"	123°00'00"		5.3	None	VII	Olympic Peninsula, eastside
1909	1-11	1549	48°42'00"	122°48'00"	deep	6	None	VII	Puget Sound
1915	8-18	605	48°30'00"	121°24'00"		5.6	none	VI	North Cascades
1918[e]	12-6	41	49°37'00"	122°55'00"		7	7	VIII	Vancouver Island
1920	1-23	2309	48°36'00"	123°00'00"		5.5	none	VII	Puget Sound
1932	7-17	2201	47°45'00"	121°50'00"	shallow	5.2	none	VII	Central Cascades
1936	7-15	2308	46°00'00"	118°18'00"	shallow	6.4	5.75	VII	Southeastern Washington
1939	11-12	2346	47°24'00"	122°36'00"	deep	6.2	5.75	VII	Puget Sound
1945	4-29	1216	47°24'00"	121°42'00"		5.9	5.5	VII	Central Cascades
1946	2-14	1918	47°18'00"	122°54'00"	40	6.4	6.3	VII	Puget Sound
1946[e]	6-23	913	49°48'00"	125°18'00"	deep	7.4	7.3	VIII	Vancouver Island
1949	4-13	1155	47°06'00"	122°42'00"	54	7	7.1	VIII	Puget Sound
1949[e]	8-21	2001	53°37'20"	133°16'20"		7.8	8.1	VIII	Queen Charlotte Isl., B.C.
1959	8-5	1944	47°48'00"	120°00'00"	35	5.5	5	VI	North Cascades, east side
1959[e]	8-17	2237	44°49'59"	111°05'	10-12	7.6	7.5	X	Hebgen Lake, Montana
1962[e]	11-5	1936	45°36'30"	122°35'54"	18	5.3	5.5	VII	Portland, Oregon
1965	4-29	728	47°24'00"	122°24'00"	63	6.8	6.5	VIII	Puget Sound
1981	2-13	2209	46°21'01"	122°14'66"	7	5.8	5.5	VII	South Cascades
1983[e]	10-28	606	44°03'29"	113°51'25"	14	7.2	7.3	VII	Borah Peak, Idaho
1990[f]	4-13	2133	48°50'42"	122°9'40"	3	12	5.2	VI	Deming
1993[e]	3-25	535	45°02'00"	122°36'26"	16		5.6	VII	Scotts Mills, Oregon
1995[g]	1-29	1511	47°23'24"	121°21'36"	20		5	V	Robinson Pt., Vashon Island
1996[h]	5-02	2104	47°45'36"	121°51'00"	7		5.3		Duvall

Year	Date	Time (PST)	North Latitude	West Longitude	Depth (km)	Mag (felt)[a]	Mag (inst)[b]	Max. Mod. Mercalli Intensity	Location[c]
1999[h]	7-02	0543	47°'33	123°'49"	41		5.8	VI	Satsop
2001[h]	2-28	1054	47°9'9"	122°43'11"	52		6.8	VIII	Nisqually
2001[h]	6-10	0519	47°9'58"	123°0'21"	41		5.0	V	Satsop

Data from Noson et al. (1988), except where noted otherwise

a. Mag (felt) = an estimate of magnitude, based on felt area; unless otherwise indicated, it is calculated from Mag (felt) = -1.88 + 1.53 log A, where A is the total felt area in km²; from Toppozada (1975).

b. Mag (inst) = instrumentally determined magnitude; refer to references listed in the original Table 2 of Noson et al. (1988), or (e) below, for magnitude scale used.

c. All earthquake epicenters are located within Washington unless noted otherwise.

d. Location uncertain but most recent study (Bakun et al., 2002) indicates the epicenter was near Lake Chelan

e. Earthquakes with epicenters outside Washington.

f. USGS

g. Dewberry and Crosson (1996)

h. Data from University of Washington Geophysics Program viahttp://www.pnsn.org/.

The historic record of seismicity in the Pacific Northwest (approximately 150 years) is insufficient to provide documentation of great earthquakes (i.e., M_w 8 or greater) on the CSZ. There has been a low rate of instrumental seismicity recorded and the CSZ was originally thought to be incapable of generating great earthquakes. In the late 1980s, Rogers (1988) and Heaton and Hartzell (1986) inferred that an M_w 9 CSZ earthquake could occur that would rupture the entire 900-kilometer length of the Juan de Fuca plate between the Explorer plate(offshore Vancouver Island, BC) and Gorda plate (offshore northwern California). Geodetic data indicate that western Washington and southwest British Columbia are moving to the northeast with respect to stable North America and the rates of movement diminish landward (McCaffrey et al. 2007). Geologic studies along the Oregon and Washington coasts in the late 1980s through mid-1990s provided data that indicated that multiple great (M_w 8+) earthquakes have occurred on the CSZ during the Holocene (Atwater 1987a, 1987b, and 1992; Carver and Burke 1987; Darienzo and Peterson 1987 and 1990; Grant and McLaren 1987; Peterson and Darienzo 1996; Savage et al. 1991; Adams 1996; Atwater et al. 1995; Nelson and Personious 1996; Shennan et al. 1996) and therefore could occur during the project lifetime. However, it was uncertain whether a single M_w 9+ earthquake or several separate M_w 8+ earthquakes closely spaced in time caused the geologic effects (e.g. subsidence, tsunami deposits, and drowned forests) with similar ages recorded at the various study locations along the Washington and Oregon coasts.

By the mid-1990s there was a general consensus that the CSZ has generated earthquakes of M_w 8+ in the past few thousand years (Atwater et al. 1995, Nelson and Personius 1996, and Weaver and Shedlock 1996), and since then there is increasing evidence that the CSZ has had multiple M_w 8+ and 9+ earthquakes in the last five thousand years (Kelsey et al. 2002 and 2005, Witter et al. 2003, Nelson et al. 1995). Geologic evidence for the most recent great earthquake in 1700 AD has been found at many coastal locations in Washington and Oregon, as well as northern California (Nelson et al. 1995, Yamaguchi et al. 1997). Analysis of historical records of tsunamis in Japan supports the interpretation that a 1700 AD great earthquake on the CSZ was about M_w 9 (Satake and Tanioka 1996, Satake et al. 2003, Atwater et al. 2005).

A single great earthquake of M_w 9+ or multiple M_w 8+ earthquakes occur on the CSZ every several hundred years. At least 10 great earthquakes have occurred in Washington and northern

Oregon in the last 5,000 years with recurrence intervals between the earthquakes ranging from 250 to 900 years. Eight of these 10 events ruptured at least 460 km of the CSZ along the Washington and northern Oregon coasts and the earthquake approximately 1,600 years BP was of similar size and rupture length as the 1700 AD earthquake (Nelson et al. 1995). These earthquakes are expected to occur at depths of approximately 6 to 25 miles beneath coastal and offshore Washington and/or Oregon. An M_w 8+ earthquake on the CSZ offshore southwest Washington and northwest Oregon would generate long period ground motions for a relatively long duration at the Whistling Ridge Energy Project site.

Intraplate seismic events appear to be more widespread geographically and result from rupture within the subducted Juan de Fuca plate at depths of 20 to 55 miles. Based primarily on the historical seismicity of intraplate origin in western Washington and other subduction zones of the world, the intraplate zone is considered capable of generating earthquakes as large as M_w 7.5. Because intraplate earthquakes do not cause deformation at the ground surface that can be distinguished from other types of earthquakes, the typical frequency of these earthquakes cannot be readily assessed. However, these types of earthquakes have historically caused the greatest amount of damage in the Puget Sound region. This source has generated three of the largest historical seismic events to affect the Pacific Northwest: the 1949 Olympia earthquake of magnitude (M) 7.1, the 1965 M_w 6.5 Seattle earthquake, and the 2001 Nisqually M_w 6.8 earthquake. These earthquakes caused substantial damage in central and southern Puget Sound but no substantive damage in the White Salmon area. There have not been any historical, damaging intraplate earthquakes with epicenters located in Oregon or southern Washington in the northern portion of the Willamette Lowland.

There is increasing geologic and geodetic evidence that other regional seismic sources in western Washington and Oregon have the potential to produce shallow continental crust earthquakes. Shallow crustal seismic events appear to be more widespread geographically relative to the other sources of historical seismicity, and often occur along mapped or postulated faults exposed at the earth's surface. A regional geologic fault slip model indicates that the predicted long term velocity of the Oregon Coast Ranges relative to stable North America in southern British Columbia is 1.8 $\pm$ 0.4 millimeters per year (mm/yr) east and 6.9 $\pm$ 0.2 mm/yr north measured at Astoria, Oregon. This is consistent with the geodetic data, which indicate a net velocity of 7.1 $\pm$ 0.4 mm/yr. Of this motion, 4.4 $\pm$ 0.3 mm/yr is likely accommodated by north-northeast shortening across western Washington and the Puget Sound region between Astoria and Bellingham, Washington (McCaffrey et al. 2007). Based primarily on historic and paleo-seismicity, Quaternary shallow crustal faults are considered capable of generating earthquakes greater than M_w 6 and potentially as large as M_w 7.0 to M_w 7.5. The largest historical shallow crustal earthquake is the 1872 North Cascade event, which was initially estimated to be M 7.3 (Noson et al. 1988), but more recently has been relocated to near Lake Chelan and is estimated to have been between M_w 6.5 and M_w 7.0 at the 95% confidence interval (Bakun et al. 2002). The largest instrumentally recorded shallow crustal earthquake in the Portland Basin area is the 1962 M 5.5 earthquake, located 15 km northeast of downtown Portland (Wong and Bott 1995). This has not been definitively associated with a recognized late Quaternary fault.

Studies by Pezzopane (1993), Geomatrix Consultants (1995), and Wong et al. (1999), among others, and more recent compilations by the USGS (Lidke et al. 2003 and Personius et al. 2003) show numerous shallow crustal faults with evidence of Quaternary displacement and a potential to generate an M_w 6+ earthquake exist in southwestern Washington and northwestern Oregon (Figure 3.1-3). A decade ago, many of these faults were unknown or not recognized as being seismogenic.

No faults are mapped within the footprint of the proposed project area. However, faults are mapped approximately 1.5 miles southwest and northeast of the proposed project area. Many of these faults are inferred and ~~shown as dotted lines~~assumed to be buried by younger surficial deposits. The activity of the area faults is unknown. However, a review of aerial photography shows no indication of recent movement along the trace of the inferred faults.

There has not been an historical surface-rupture earthquake on any fault within northwestern Oregon or southwestern Washington, and paleoseismic investigations of the regional faults have been limited to date. The closest Quaternary faults to the site are the Hood River fault south of the site in Northern Hood River County, Oregon (No. 29 in Figure 3.1-5), the faults near the Dalles east and west of the site (No. 48 in Figure 3.1-5), and the Columbia Hills fault zone on the north shore of the Columbia River southeast of the site (No. 45 in Figure 3.1-5).

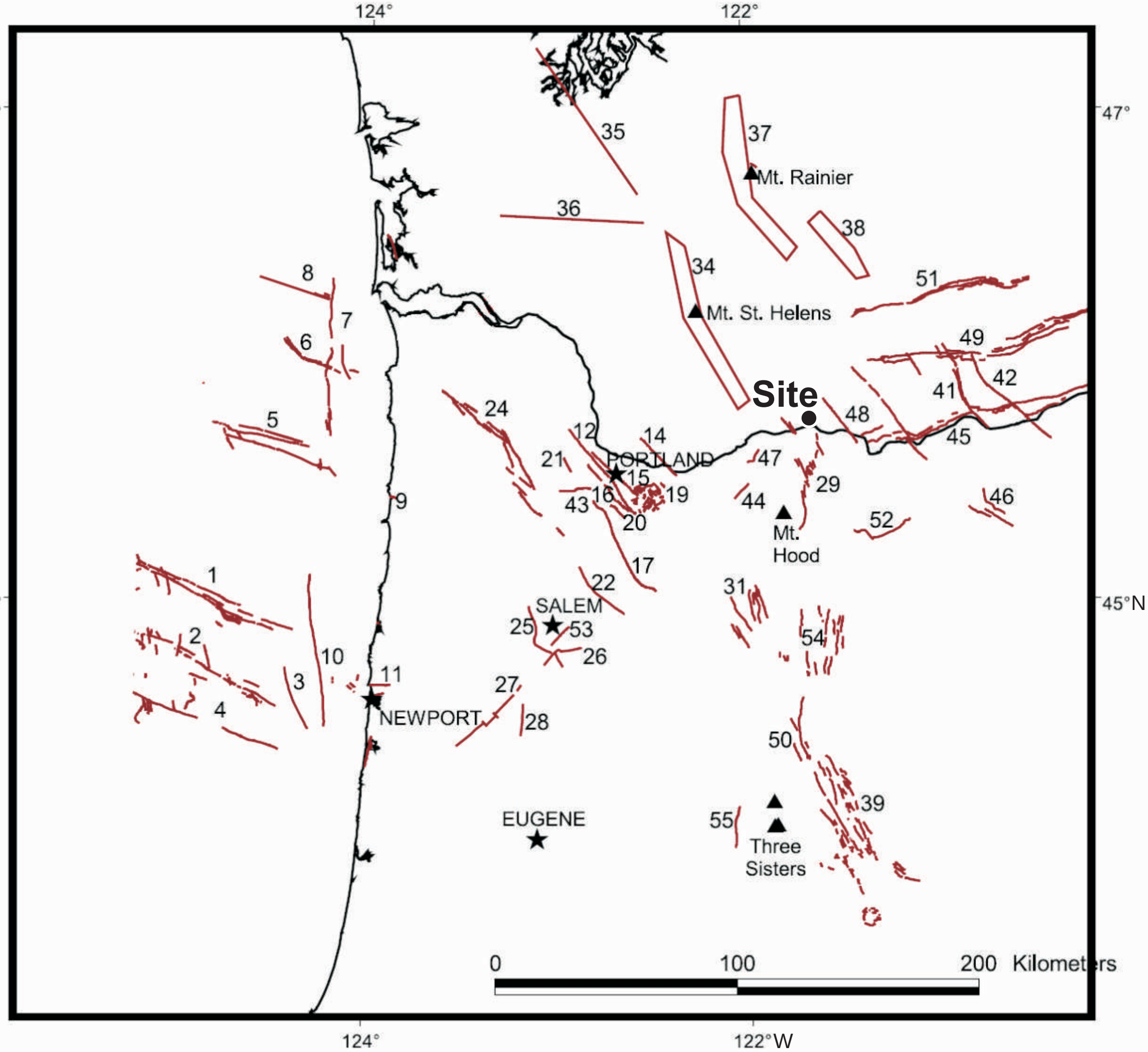
According to the updated National Seismic Hazard Maps published by the USGS in 2008 (Peterson et al. 2008 and http://earthquake.usgs.gov/research/hazmaps/), the peak ground acceleration estimated for the ~~Kalama Energy~~Whistling Ridge Energy Project site area is 0.12~~8~~g for a 475-year return period earthquake (i.e., ground motion with a 10 percent chance of being exceeded in 50 years) and 0.24~~40~~g for a 2,475-year return period earthquake (i.e., ground motion with a 2 percent of being exceeded in 50 years).

3.1.3.1 Impacts

Liquefaction is a phenomenon whereby soils undergo significant loss of strength and stiffness when they are subjected to vibration or large cyclic ground motions produced by earthquakes. Typically, cyclic loading of saturated soils leads to the buildup of excess pore-water pressure as a result of soil particles being rearranged with a tendency toward denser packing. Under undrained conditions (such as during earthquake shaking), loads are transferred from the soil skeleton to the pore-water with consequent reduction in the soils' shear strength.

Saturated granular soils without cohesive fines (i.e., gravels, sands, and silts) are most susceptible to liquefaction. Other factors affecting the potential for liquefaction in soils are density, amplitude of loading, confining pressure, past stress history, age of soil deposit, the size, shape and gradation of particles, and the soil fabric structure. Liquefaction-induced ground settlement and lateral spreading have been the primary cause for extensive damage to aboveground structures, foundations, and pipelines during many earthquakes.

Test pits excavated at the project site encountered shallow bedrock covered with a combination of cohesive and cohesionless soil. No groundwater was observed in any of the test pits. Based on the soils encountered during the field explorations, it is URS's opinion that the potential for liquefaction is very low at this site.



01 - Wecoma Fault
02 - Daisy Bank Fault
03 - Stonewall Bank Fault
04 - Alvin Canyon Fault
05 - Fault G
06 - Fault H
07 - Nehalem Bank Fault
08 - Fault J
09 - Netarts Bay Fault
10 - Yaquina Bay Fault
11 - Waldport Fault
12 - Portland Hills Fault A
14 - Frontal Fault - Lacamas Lake
15 - East Bank Fault
16 - Oatfield Fault
17 - Mollala Canby Fault
19 - Grant Butte Fault
20 - Bolton Fault
21 - Helvetia Fault
22 - Mt. Angel Fault
24 - Gales Creek Fault
25 - Salem Hills Fault
26 - Mill Creek Fault
27 - Corvallis Fault
28 - Owl Creek Fault
29 - Hood River Fault
31 - Clackamas River Fault
34 - St. Helens Fault Zone
35 - Olympia Fault
36 - Doty Fault
37 - Western Rainer Zone
38 - Goat Rocks Zone
39 - Sisters Fault Zone
41 - Oak Flat Fault
42 - Arlington-Shutler Butte Fault
43 - Beaverton Fault
44 - Bull Run Fault
45 - Columbia Hills
46 - Condon Northwest Fault
47 - Eagle Creek Fault
48 - Fault Near Dalles
49 - Horse Heaven Hills Fault
50 - Metolius Fault
51 - Toppenish Ridge Fault
52 - Tygh Ridge Fault
53 - Waldo Hills Fault
54 - Warm Springs-Shitike Fault
55 - White Branch Fault

Figure 3.1-5

Quaternary Faults and Seismic Source Zones in Northwest Oregon and Southwest Washington

Job No. 33758687

The risk of seismically induced settlement and lateral spreading is low due to the low liquefaction potential. It is URS's opinion settlements and lateral spread induced by a seismic event would be minimal.

Coseismic surface rupture occurs when a fault breaks to the land surface during an earthquake. Surface rupture is usually associated with moderate to large earthquakes (M_w 6.5 or greater) or rarely during smaller, very shallow events. There are no mapped faults crossing the site. Therefore, the potential for coseismic primary surface rupture at the proposed project site is small.

Seismic slope instability could potentially affect the site access road. However, the proposed access road does not cross any mapped landslides, nor were any observed during a preliminary site investigation.

3.1.3.2 Mitigation Measures

No mitigation measures are proposed beyond adhering to local building codes and standard turbine and foundation design. The proposed facility would comply with the state building code provisions for seismic hazards applicable to the proposed location. Access road designs would comply with applicable county, state, and federal codes.

3.1.4 SOILS

3.1.4.1 Existing Environment

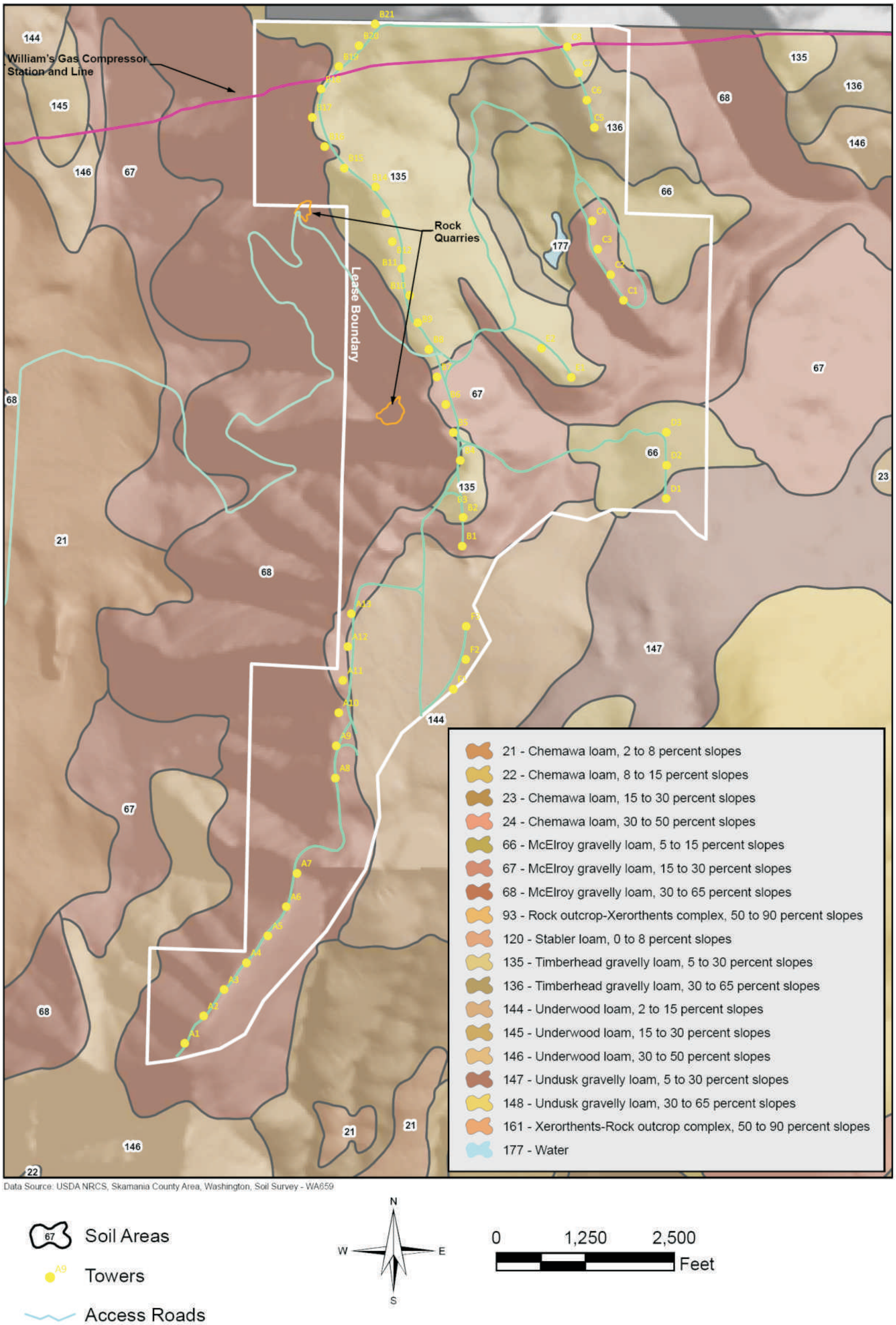
Whistling Ridge Energy Project Site

Soils in the project area are shown on Figure 3.1-6. The NRCS describes the soils in the project vicinity as follows (USDA 2003):

- ~~**Chemawa Series:** The Chemawa series consists of very deep soils (up to five feet) formed in alluvium from volcanic ash and basalt. The soils exist on terraces, footslopes and backslopes at elevations between 800 and 2,500 feet in southeast Skamania County and southwest Klickitat County. Chemawa Soils are well drained with slow to medium runoff and moderate permeability. The Chemawa series soils are present in areas that would be crossed during access to the site, but are not present within the boundaries of the proposed wind turbine site~~

- **McElroy Series:** The McElroy series consists of very deep soils (up to five feet) formed in colluvium and residuum from basalt with a mantle of volcanic ash that influences soils in the top nine to 13 inches. The soils exist on the footslopes and backslopes of mountains on slopes from five to 90 percent at elevations from 400 to 2,600 feet in eastern Skamania County and western Klickitat County. McElroy Soils are well drained with medium to rapid runoff and moderate permeability. The series was established in 1981 following the introduction of volcanic ash from the eruption of Mt. St. Helens.

33758687_87.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.1-6

Soil Classifications

URS

Whistling Ridge Energy Project
Skamania County, Washington

- **Timberhead Series:** The Timberhead series consists of very deep soils (up to five feet) formed in residuum and colluvium from basalt mixed with volcanic ash. The soils exist on mountain ridges between five and 30 percent at elevations from 2,000 to 3,600 feet in Skamania County and western Klickitat County. Timberhead Series soils are well drained with medium to rapid runoff and moderately high to high permeability.

- **Underwood Series:** The Underwood series consists of very deep soils (five feet or more) formed in residuum and colluvium from basalt and andesite with a thin mantle of volcanic ash. The soils exist on benches, backslopes, and footslopes of mountains with slopes between two and 50 percent at elevations between 500 and 2,700 feet in southeast Skamania County and west Klickitat County. Underwood Series soils are well drained with slow to medium runoff and moderately high permeability.

- **Undusk Series:** The Undusk series consists of very deep soils (five feet or more) formed in residuum and colluvium from basalt and andesite with a thin mantle of volcanic ash. The soils exist on benches, backslopes, and footslopes of mountains with slopes between five and 65 percent at elevations between 2,000 and 2,800 feet in southeast Skamania County and west Klickitat County. Undusk Series soils are well drained with slow to medium runoff and moderately high permeability.

Based on the current test pits and field observations, the site soil is best represented as ~~Stiff Soil~~Soft Rock (IBC Soil Site Class ~~D~~B). Rock, with varying strength and weathering characteristics, was encountered at shallow depths (ranging from three to 12 feet bgs).

Prior to final design of the tower foundations, additional subsurface investigations (boreholes) would be required to provide geotechnical data at foundation and anchor depths.

3.1.4.2 Impacts

Whistling Ridge Energy Project Site

Foundations for the wind turbines and the grading plan would be determined during final design.

Because surface soils on the project site are considered moderately susceptible to erosion, there is potential for adverse impacts on the site soil in areas of steep topography during grading and foundation construction activities.

Roadway Improvements

Improvements to existing roadways and construction of new access and maintenance roads are anticipated for construction and operations of the proposed facility. For the current proposed number of wind turbines, approximately 350 over-size and/or overweight loads would be required over the County and site roads for the towers only, in addition to construction equipment. This quantity does not include delivery of construction materials such as concrete required for the foundation, grading equipment to construct roads and prepare the site or other construction traffic not associated with the Whistling Ridge Energy Project. Improvements to the County roadways and the private logging roads would be necessary to support the long and heavy loads that would be required for the delivery of the wind energy components from SR 14 to the proposed project site are discussed in Section 4.3.2.2, Roadway Improvements..

URS drove and observed the haul roads on the property during our September 2007 and June 2009 site visits. The existing logging road (CG2930West Pit Road) to the site has been used primarily for accessing stands of timber for harvesting and exporting timber from the site. At the time of the June 2009 site visit, The the dirt road is currently was surfaced with soil and rock, and is was in poor condition, and . In its current state the road is not suitable for the trucks that would be carrying the wind tower equipment. Roadway improvements were made during the summer 2009 to widen the road for logging purposes, however additional widening and surface improvements would be required for the wind project.

URS would analyze the existing topography and work within the equipment limitations of the haul trucks that would be transporting the equipment to the site. Likely this would include rebuilding large sections of the existing road and surfacing with rock. For areas with steep slopes, there may be a need to flatten and rebuild the slopes to allow access by the hauling equipment. In addition, a new connection would be made between West pit Road and Willard Road, and portions of the West Pit Road widened and realigned beyond the improvements made for logging access. These modifications would likely require construction of new cut and fill slopes.

3.1.4.3 Mitigation Measures

Site-specific geotechnical engineering evaluations would be conducted prior to design of the project to identify design methods to address the potential impacts presented above. Mitigation of soil impacts at the site would be incorporated into the final design of the foundations and roadways. A SWPPP would be developed prior to construction or modification of any roads or facilities. The SWPPP would be submitted for approval to EFSEC and followed throughout construction at the site.

3.1.5 TOPOGRAPHY

3.1.5.1 Existing Environment

Whistling Ridge Energy Project Site

The area of the proposed project is approximately 1,152 acres. The project site is located on a series of north trending ridges that range in elevation from approximately 2,100 to 2,300 feet above msl. The land west of the proposed project site drops sharply to a narrow river terrace and then to an elevation of less than 800 feet above msl in the Little White Salmon River valley. The topography northeast of the site drops gradually toward the White Salmon River or climbs gently up the northeast flank of Underwood Mountain at 2,728 feet above msl. To the south, the topography drops to a terrace of largely agricultural use and then toward the Columbia River. Site topography is shown on Figure 3.1-7.

3.1.5.2 Impacts

Whistling Ridge Energy Project Site

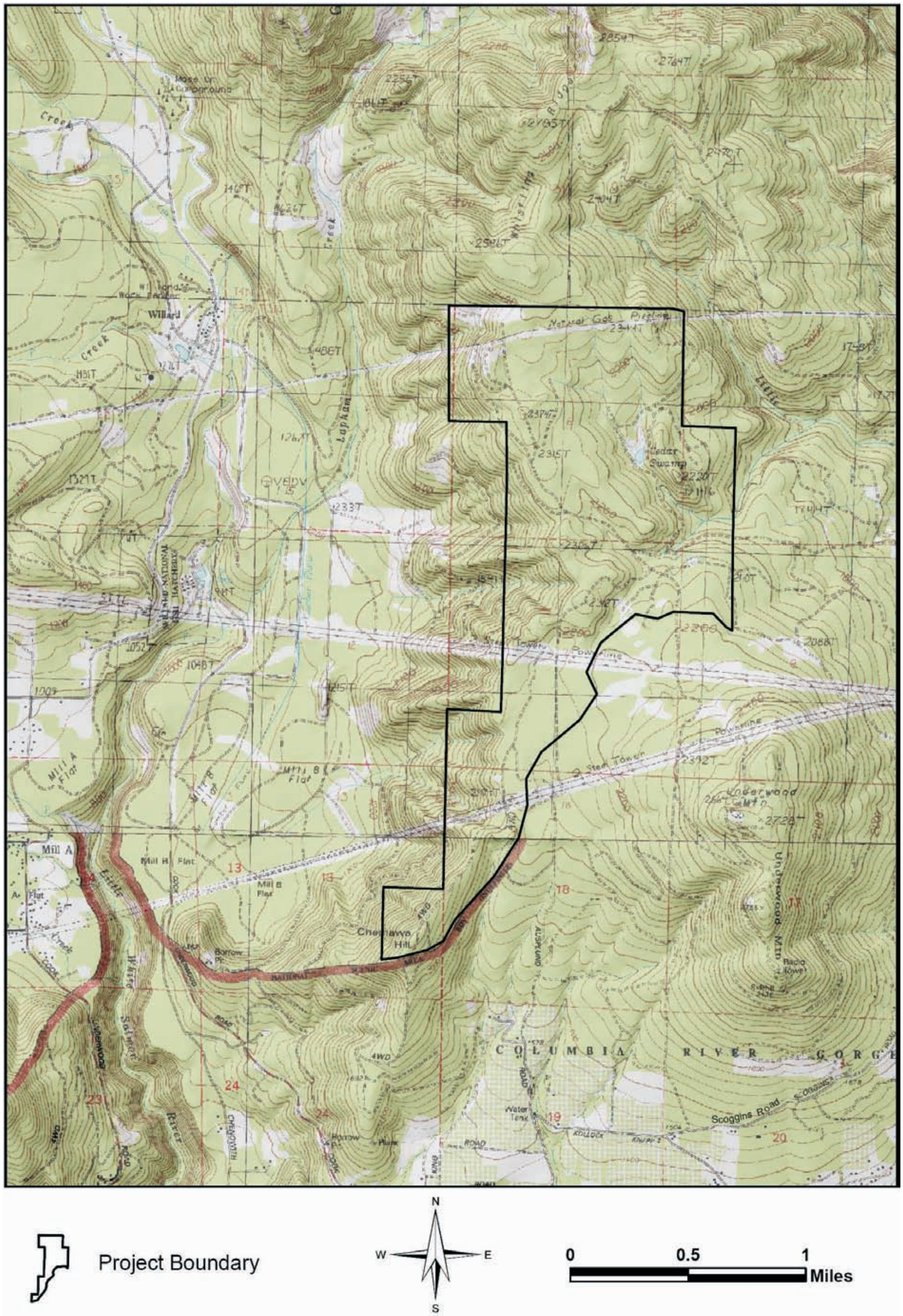
Impacts to the topography due to construction of the Whistling Ridge Energy Project would include grading of access roads and foundations. The areal footprint of the grading and total volume of material excavated would depend on the final foundation design(s) of the turbine towers.

Roadway Improvements

Roadway improvements would be necessary to accommodate the heavy and long loads associated with the turbine towers. It is anticipated that some steep sections of existing or new roads would be regraded to create shallower grades. Some tight-radius turns may require localized ~~rerouting~~ realignment of existing site roadways. These modifications would likely require construction of new cut and fill slopes.

3.1.5.3 Mitigation Measures

No mitigation measures for topography are anticipated at this time.



Source: GeoDataScape.

Job No. 33758687

Figure 3.1-7
Site Topography

URS

Whistling Ridge Energy Project
Skamania County, Washington

3.1.6 UNIQUE PHYSICAL FEATURES

3.1.6.1 Existing Environment

URS conducted a preliminary landslide hazard evaluation of the proposed Whistling Ridge Energy Project wind turbine site pursuant to SCC Title 21A, Chapter 21A.06 - Landslide Hazard Areas.

A URS Licensed Engineering Geologist conducted a site-specific landslide hazard investigation that consisted of:

- Reviewing sections of the County Code that address geologically hazardous areas
- Reviewing existing available topographic, geologic, and soils literature and maps
- Analyzing project-specific stereo aerial photographs
- Reviewing project test pit logs and soil samples
- Performing a one day site reconnaissance

According to the County Code, the primary criteria for landslide hazard designations are: presence of pre-existing, known mappable landslides; slope angle; and/or composition of the near-surface soils or rock.

URS created a color-coded map of the study area using an existing USGS 10 meter DTM to segregate slopes into three categories: slopes less than 20%; slopes between 20% and 30%; and slopes greater than 30%. We then superimposed the NRCS soil survey map onto the slope map to provide soil type information. The resulting Landslide Hazard Map is presented as Figure 2.15-1.

Landslide Hazard Area Delineation

Skamania County recognizes three classes of LHAs. Class I (Severe) LHAs are considered to present a severe landslide hazard and are distinguished as areas of known mappable landslide deposits which have been designated landslide hazard areas by the local legislative body. Class II (High) LHAs are areas with slopes between twenty and thirty percent that are underlain by soils that consist largely of silt, clay or bedrock, and all areas with slopes greater than thirty percent. Class III (Moderate) LHAs are areas with slopes between twenty percent and thirty percent not included in Class II.

URS reviewed available geologic and soils literature to develop a landslide hazard classification for the proposed project. An existing published regional geologic map (partially recreated in Figure 3.1-1) indicates a large landslide in the northeast corner of the study area underlying Tower Line C. Review of stereo photographs of the area where the landslide deposits are mapped, coupled with a site reconnaissance, indicate that there is little geomorphic evidence for landslide activity such as obvious scarps, hummocky or benched terrain, lobate toe areas, or redirected watercourses. No deep subsurface investigations have been carried out at the site to date, but future explorations in support of design for the turbine tower foundations would provide subsurface information regarding the presence of landslide deposits in the area. Based on our preliminary investigation, there does not appear to be any area of the site that meets Skamania County's criteria for a Class ~~1~~ I LHA.

Class II LHAs are shown in green on Figure 2.15-1. The Class II LHAs at the site are predominantly associated with the steep slopes to the west of proposed Tower Lines A and B. The proposed site access road, West Pit Road, ascends these slopes to reach the site from the Little Salmon River valley. There are also steep slopes to the east of the 7 southernmost Tower Lines A towers, and on both sides of Tower Line C.

3.1.6.2 Impacts

Although none of the proposed turbines are located within Class II LHAs, several of the towers along the western side of the project site (Tower Lines A and B) are located along ridgelines with descending slopes that are locally greater than 35 degrees (70%). The heads of some of the drainages along these slopes are arcuate, indicating possible mass-wasting activity such as landslides, debris flows, and/or earthflows. The access road from the Little Salmon River valley to the project site will traverse Class II LHAs.

Based on aerial photo and field observations, the primary mass wasting process below the ridgelines appears to be debris flows and soil creep. No evidence for deep-seated, block failure type landslides was observed. Local surficial creep of near-surface soils is indicated by the presence of pistol-butted trees on some of the slopes, primarily on the descending slope west of the northern portion of Tower Line A. Other slopes have mature conifer stands that indicated little or no soil creep. Further subsurface investigation in support of final tower foundation design would help determine if there are weak rock or soil layers that could contribute to more deep-seated failure of the ridges and provide information on the quality of the rock mass underlying the ridgelines.

It appears that the primary concern for towers located adjacent to the Class II LHAs is the potential for headward erosion of the steep drainages by debris or earth flow processes. Debris flows could potentially damage to the proposed site access road. Erosion rates of these drainages are unknown, but no obvious recent mass wasting features were observed in the aerial photos or during the site reconnaissance.

Class III LHAs have been delineated adjacent to proposed wind turbines along the southern Tower Line A and along Tower Line C. Class III LHAs are not anticipated to have any impact on the proposed facilities due to the robust nature of the proposed foundation designs.

The landslide hazard evaluation identified several areas where the proposed wind turbine generators are located adjacent to slopes that meet Skamania County's criteria for Class II and Class III LHAs. The proposed site access road will traverse Class II LHAs as well. The primary hazard to the proposed towers appears to be the potential for exposure to headward erosion of steep drainages on the slopes below some of the tower locations. Exposure of the towers to headward erosion of the steep slope drainages can be minimized by providing maximum possible setbacks from the tops of the steep slopes and/or by siting the turbines along portions of the ridgelines that are above intervening spur ridges. The most critical area of exposure to Class II LHAs is the narrow ridge at the southern portion of Tower Line A. The primary hazard to the access road would be damage sustained due to debris flow or mass wasting. This hazard would not pose an immediate threat to the operation of the towers, but could temporarily limit access to the site. Interruption to site access could be minimized with regular slope monitoring and contingency plans for slope instability (such as alternate access routes and identification of contractors available for emergency assistance).

It is URS's opinion that the proposed Whistling Ridge Energy Project facilities can be constructed and operated without danger to human life or the surrounding environment due to landslide hazards.

3.1.6.3 Mitigation Measures

At this time, no mitigation measures are anticipated. Additional geotechnical investigations for tower foundation design would provide deeper (> 16 feet) subsurface data. If the additional data indicates potential for slope instability, mitigation would be accomplished through engineering design or avoidance.

3.1.7 EROSION/ENLARGEMENT OF LAND AREA (ACCRETION)

Erosion is the breakdown and transport of soils and bedrock by natural processes, including water, wind, and glaciation. The susceptibility of any material to erosion depends on 1) chemical and physical characteristics (e.g., cohesion); 2) topography; 3) the amount and intensity of precipitation and surface water; 4) the intensity of wind; and 5) the type and density of vegetative ground cover, if present.

The assessment of erosion potential is principally based on the erosion potential specified for the surficial soils by the NRCS (formerly the Soil Conservation Service). The NRCS uses an erosion factor, K, to indicate the susceptibility of a soil to sheet and rill erosion by water. This is one of the six factors used in the Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion. The values of K range from 0.05 to 0.69, with higher K indicating more erosion susceptible soil. K-values below 0.13 are considered to have low potential for erodibility; values in the range of 0.13 to 0.26 are considered medium; and values higher than 0.26 are considered high. The effect of wind erosion is given by grouping the soils into different wind erodibility groups.

3.1.7.1 Existing Environment

~~Plant Site~~

The K-values for soil at the proposed development site and access roads are 0.20 for the McElroy and Timberhead gravelly loams, 0.24 for the Undusk gravelly loam, and 0.37 for the Underwood loam (USDA NRCS 1988). These erosion factors indicate that the Underwood loam has a high potential for erosion by water and the McElroy, Timberhead, and Undusk units have a medium potential. Most soils found in the site vicinity are classified as having a low susceptibility to wind erosion.

3.1.7.2 Impacts

~~Plant Site~~

The potential for erosion or aggradation related to the planned development would be greatest during and immediately after the construction process. The NRCS classifies surficial soils at the site as generally having medium erosion potential. During the dry season, soils that are disturbed and stripped of vegetative cover may be susceptible to wind erosion. The potential for erosion by wind and water would be minimized through the use of erosion control measures to be outlined in the SWPPP as described in Section 2.10.

3.1.7.3 Mitigation Measures

BMPs and other measures would be taken to mitigate the erosion hazard at the project site.

Erosion control measures for construction at the site are outlined in Sections 2.10.2 and 2.14.1. The sequences and methods of construction activities would be controlled to limit erosion and are summarized below:

- Construction activities would be controlled to help limit erosion. Clearing, excavation and grading would be limited to those areas of the project absolutely necessary for construction of the project. Areas outside the construction limits would be marked in the field and equipment would not be allowed to enter these areas or to disturb existing vegetation.

- The construction contractors would implement the EFSEC-approved Erosion and Sedimentation Control Plan during construction to minimize soil loss due to surface water flows.

- The EFSEC-approved Environmental Protection Control Plan would be implemented to provide adequate maintenance and inspection of the erosion and sediment control system. The plan specifies that control structures would be inspected at a frequency sufficient to provide adequate environmental protection. Such inspections would increase in frequency during rainfall periods. In addition, supplies including sandbags and channel-lining materials would be stored on site for emergency use.

- Surface runoff would be diverted around and away from cut and fill slopes and conveyed in pipes or protected channels. If the runoff is from disturbed areas, it would be directed to a sediment trap prior to discharge.

SECTION 3.2 AIR
(WAC 463-60-312)

3.2.1 AIR QUALITY

Air quality in Washington is typically regulated by several agencies. In Skamania County, the Southwest Region Clean Air Agency is typically the local authority for air quality permitting of industrial sources, and permits minor sources through the Notice of Construction permit process. Ecology generally retains the authority for air quality permitting of major sources in attainment areas through the Prevention of Significant Deterioration (PSD) permit process. The United States Environmental Protection Agency (EPA) also has a role in the PSD process and in ensuring all states have plans in place to maintain compliance with ambient air quality standards.

The fuel source for the Whistling Ridge Wind Energy Facility would be wind that is transformed from kinetic energy into electrical energy by wind turbine generators. No air emissions would be generated from operation of the wind turbine generators at the project. The operation of the project would have no effect on the climate (visible plumes, fogging, misting, icing, or impairment of visibility, and changes in ambient levels caused by emitted pollutants). There would no emissions from the operation of the project, and thus none to be regulated. There are no areas within Skamania County that are currently designated as non-attainment areas for air quality. For a description of the meteorological conditions at the site, see Section 2.1.3.2, Climate.

In recent years, many of the new power plants proposed and constructed in the Pacific Northwest have been fossil fuel fired plants, primarily using natural gas as fuel. Fossil fuel fired plants, in contrast to wind power projects, emit significant quantities of the carbon dioxide that is the primary cause of anthropogenic climate change. Natural gas fired plants also emit sulfur oxides and nitrogen oxides, which contribute to both ground-level air quality problems and acid rain. By producing electricity without generating air emissions, which would otherwise be produced by fossil fuel fired plants, the project would have a significant beneficial impact on overall air quality and climate.

3.2.2 CONSTRUCTION EMISSIONS

Construction of the project would result in temporary air emissions from the following sources:

- Exhaust from the diesel construction equipment used for project site preparation, grading, excavation, and construction of on-site structures
- Exhaust from water trucks used to control construction dust emissions
- Exhaust from diesel trucks used to deliver equipment, concrete, fuel, and construction supplies to the construction site

- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site and from vehicles used by workers to commute to the construction site
- Exhaust from diesel-powered welding machines, electric generators, air compressors, etc.

These emissions would be similar in nature to those produced by any construction project that involves heavy equipment and transportation of materials to the project site.

3.2.3 OPERATION EMISSIONS

Operation of the project would produce no air emissions as no fuel would be burned to produce energy. Operation of the project would therefore have no negative impact on air quality. According to the EPA, air emissions from fossil fuel combustion for electricity production are a leading source of air pollution nationally, accounting for:

- 67% of sulfur dioxide emissions
- 28% of nitrogen oxide emissions
- 36% of carbon dioxide
- 3% of mercury

The most likely alternative to wind energy generated by the project would be electricity generated from the combustion of fossil fuels. Fuel combustion from electric utilities generated 6.6 million tons of carbon monoxide and 6.0 million tons of nitrogen oxides in 2006. Total fossil fuel combustion produced 5,638 million metric tons carbon-equivalent of carbon dioxide in 2006 (EPA 2008).

As the energy produced by the project would displace the need for other energy produced by fossil fuel combustion, operation of the project would have a positive effect on air quality and climate change by reducing overall air emissions.

3.2.4 ODOR

Construction of the project would produce limited odors associated with exhaust from diesel equipment and vehicles. Mitigation efforts are described in Section 3.2.6, Mitigation Measures.

Operation of the project would create no odors as no combustion is involved and no odor-producing materials would be used in project operations.

3.2.5 DUST

Construction of the project would create fugitive dust emissions from construction-related traffic and additional wind-blown dust as a result of ground disturbance. Whistling Ridge Energy LLC would implement an effective dust control program to minimize any potential disturbance from construction-related dust. Dust suppression would be accomplished through application of either water or a water-based, environmentally safe dust palliative such as lignin. The use of a dust palliative such as lignin (a non-toxic, non-hazardous compound derived from trees) would result in the use of substantially less water for dust suppression and therefore less traffic from water trucks to the construction site. The final decision regarding dust suppression techniques would be made by the EPC contractor in consultation with local authorities.

Operation of the project would result in minimal or no increase in dust levels. Project related-traffic increases on gravel access roads would generate small amounts of additional fugitive dust. This increased traffic would consist largely of weekly or less frequent trips to turbines in service vehicles for maintenance and repair activities.

3.2.6 MITIGATION MEASURES

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

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

Mitigation measures for construction impacts are described in greater detail in Section 2.3, Construction on Site, and Section 1.4, Mitigation Measures.

No mitigation is proposed for project operations, as there would be no air or odor emissions.

SECTION 3.3 WATER
(WAC 463-60-322)

Project operation would require water use primarily for the Operations and Maintenance building. When the project is operational, there would be eight to nine permanent full-time and/or part-time employees on the Operations and Maintenance staff. The average total water supply needs would be less than 5,000 gpd.

A well would be drilled to provide potable water for the bathroom and kitchen in the Operations and Maintenance building. All water would be discharged to a septic tank installed on site. There would be no process water generated on site, so no water associated with plant operations would be discharged to surface waters. The project would have negligible impacts on surface water and groundwater resources in the vicinity.

Stormwater runoff drains to open land and the ephemeral and perennial streams that flow either westward toward the Little Salmon River or eastward toward the White Salmon River. Stormwater is conveyed to these streams via ditches and culverts.

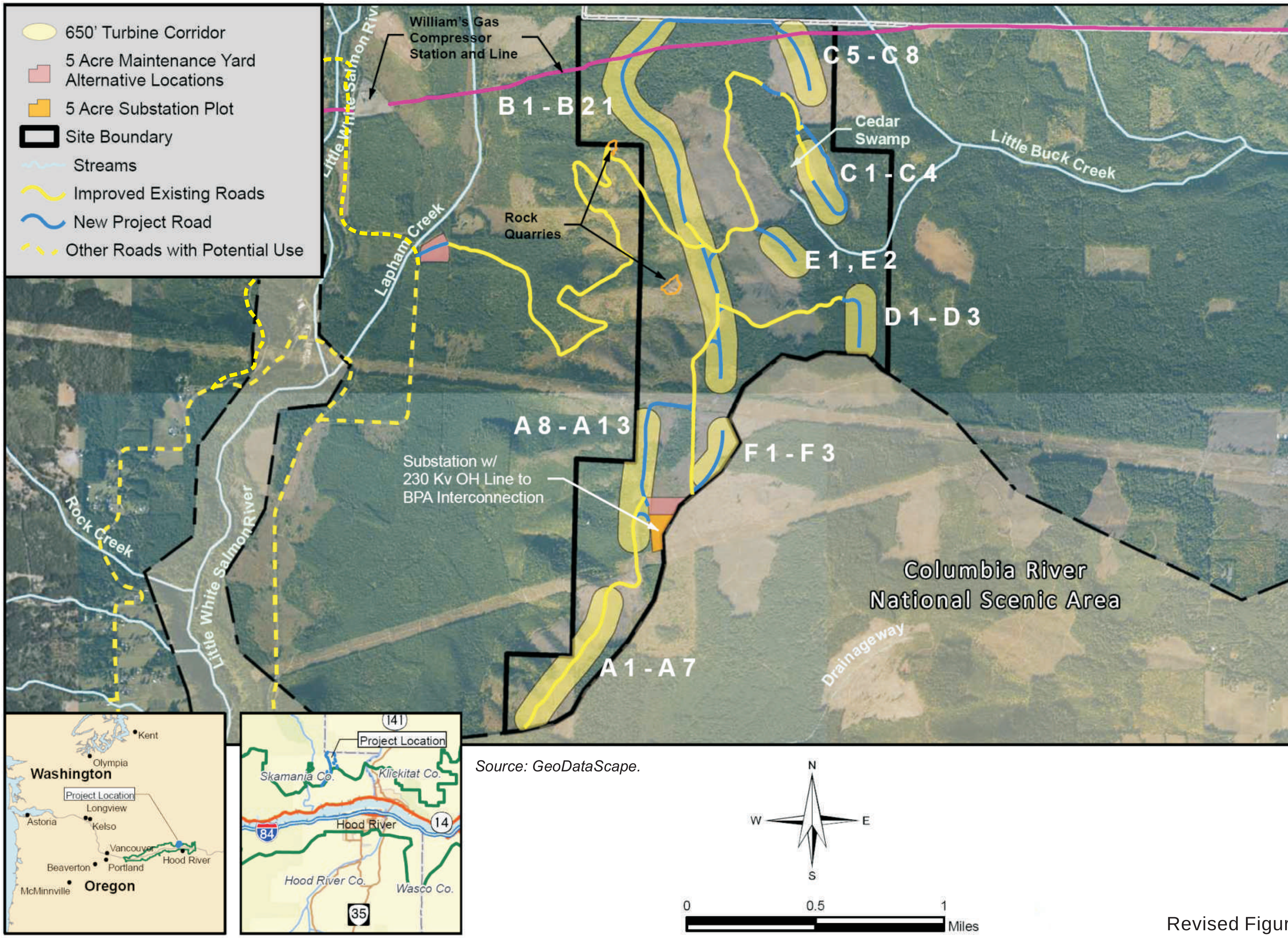
3.3.1 SURFACE WATER RESOURCES (MOVEMENT/QUALITY/QUANTITY)

3.3.1.1 Existing Surface Water Conditions

The project area is generally mountainous with steep-sided narrow drainages. Elevations of the turbine positions generally range from 2,100 feet to 2,300 feet above msl. The Columbia River flows south of the site and receives runoff via the White Salmon drainage area from the east portion of the site and via the Little White Salmon Basin from the west portion of the site.

USGS review identified one undelineated wetland occurring outside the impacted area, west of turbine E3. This wetland is labeled as "Cedar Swamp" on the USGS topographic map (Figure 3.3-1). Five intermittent drainage ways were identified on the map at the northeastern portion of the project area. Three of the drainage ways drain to Cedar Swamp from the north. The remaining two drainage ways are to the south of Cedar Swamp, and ultimately drain intermittently to Little Buck Creek, a perennial stream that is outside of the project area to the east. The planned improvements to existing roads that would occur inside the Scenic Area would cross one intermittent stream (shown on Figure 3.3-1). This stream has no defined channel and carries water only during runoff events. It is classified as a Class V stream under SCC 21.04.020(B).

The project area soils are classified as well-drained, with slow to moderate runoff, and slight to moderate hazard of water erosion. The presence of scour, sedimentation, steep slopes, ephemeral and perennial streams, and the soil classifications suggest that surface water runoff and infiltration within the project are moderate (Haagen 1990). Water runoff from the northeast area of the project drains southeast via Cedar Swamp and tributaries to Little Buck Creek before flowing south to the White Salmon River, and ultimately to the Columbia River. Water runoff from the southwest area of the project drains west and southwest to a flat area east of the project, ultimately draining to the Columbia River.



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.3-1

Waterways in the Project Vicinity

URS

Whistling Ridge Energy Project
Skamania County, Washington

The proposed access road, West Pit Road, crosses one unnamed drainage in the Lapham Creek watershed. This stream had observed flow through the existing culvert under West Pit Road at the time of the July 2009 field visit. However, the surface flow and the channel disappear downstream of the culvert. There is no surface water connection to Lapham Creek.

3.3.1.2 Impacts to Surface Water

No wetlands or other surface water bodies are proposed to be filled as a result of the project. Wetlands are discussed in further detail in Section 3.5, Wetlands.

The planned improvements to ~~existing roads that would occur inside the Scenic Area~~West Pit Road would cross one ~~intermittent stream~~unnamed drainage which currently flows under West Pit Road through a culvert (Figure 3.3-1). This ~~stream~~ drainage has no defined channel ~~and carries water only during runoff events~~downstream of the culvert. It is classified as a Class V stream under SCC 21A~~.04.020(B)~~ Appendix C. Buffers are established for Class V streams. However, expansion of existing uses is allowed within these water resource buffers. Development review would be required under SCC 21A.05 and SCC 21A.06 in Fish and Wildlife Protection Areas and Geologically Hazardous Areas in consultation with WDFW. However, existing roadways would be allowed without review. The road improvements in these regulated fish and wildlife protection areas do not exceed the allowed expansion threshold. For a full discussion of fish, wildlife, their habitats, and project impacts to these, please see Section 3.4.

The impacts to surface water relating to site drainage during and following construction are expected to be minimal. The highest risk of construction-related impacts to surface water quality is expected to be associated with the construction and improvement of new and existing roadways. These activities are expected to disturb the largest areas, exposing soils in potentially steep areas. Roadway improvements to West Pit Road would be needed. The culvert under West Pit Road through which the unnamed drainage flows would be maintained however would likely be extended along with the roadway widening. The highest priority for these activities would be to control erosion and sedimentation. A SWPPP would be developed for the project, consisting of structural and non-structural BMPs, to minimize the potential for discharge of pollutants from the site during and after construction activities.

The SWPPP would be developed to meet the requirements of the Ecology General Permit to Discharge to Stormwater pollution control program associated with construction activities. Examples of structural BMPs included in the SWPPP to be implemented during construction activities are the installation of silt curtains, mats, hay bales, check dams, silt traps, and other methods for controlling and diverting runoff away from exposed soils or areas susceptible to erosion. Examples of non-structural BMPs to be included in the SWPPP are management practices for handling and disposing of materials, as well as spill prevention. BMPs associated with construction are discussed in further detail in Section 2.10, Surface Water Runoff.

Stormwater would be conveyed through roadside ditches, discharging to existing on-site drainage ways. New culverts would be constructed in the newly constructed roads, where required, to convey runoff toward the existing drainage ways, and existing culverts would be replaced to better accommodate seasonal flow regimes of intermittent streams crossing roadways. Culvert outlets to natural channels would be armored to control erosion and scouring of site soils. Permanent vegetation would be established and other permanent BMPs would be used to control erosion and sedimentation. With all permanent stormwater BMPs in place, operation-related impacts to stormwater are expected to be minor.

The amount of chemicals kept on site would be very minimal, and all would be located at the Operations and Maintenance building, under cover. An SPCC Plan would be developed and kept on site for the prevention and response to spills.

3.3.1.3 Mitigation Measures

Permanent BMPs would be designed and incorporated into the final construction plans and specifications prepared by the site civil design engineer. These permanent BMPs would include erosion and sediment control through site landscaping, grass, and other vegetative cover. All final designs would conform to the applicable Stormwater Management Manual. Non-structural BMPs also would be incorporated into the operations manual including good housekeeping, preventative and corrective maintenance procedures, steps for spill prevention and response, employee training, and inspection and record-keeping procedures.

3.3.2 RUNOFF/ABSORPTION

3.3.2.1 Existing Runoff/Absorption Conditions

As discussed in Section 3.3.1.1, site soils are well-drained with slow to moderate runoff and slight to moderate hazard of water erosion. This infers that currently there is both moderate stormwater runoff and infiltration onsite.

3.3.2.2 Impacts to Runoff/Absorption

The current site is not developed, with the exception of private, gravel logging roads, and is composed of well-draining soils. The construction of the Whistling Ridge Energy Project would involve roadway improvements on approximately ~~7.2~~7.9 miles of existing private, gravel logging roads, construction of about 2.4 miles of new gravel access roads, the project substation, an Operations and Maintenance building, the collector system pad, a pad for each turbine tower, and underground electric cables buried in trenches along the access roads Temporary roadways would be built to provide additional access for heavy machinery during construction.

As a result of permanent improvements, site surface water runoff is expected to increase slightly. However, since the increased area of impervious surfaces is small compared to the total project area (estimated at less than 1 acre), these impacts are expected to be minimal. Stormwater would continue to be routed off site via culverts and some stormwater would continue to infiltrate in the way it does currently. Based on the conditions and implementation of BMPs, the net impact to absorption on the site is considered negligible. No negative impacts on runoff and no negative impacts on adjacent surrounding properties are anticipated as a result of the permanent site improvements. See Section 2.10, Surface Water Runoff for further detail of permanent improvement areas.

3.3.2.3 Mitigation Measures

The required BMPs are expected to: minimize erosion, control sedimentation, prevent run-on of stormwater onto disturbed areas, and prevent runoff from disturbed areas. One measure may be treatment of stormwater exiting disturbed areas. Construction-phase erosion and sedimentation control BMPs, as described in Section 2.10, Surface Water Runoff, would be implemented to mitigate the expected impacts of soil disturbance. These may include chemical source control, silt fencing, stabilized construction entrances, street sweeping, straw bale check dams, and rock check dams. With implementation of BMPs, no negligible impacts on runoff or on adjacent surrounding properties are anticipated during construction activities. Construction BMPs are described in further detail in Section 2.10, Surface Water Runoff.

Permanent, operations-phase runoff control and water quality enhancement BMPs, also described in Section 2.10, Surface Water Runoff would be implemented to mitigate the expected impacts of increased runoff rate and pollution from vehicle traffic. These BMPs would include stabilized landscaped areas and vegetated ditches or swales, and would provide the necessary control of stormwater runoff.

3.3.3 FLOODPLAINS

3.3.3.1 Existing Conditions

The project area is located outside the 100-year floodplain for the Little White Salmon and Columbia Rivers as currently mapped by FEMA. The project site is located on a series of north trending ridges that range in elevation from approximately 2,100 to 2,300 feet above msl. The land west of the proposed project site drops sharply to a narrow river terrace and then to an elevation of less than 800 feet above msl in the Little White Salmon River valley. Because the current elevation of the site is above the 100-year floodplain, additional mitigation measures for flooding are not planned.

3.3.3.2 Potential for Flooding and Protective Measures

Because the site is above the 100-year floodplain, an evaluation of the change in surface water elevation created by the additional fill placed for site development would not be necessary.

3.3.4 GROUNDWATER RESOURCES

This section describes the hydrogeologic resources at the Whistling Ridge Energy Project site, project impacts, and mitigation.

3.3.4.1 Hydrogeologic Setting

The project site is located approximately 7 miles west of the town of White Salmon, Washington, and approximately 2 miles east of the Little White Salmon River. A subsurface investigation was conducted in September 2007, which included twelve test pits excavated from seven to 16 feet in depth to assess near-surface soil and rock characteristics. Surficial soils are primarily characterized as soft, moist sandy silt to clay with sand, and clayey sand. Immediately beneath the unconsolidated soils, rock with variable strength and weathering properties is present. The test pit data is limited to depths no greater than 16 feet bgs. It is anticipated that rock quality of basalts would improve with depth but that weaker interflow zones consisting of volcaniclastic material and paleosols are possible at any depth. The bedrock underlying the proposed project site consists of Grande Rhonde Basalt of the CRBG and Quaternary basalt of Underwood Mountain. Groundwater was not encountered up to a depth of 16 feet bgs during subsurface exploration. However, these observations reflect groundwater levels at the time of the field investigation and actual groundwater levels may fluctuate significantly in response to seasonal effects, regional rainfall, and other factors no observed during this investigation. Regional or perched water tables may be present at a greater depth.

3.3.4.2 Impacts to Groundwater Resources

Operation of the project would have minimal impacts to groundwater. For operations, a well would be installed by a licensed installer to serve the Operations and Maintenance facility. A well using less than 5,000 gallons of water a day, and thus exempt from permit requirements in RCW 90.44.040, would be installed to provide water for use to the Operations and Maintenance building. The well would be installed by a well contractor licensed pursuant to Chapter 173-162 WAC, and in compliance with the requirements and standards of Chapter 173-160 WAC. The well would be installed consistent with Skamania County Community Development Department and Ecology requirements for the new wells. This well would provide water for bathroom and kitchen use and is expected to consume less than 5,000 gpd. It is unlikely that the project water use would have a direct effect on groundwater quantity, quality, and flow direction in the immediate area below the proposed facilities. Although the impervious surfaces would increase slightly with the construction of the project, they are not expected to be significant enough to notably affect the water recharge and runoff on site. Therefore, impacts to the hydrologic setting within the Whistling Ridge Energy Project site are considered negligible.

3.3.4.3 Mitigation Measures

No impacts have been identified regarding the quantity of water infiltrating the site following construction. BMPs that are recommended for site development include stabilized landscaped areas and vegetated ditches or swales.

Storage of chemicals onsite is minimal; however, the site development plan would require an SPCC Plan that would protect groundwater (See Section 2.9, Spillage Prevention and Control). Therefore, mitigation for groundwater quality impacts is not necessary.

3.3.5 PUBLIC AND PRIVATE WATER SUPPLIES

3.3.5.1 Existing Conditions and Water Authorization

The Pleistocene epoch (1.8 million years to 10,000 years BP) basalts and cinders erupted from the Underwood Mountain vents and overlie the Tertiary CRBG Grande Ronde and Wanapum basalts. Public records of wells located within the Underwood volcanic field indicate a 310-foot thick repetitive sequence of thin lava flows (two to eight feet thick), cinders and silty-clays overlying a productive confined aquifer consisting of intensely fractured Grande Ronde basalt.

The Miocene-epoch Grand Ronde Basalt consists of multiple basalt flows that are a subgroup of the CRBG, and has been described to have a thickness of up to 1,000 feet, although the thickness in the project vicinity is not known. There are no public water supplies within the project area.

3.3.5.2 Impacts to Public and Private Water Supplies

Water Usage

As described earlier, water use during operations is expected to be less than 5,000 gpd and would be provided by a well that would be drilled on site. Water use is expected to be consistent year-round.

Water Supply During Construction

Water used during construction would be primarily associated with road construction, wetting of concrete, dust control, and other activities. Water consumed during construction activities would be purchased by the contractor from an off-site vendor with a valid water right and transported to the site in water-tanker trucks. No water would be used from the site during construction. There would be no water treatment requirements or methods on site. Environmentally benign dust palliatives such as lignin may be added to water used for dust suppression to improve efficiency and reduce water use.

Future Conditions

The well that would be drilled for the project, and its associated use of less than 5,000 gpd, is not expected to impact water levels in private wells in the vicinity of the project. There are no public water supplies within the project area; therefore, no impacts are anticipated to public water supplies.

3.3.5.3 Mitigation Measures

No impacts to public water supplies and no adverse impacts to private water supplies (water wells) are expected. Therefore, no mitigation measures are required.

SECTION 3.4 HABITAT, VEGETATION, FISH AND WILDLIFE (WAC 463-60-332)

3.4.1 HABITAT AND VEGETATION

This section describes existing habitat and vegetation resources within the Whistling Ridge Energy Project site, the potential impacts of the proposed project on these resources, and the mitigation planned for the project.

3.4.1.1 Existing Conditions

The project site is located in the Southern Washington Cascades Province, within the grand fir (*Abies grandis*) and Douglas-fir (*Pseudotsuga menziesii*) major vegetation zones (Franklin and Dyrness 1988). Topography in the area is characterized by generally accordant ridge crests, separated by steep, deeply dissected valleys. The prevailing climate is cool and wet. The majority of precipitation falls as snow, which may accumulate one to three meters during the winter season.

Whistling Ridge Energy Project Site

The proposed Whistling Ridge Energy Project site is located on Underwood Mountain, northwest of White Salmon, Washington. The project site, which includes turbine strings, access roads, laydown staging areas, the operations and maintenance facility, and substation, measures 1,152 acres. Major drainages in the vicinity of the project site include the White Salmon Basin to the east and the Little White Salmon River Basins to the west, both of which drain to the Columbia River, which is located south of the project site.

Historically, the project site was dominated by grand fir and Douglas-fir. The relative abundance of each of these coniferous species was driven by elevation, aspect, underlying soil, and previous disturbance history (Franklin and Dyrness 1988). Mixed conifer and deciduous forest stands were present, typically following natural disturbance events. Deciduous forests also were present, composed mainly of alder (*Alnus rubra, A. viridis* ssp. *sinuata*), Pacific dogwood (*Cornus nuttallii*), and big-leaf maple (*Acer macrophyllum*).

For the last century, the predominant land use in the area located between Underwood Mountain and the Little White Salmon River has been commercial forest production. Lands within the project site are privately owned, and have been actively-managed for timber for the last century. As a result of ongoing timber harvest, forests within the project site are characterized by a mosaic of stand ages; however, average stand age has declined as a result of relatively short stand rotations. Forest management practices have resulted in a shift in species dominance to the commercially valuable Douglas-fir. Changes in stand structure and complexity, patch size, and species distribution also have occurred. Few large, old-growth conifers exist in the vicinity of the project site, and there are no known late-successional stands within or adjacent to the project site. A linear clearing associated with a high voltage transmission line corridor traverses the southern portion of the project site in an east-west axis. Canopy species within the corridor have been removed, and areas are managed to be devoid of shrub and tree species. The project site contains a network of roads ranging in width from approximately 8 to ~~12~~ 20 feet. These roads are currently used to support logging activity and for accessing BPA transmission lines. Existing roads within the project site can be accessed from County roads extending north from SR 14.

Habitat, vegetation, and rare plant surveys were conducted within the Whistling Ridge Energy Project site in 2003. Environmental assessments included a pre-field information review and field surveys designed to classify habitats and identify rare plants that may occur within the project site.

Habitat Types

Habitat maps were created by CH2M Hill (Figure 3.4-1). Existing data was obtained from Washington Natural Heritage Program (WNHP) and through discussions with the USFWS. Habitats were identified using WDNR orthophotos from January 2002 and classified using the US Forest Service Classification System (USFS 1985). Habitat maps were field-verified during the 2003 plant survey season. These data were entered into a GIS database and used to calculate the total acres of each habitat type that would be crossed by the proposed project elements. The results of the habitat survey are provided in the Vegetation Technical Report (Appendix B-1).

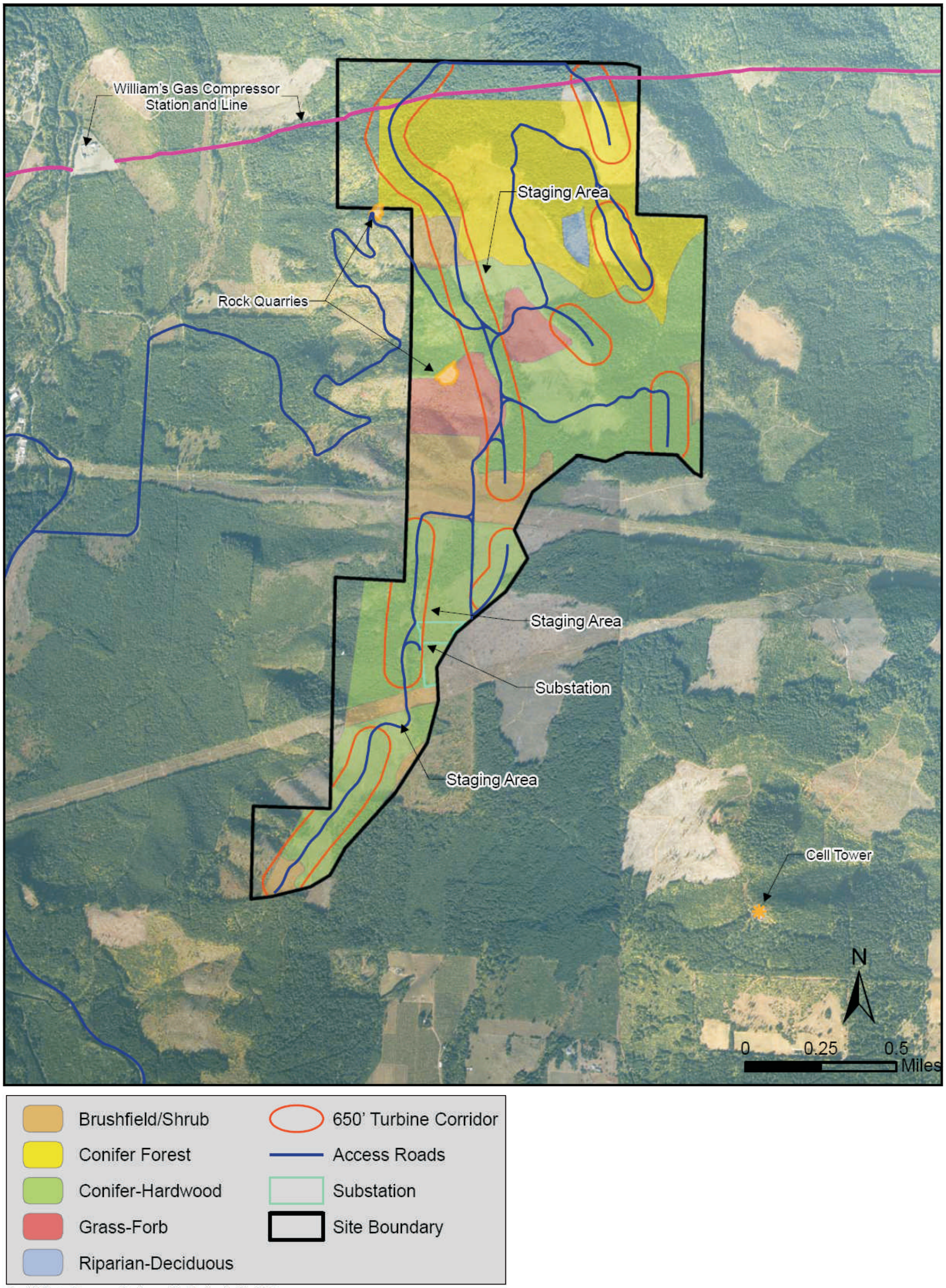
Five vegetation communities and wildlife habitats were identified within the project site:

- Grass-Forb Stand (recent clearcuts)
- Brushfield/Shrub Stand
- Conifer-Hardwood Forest
- Conifer Forest
- Riparian-Deciduous Forest

Grass-Forb Stand. Grass-forb stands are defined as habitats where shrubs comprise less than 40 percent crown cover and are less than 5 feet tall (USFS 1985). This stand type typically occurs when a natural or anthropogenic disturbance such as a wildfire, wind, or timber harvest results in the removal or death of the majority of large trees, or when brushfields are cleared for planting. These habitats may be devoid of vegetation, or covered by herbaceous grasses and forbs. Tree regeneration in grass-forb stands is typically less than 5 feet tall and 40 percent crown cover.

Grass-forb stands within the project site are primarily located in recently clearcut harvest areas. Vegetation in these areas is minimal and consists predominantly of weedy herbaceous species, including bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), and dandelion (*Taraxacum officinale*). Coarse woody material (CWM), occasional slash piles, and large areas of bare ground are common in these areas.

33758687_88.cdr



Aerial Photo: Bergman Photographic, Portland, OR 2008

Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-1

Habitat Types, 2003 Survey

URS

Whistling Ridge Energy Project
Skamania County, Washington

Brushfield/Shrub Stand. Brushfields are defined as the shrub-dominated habitats (USFS 1985). These habitats typically develop following clearcut harvest, or natural disturbance that may result in removal of vegetation.

The majority of brushfields are young plantations that have been planted with Douglas-fir. The plantations typically have not reached the closed-canopy stage. Vegetation consists of remnant forest understory species, such as vine maple (*Acer circinatum*), Sitka alder, beaked hazelnut (*Corylus cornuta* var. *californica*), serviceberry (*Amelanchier alnifolia*), oceanspray (*Holodiscus discolor*), bracken fern (*Pteridium aquilinum*), sword fern (*Polystichum munitum*), and early successional species such as Himalayan blackberry (*Rubus armeniacus*), fireweed (*Epilobium angustifolium*), common yarrow (*Achillea millefolium*), pearly everlasting (*Anaphalis margaritacea*), and grasses. Large amounts of bare soil, slash and other logging debris are common.

Vegetation control has occurred in some areas as part of existing forest management practices. Control methods include herbicide application and/or mechanical control. Areas where vegetation management has occurred are visually and functionally different from areas where control has not been implemented. In areas where vegetation control has not occurred, dense vine maple thickets with occasional alder or Douglas-fir frequently occur. Patches of alder saplings, salmonberry (*Rubus spectabilis*), vine maple, red elderberry (*Sambucus racemosa*), oceanspray, lupine (*Lupinus* spp.), Oregon oxalis (*Oxalis oregana*), and grass also may be present in these areas. Small diameter CWM is common.

Conifer-Hardwood Forest. Conifer-hardwood forests within the project site are predominantly characterized by the presence of bigleaf maple and Douglas-fir, with some red alder. The forest stand condition is characterized as a multi-layer, closed sapling-pole forest (USFS 1985). Canopy height ranges from 40 to 60 feet, and canopy closure is between 60 and 80 percent. The majority of canopy cover results from the presence of Douglas-fir (~70 percent). The shrub layer is characterized by vine maple, salmonberry, thimbleberry (*Rubus parviflorus*), red elderberry, beaked hazelnut, and Pacific dogwood. Density of the shrub layer is variable. The herbaceous layer is characterized by sword fern, trailing blackberry (*Rubus ursinus*), oxalis, grasses, and moss. CWM is generally low to moderate. Deciduous snags are more common than conifer snags; however, short well-decayed conifer snags may be present.

Conifer Forest. Coniferous forests located within the project site are dominated by grand fir and Douglas-fir. Forest stand condition is primarily closed sapling-pole-sawtimber and large sawtimber. The diameter at breast height (dbh) of pole-size conifers measures 8–12 inches. The dbh of sawtimber measures 12 to 23 inches. Closed sapling-pole-sawtimber stands are characterized by closed canopy, relative short live crowns, and exclusion of shrub species and many forb species. CWM in these stands is typically low, consisting mainly of remnants from historic forests. Snags are rare; however, small diameter snags become more common in the pole and sawtimber stages, as smaller individuals are out-competed.

Large sawtimber is considered to be at least 21 inches in dbh. Large sawtimber stands are characterized by within-stand differentiation of canopy species, the emergence of dominant trees, and a more diverse and multilayer understory composed of shrubs and forbs. Snags and CWM are generally rare; however, this may vary depending on past harvest practices, stand management, and actual stand age.

The majority of coniferous forests within the project site is managed for commercial timber production, and is replanted following harvest. Commercial timber lands are widespread throughout the vicinity of the project site.

Riparian Deciduous Forest. Riparian deciduous forests may develop in near-stream areas as a result of natural or anthropogenic disturbance. Riparian deciduous forest habitats are present within the project site in an area known as "Cedar Swamp". Historically this area was dominated by large, old-growth western redcedar (*Thuja plicata*); however, these trees have since been harvested. Cedar Swamp is now dominated by willow (*Salix sp.*) and cottonwood (*Populus balsamifera*), with scattered occurrences of young western redcedar.

The vegetation communities described above are common throughout the Southern Washington Cascades Province. In the proposed project site, these communities are primarily maintained through forest management. Because the project is located within private commercial timber lands, existing forest management practices are expected to continue for the foreseeable future. The total acreage of each habitat type was calculated during the 2003 surveys; however, because of active forest rotation schedules, some of these areas have been harvested. Aerials photos from ~~2008~~ 2009 were used to update the habitat maps from 2003 with recent timber harvests. The updated acreages of each habitat type can be found in Table 3.4-1 and are shown on Figure 3.4-2.

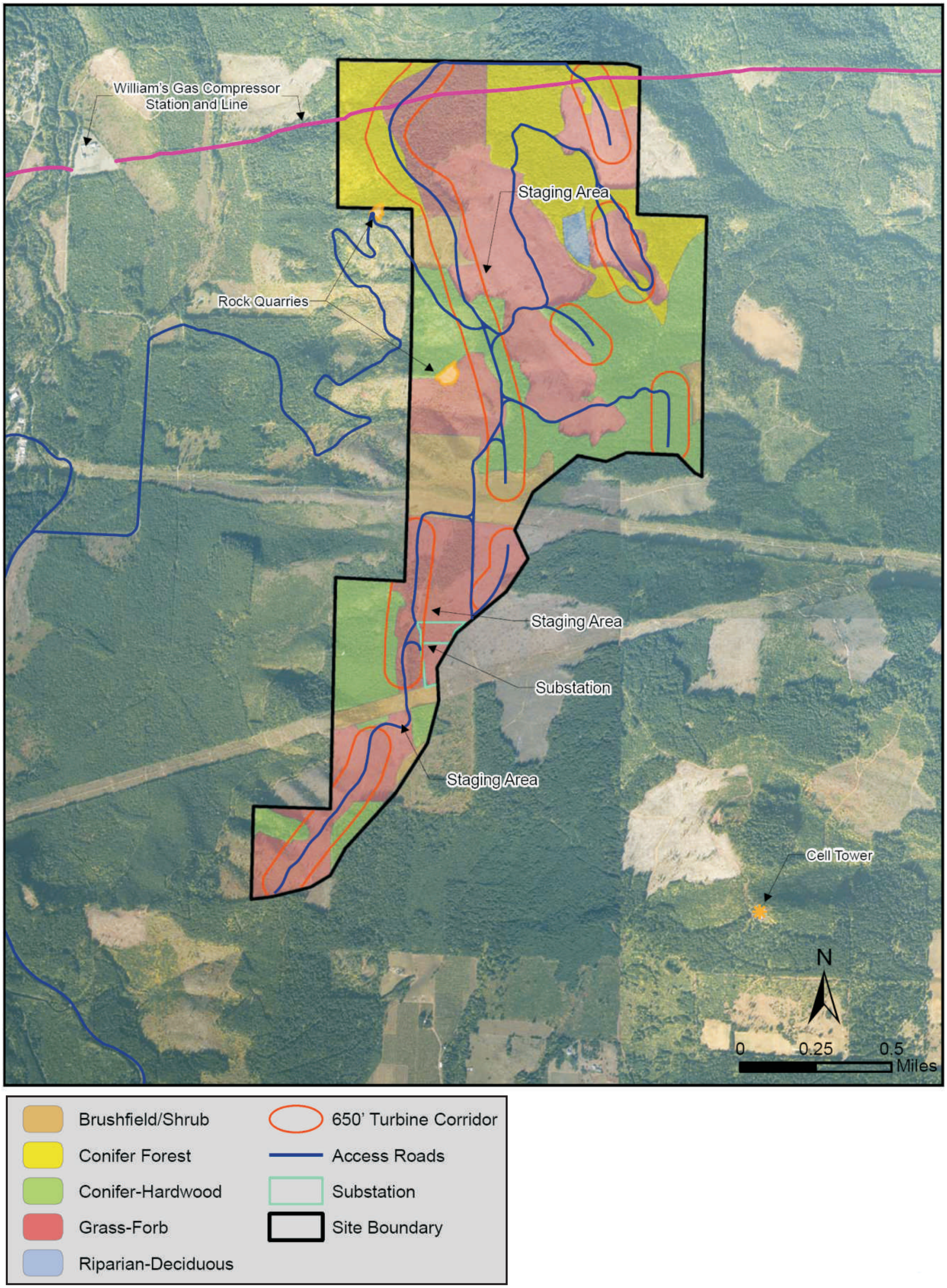
Table 3.4-1
Habitat Types within the Project Site

Habitat Type	Area (acres)
Grass-Forb Stand	~~414~~522
Brushfield/Shrub Stand	103
Conifer-Hardwood Forest	~~346~~310
Conifer Forest	~~281~~209
Riparian Deciduous Forest	8
Total	1,152

Rare Plant Species and Vegetation Communities

Several sources were used to identify special-status plants that have been documented or have the potential to occur within the vicinity of the proposed project, including:

33758687_89.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-2

Habitat Types, 2009 Aerial

URS

Whistling Ridge Energy Project
Skamania County, Washington

- Federal-listed or proposed as a rare, threatened, or endangered species in Skamania County (USFWS 2009)
- A WNHP record search of known rare plant locations in the vicinity of the project site (WNHP 2003a)
- *Rare Plant List for Skamania County* (WNHP 2003b)

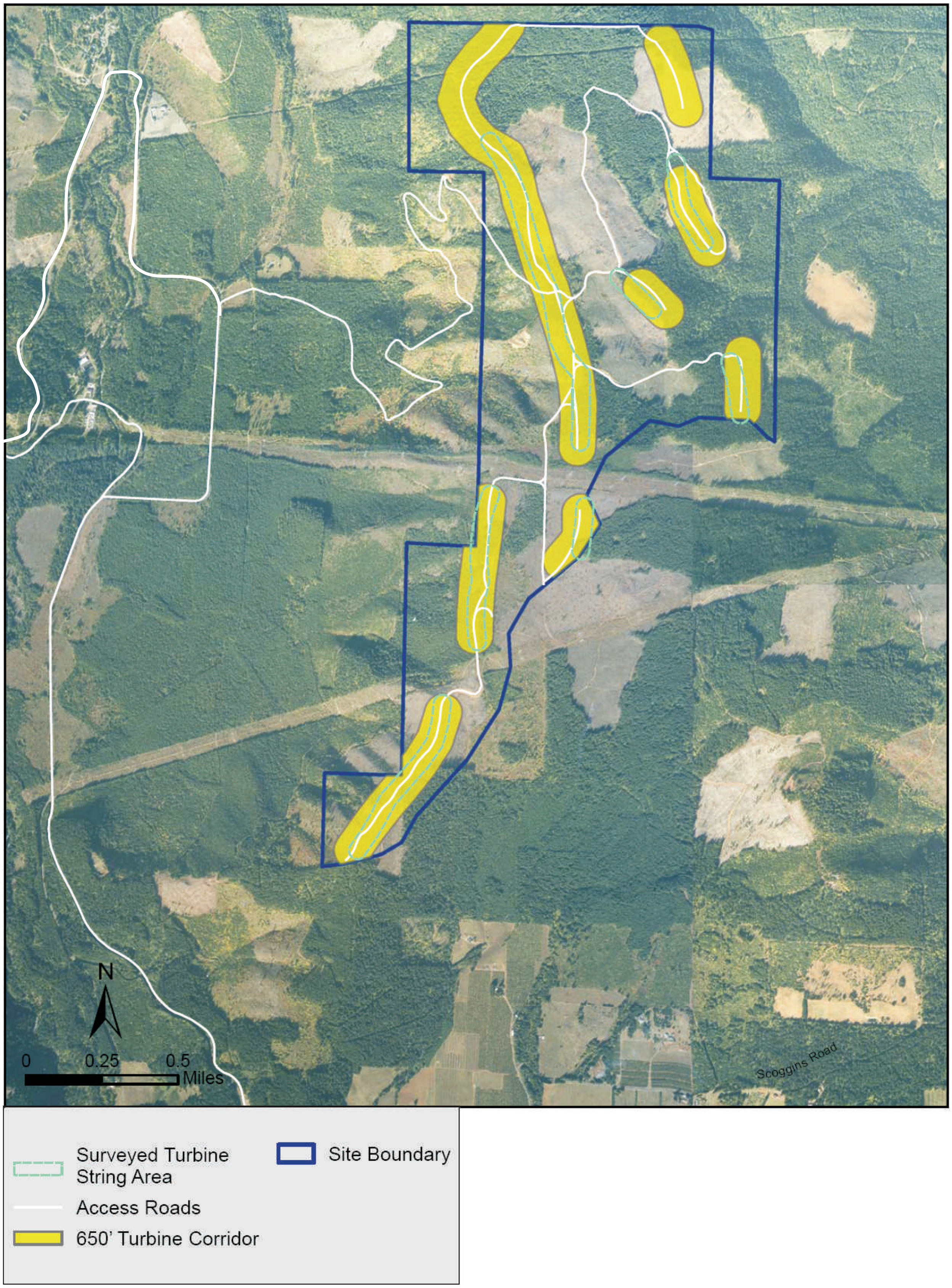
These data indicated that no federal-listed plant species are known to occur in the vicinity of the project site. However, four rare plants occur within two miles of the project site, including branching montia (*Montia diffusa*), Suksdorf's desert parsley (*Lomatium suksdorfii*), Siskiyou false hellebore (*Veratrum insolitum*), and golden chinquapin (*Chrysolepis chrysophylla*). Two additional rare plant species are reported as historically occurring in the vicinity of the project site, including bolandra (*Bolandra oregana*) and white-top aster (*Aster curtus*). Three occurrences of the Oregon white oak/Idaho fescue (*Quercus garryana/Festuca idahoensis*) vegetation community, a Known High-Quality or Rare Plant Community and Wetland Ecosystem of Washington, are documented within two miles of the project site (WNHP 2003a). These are located along the Columbia and White Salmon Rivers. No additional rare plants sites have been recorded in the vicinity of the project site since the rare plant surveys were conducted in 2003 (WNHP 2009).

Surveys were conducted in May and June 2003, and followed methods described in the Bureau of Land Management (BLM) Survey Protocols for Survey and Manage Strategy 2 Vascular Plants (Whiteaker et al. 1998). Survey dates were selected to encompass all or a portion of the blooming times of all rare plants potentially occurring in the project site. All surveys were completed by CH2M HILL. Surveys were conducted within a 300-foot corridor centered on proposed turbine strings and associated access roads, and a 100-foot corridor centered on existing roadways that were identified as needing improvement. Rare plant surveys also were conducted in proposed locations for the Operations and Maintenance facility, substation, and staging areas. No rare plant or habitat surveys were conducted on County roads used to access the site or along the underground cable routes. However, much of this area has been harvested recently and does not contain rare plant habitat.

No rare plant species or plant communities were detected on the project site. A detailed account of survey methods and results can be found in the Rare Plant Survey Report (Appendix B-2). A list of plant species observed during vegetation surveys also can be found in Appendix B-2.

Because turbines have been added and removed from the initial alignment, field surveys conducted ~~to date~~prior to the March 2009 Application submittal (Figure 3.4-3) may not cover 100% of the proposed wind farm. Additional surveys ~~are planned for~~were conducted in May and July 2009 to supplement the previous studies and ~~would~~ included County roads and underground cable routes where potential rare plant habitat could exist.

33758687_90.cdr



Aerial Photo: Bergman Photographic, Portland, OR 2008

Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-3

Rare Plant Surveys (2003 - 2006)

URS

Whistling Ridge Energy Project
Skamania County, Washington

Noxious Weeds

The project site contains several noxious weed species, which are nonnative, invasive plants. The weed species observed during field visits to date are listed in Table 3.4-2.

Table 3.4-2
Noxious Weed Observations

Scientific Name	Common Name	Status
Centaurea diffusa	Diffuse knapweed	Class B
Cirsium arvense	Canada thistle	Class C
Cirsium vulgare	Bull thistle	Class C
Cytisus scoparius	Scot's broom	Class B
Daucus carota	Queen Anne's lace	Class B
Hypericum perforatum	Common St. John's-wort	Class C
Linaria dalmatica	Dalmatian toadflax	Class B

The Washington Noxious Weed Control Board identifies lists of noxious weed species that require control, eradication, or monitoring. Class A noxious weeds are nonnative species with a limited distribution within a state and require eradication to reduce the potential of becoming more widespread.

Class B noxious weeds are regionally abundant, but may have limited distribution in some counties. In Washington, in regions where a Class B noxious weed is unrecorded or of limited distribution, prevention of seed production is required. In these areas the weed is a "Class B designate." However, in regions where a Class B species is already abundant or widespread, control is a local option. In these areas the weed is a "Class B non-designate."

Class C noxious weeds are already widely established, but placement on the state list allows counties to enforce local control if desired.

Improved Roadways outside the Site Boundary

Access to the proposed project site from SR 14 would ~~require traversing lands located within the Columbia River Gorge National Scenic Area.~~be via Cook-Underwood Road to Willard Road, and then via a new direct connection to West Pit Road, an existing private logging road. Approximately ~~2.1~~2.5 roadway miles in this area would require ~~minor~~ improvements as a result of the proposed project. ~~This improved~~West Pit ~~road~~ Road is owned and operated by S.D.S Co., LLC~~, and would be used to connect existing County roads within the Scenic Area to project roads owned by S.D.S Co., LLC on the project site~~. ~~In addition, four existing roadway intersections in the Scenic Area would require slight modification to accommodate transportation~~

~~of the large turbine segments (Figure 4.3-2). These intersections have not been surveyed for habitat or rare plants.~~ Surveys ~~are planned for spring~~<u>for habitat and rare plants were conducted in May and July</u> 2009<u> and none were found</u>.

3.4.1.2 Impacts

Whistling Ridge Energy Project Site

Habitat Types

Construction and operation of the Whistling Ridge Energy Project would require the removal of vegetation in some areas to accommodate roadway construction and improvement, turbine siting, staging, and construction. Each turbine footings and foundations would measure approximately 3,100 square feet. Vegetation surrounding each turbine would be managed according to the following specifications:

- A circular area extending 50 feet from each turbine would be harvested and graveled
- From 50 feet to 150 feet from the base of the turbines, tree heights would be limited to 15 feet above the elevation of the base of the turbine
- From 150 feet to 500 feet from the base of the turbines, tree height would be restricted to 50 feet above the turbine base within an area formed by a 90 degree arc centered on the ordinary downwind direction

The A and F turbine strings and parts of the B and C turbine strings would be accessed by existing roads. Modifications to these roads are anticipated in order to support the long and heavy loads required for delivery of the wind turbine systems. An estimated 5.1 miles of roads within the project site would require improvements as a result of the proposed project. The majority of new roads would be constructed to access parts of the B and C turbine strings, and all of the D and E turbine strings. Access to these turbines would require 2.4 miles of new roadway. All roads used to access turbines would be maintained throughout the life of the project.

All vegetation clearing would be completed using crawler tractors, rubber-tired skidders, mobile feller-bunchers, or cable yarding equipment. This equipment is typically used in timber harvest, and is currently used to harvest other mature stands located on S.D.S. Co., LLC property. Logs would be transported by truck to SDS Lumber Company facilities in Bingen, Washington. Except for maintained and permanently cleared areas, cleared areas would be replanted with trees within one year following completion of construction (typically the following spring). Areas where trees are permanently removed would be replanted with appropriate native grasses and low-growing shrubs. Because it is being implemented for the purpose of the project, cleared areas would be considered "forest conversion" under the Washington Forest Practices Act. However, cleared areas would still be reforested in accordance with typical commercial forestry management practices when feasible.

Permanent and temporary impacts to habitat types within the project site can be found in Tables 3.4-3 and 3.4-4.

Table 3.4-3
Temporary Impacts from Project Elements to Habitat Types (acres)

Habitat Type	Turbine Corridor[a]	Road Corridor[b]	Transmission Line Corridor[c]	Total
Grass-Forb Stand	19.44	5.19	1.39	26.02
Brushfield/Shrub Stand	2.97	1.27	1.26	5.50
Conifer-Hardwood Forest	14.87	1.62	2.22	18.71
Conifer Forest	9.52	2.43	0.05	12.00
Riparian Deciduous Forest	0	0	0	0

a. Total temporary impact area of proposed development within the 650-foot corridor measured on either side of an imaginary line connecting each turbine string.
b. The temporary impact area of proposed roadway modifications ~~development~~ within the ~~region~~ project site area encompassed by a 100-foot corridor along all roads ~~in the project starting at the intersection of the site boundary and the Scenic Area~~. Does not include overlap of transmission corridor or turbine corridor.
c. The temporary impact area of proposed development within the area encompassed by a 100-foot corridor along all project transmission lines. Does not include overlap of road corridor or turbine corridor.

Table 3.4-4
Permanent Impacts from Project Elements to Habitat Types (acres)

Habitat Type	Turbine Corridor[a]	Road Corridor[b]	Transmission Line Corridor[c]	Total
Grass-Forb Stand	11.89	4.81	0.43	17.13
Brushfield/Shrub Stand	1.49	1.33	1.36	4.18
Conifer-Hardwood Forest	9.85	1.22	2.34	13.41
Conifer Forest	5.61	2.84	0	8.45
Riparian Deciduous Forest	0	0	0	0

a. Total permanent impact area of proposed development within the 650-foot corridor measured on either side of an imaginary line connecting each turbine string.
b. The permanent impact area of proposed ~~development~~ roadway modifications within the ~~region~~ project site area encompassed by a 100-foot corridor along all roads ~~in the project starting at the intersection of the site boundary and the Scenic Area~~. Does not include overlap of transmission corridor or turbine corridor. Also excludes existing roadway.
c. The permanent impact area of proposed development within the area encompassed by a 100-foot corridor along all project transmission lines. Does not include overlap of road corridor or turbine corridor.

Rare Plant Species and Vegetation Communities

Because no rare plants were identified in the portion of project site surveyed to date, no project-related impacts are anticipated to any federal- or Washington State-listed plant species during construction or operation of the proposed project. Impacts to habitats are expected to vary depending on the location and quality of habitat. Mature forests within the project site would be harvested to accommodate the facility. However, timber harvest in these areas would occur in the absence of the proposed project based on existing harvest rotation schedules.

Noxious Weeds

While no Class A weeds have been observed in the project area, several Class B and C weeds are present. Constructing the project can foster the spread of noxious weeds throughout the project area. New roads are a pathway for weeds to invade. Many weeds are adapted to disturbed conditions and can establish immediately after construction. Increased traffic also can lead to the spread of weeds. Noxious weeds can threaten the general ecological health and diversity of native ecosystems. Noxious weed infestations are the second leading cause of wildlife habitat degradation. Noxious weeds would be managed within the project site. By implementing BMPs, weeds are not anticipated to spread further as a result of the development of the wind energy facility.

Improved Roadways outside the Site Boundary

A total of ~~2.1~~2.5 roadway miles located outside the proposed project site would require upgrades as a result of the proposed project. ~~These roads~~West Pit Road traverses forests of varying stand age. ~~Half~~ Much of the ~~upgraded~~ roads ~~are~~ is adjacent to areas characterized by ~~recent~~ clearcut harvest. Road improvements are expected to have negligible impact on habitat and vegetation. ~~Preliminary assumptions of the degree of anticipated impact will be verified during 2009 field surveys.~~

~~In addition, four existing roadway intersections in the Columbia River Gorge National Scenic Area would require slight modification to accommodate transportation of the large turbine segments. These intersections have not been surveyed for habitat or rare plants. However, the impact areas for most of these modifications would be immediately adjacent to the road in previously disturbed areas and do not appear to contain natural habitat conditions. Preliminary assumptions of the degree of anticipated impact would be verified during 2009 field surveys.~~

3.4.1.3 Mitigation Measures

Mitigation for potential impacts resulting from the proposed project includes the following:

- The applicant has commissioned extensive studies by qualified biologists of rare plants and habitats at the project site to avoid impacts to sensitive populations. The results and recommendations of these studies have been incorporated into the proposed design, construction, and operation of the project. In the event that the final project layout includes areas that contain suitable habitat for rare plants which have not previously been surveyed, an additional rare plant survey would be conducted at the appropriate time of year.

- The turbine strings have avoided sensitive riparian areas.

- Locating wind turbines in an actively-managed commercial forest avoids impacts to higher quality habitats.

- To the extent possible, new road construction and associated habitat impacts have been minimized by improving and using existing roads instead of constructing new roads.

- Use of certified "weed free" straw bales during construction to avoid introduction of noxious weeds

- All temporarily disturbed areas would be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed to accelerate the revegetation of these areas and to avoid the establishment and spread of noxious weed species.

- Implementation of a noxious weed control program, in coordination with the Skamania County Noxious Weed Control Board, to control the spread and prevent the introduction of noxious weed species.

3.4.2 FISH

3.4.2.1 Existing Conditions

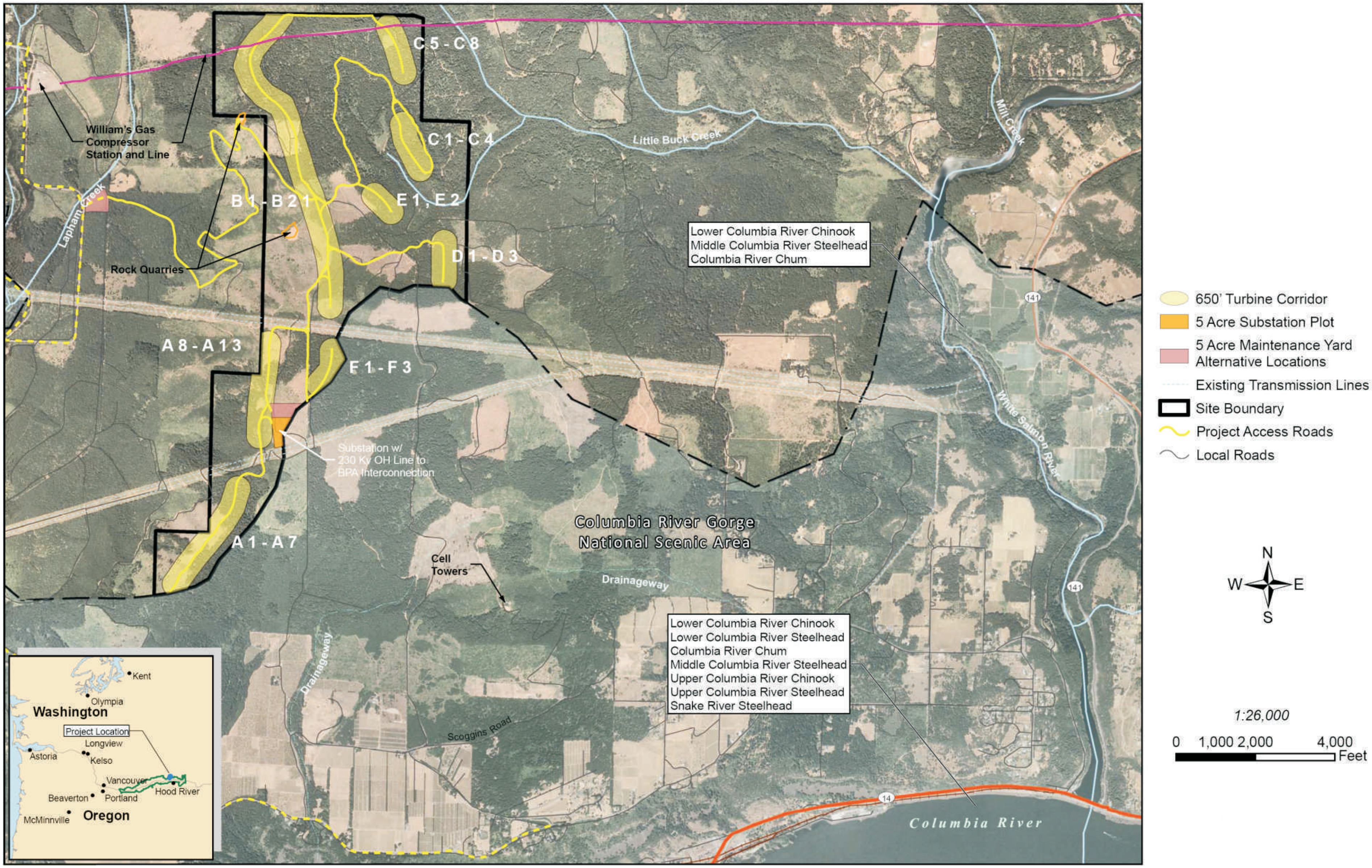
Lands surrounding the Whistling Ridge Energy Project are generally mountainous with steep-sided narrow drainages. Elevations of the turbine positions range from approximately 2,100 feet to 2,300 feet above msl. The Columbia River flows south of the site and receives runoff via the White Salmon drainage area from the east portion of the site and via the Little White Salmon River from the west portion of the site.

The Whistling Ridge Energy Project is sited on lands characterized by shallow slopes, located between Underwood Mountain and the White Salmon River, approximately three miles from the Columbia River. The proposed layout is situated on a ridge above the Little White Salmon River drainage; however, project elements such as roadway, turbine strings, and facilities do not cross tributaries to this system. The ridgeline is oriented in a north-south direction. A tributary to Little Buck Creek is located in the northeast portion of the project site, and drains into the White Salmon River (Figure 3.4-4). Little Buck Creek is not crossed by any project elements. No perennial streams are located in or adjacent to the Whistling Ridge Energy Project footprint.

~~Road CG2930 crosses one unnamed, intermittent creek that drains to the south. This road would require small radius improvements to support loads required for construction of the project.~~West Pit Road crosses one unnamed drainage in the Lapham Creek watershed. This stream had observed flow through the existing culvert under West Pit Road at the time of the July 2009 field visit. However, the surface flow and the channel disappear downstream of the culvert. There is no surface water connection to Lapham Creek and fish are not present in this stream.

Although no special status fish species are present in Little Buck Creek, this creek does drain into Northwestern Lake, which in turn drains into the White Salmon River. The White Salmon River contains evolutionarily significant units and designated critical habitat for three species listed as threatened under the ESA: (1) Lower Columbia River Chinook, (2) Middle Columbia River Steelhead, and (3) Columbia River Chum (Figure 3.4-4).

33758687_91.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-4

Location of Designated Critical Fish Habitat

URS

Whistling Ridge Energy Project
Skamania County, Washington

3.4.2.2 Impacts

Due to the location of water bodies on the project site, no impacts to aquatic species, their habitat, or designated critical habitat are expected as a result of construction and operation of the proposed facility. Water quality would be maintained during construction and operation of the project by incorporating BMPs.

3.4.2.3 Mitigation Measures

Section 3.3, Water, lists the project BMPs that would be incorporated to protect water quality and quantity. Pursuant to an erosion control plan for the project and an NPDES permit, drainage improvements would be made as needed. All temporarily disturbed areas would be regraded and reseeded with an appropriate mix of native plant species to restore vegetation after the construction phase is completed.

3.4.3 WILDLIFE

3.4.3.1 Existing Conditions

Whistling Ridge Energy Project Site

This section summarizes baseline wildlife surveys conducted at the Whistling Ridge Energy Project site discusses potential impacts that may result from the proposed actions, and lists potential mitigation for these impacts.

While the information provided in this section reflects survey efforts comparable to other wind energy facilities permitted in the Northwest, evaluation of wildlife resources within the project site is ongoing. Data presented in this Application were collected during preliminary wildlife and avian surveys. In order to provide the best information available to the decision-making process, the applicant believes that additional data is warranted. Final impact assessments would be conducted during the SEPA process.

The applicant contracted Turnstone Environmental Consultants (TECI), and Western Ecosystems Technology (WEST) to conduct wildlife investigations on the project site. Wildlife surveys were conducted between 2004 and 2008, and included:

- Surveys for northern spotted owl, western gray squirrel, and northern goshawk (TECI)
- Fall avian migration and summer avian breeding/nesting surveys (WEST)
- Bat acoustic surveys (WEST)

In addition, WEST performed avian surveys as part of an analysis of potential avian/wind plant interactions in Klickitat County contained in the Klickitat County Energy Overlay Draft EIS (Kennedy Jenks 2003) and Final EIS (Anchor Environmental 2004). The surveys included two observation points in Skamania County, in the vicinity of the project site, shown on Figure 1, Avian Survey Points and Geographic Regions Used for Data Analysis, in the Draft EIS.

Current habitat conditions are described in Section 3.4.1 Habitat and Vegetation, and are not repeated below. For complete reports on surveys discussed below, see Appendices B-1 and B-2.

Special Status Species

Three special-status wildlife species are documented present within the vicinity of the proposed project: northern spotted owl (*Strix occidentalis caurina*), western gray squirrel (*Sciurus griseus)*, and northern goshawk (*Accipiter gentilis*) (Table 3.4-5).

Table 3.4-5
Federal and State Status of Special Status Species
with the Potential to Occur at the Whistling Ridge Energy Project Site

Common Name	Scientific Name	Washington State Status	Federal Status
northern spotted owl	*Strix occidentalis caurina*	Endangered	Threatened
western gray squirrel	*Sciurus griseus*	Threatened	Species of Concern
northern goshawk	*Accipiter gentilis*	Candidate	Species of Concern

Northern Spotted Owl. The northern spotted owl is listed threatened under the ESA. This species also is included as a state-listed threatened species in State of Washington. In Washington State, northern spotted owls inhabit the Eastern and Western Cascades, Western Lowlands and Olympic Peninsula Provinces. Within these regions, the northern spotted owl is associated with a variety of areas containing suitable habitat for nesting, roosting, foraging and dispersal. The species prefers forest habitats characterized by multi-layered canopy, and a high incidence of large trees that provide suitable structure for nesting and roosting. Northern spotted owls have large home ranges and use large tracts of land containing late successional forests. Fragmented forest habitats may be used for dispersal and foraging. Spotted owls will nest in stick nests of northern goshawks, on clumps of mistletoe, in large tree cavities, on broken tops of large trees, or on large branches or cavities in banks and rock faces.

Two historical northern spotted owl activity centers, Mill Creek (MSNO# 0991) and Moss Creek (MSNO#1003), are located north of the project site. The nest cores of both activity centers are located on public lands managed by the WDNR and the US Forest Service (USFS). The Mill creek activity center is composed of contiguous yet scattered northern spotted owl habitat located on private and public (WDNR) lands. This site was designated in 1992, and was last known to have spotted owls present in 2000. Surveys performed since 2000 have not resulted in any spotted owl sightings. The Moss Creek activity center is comprised of patchily distributed northern spotted owl habitat and a mix of rural residential lands, industrial timberland, and lands administered by WDNR and USFS. This activity center was established in 1994 and was last considered to have spotted owls present in 2002. Typically spotted owl activity centers will have their status changed to "historic" after three consecutive years with no documented spotted owl observations. ~~However, the state of Washington currently has a moratorium on changing the status of a known spotted owl activity center.~~ Northern spotted owl critical habitat is designated on lands located to the west/ northwest of the project site, and is almost entirely within the Gifford Pinchot National Forest Boundary. No spotted owl critical habitat is present on the project site.

Spotted owl surveys followed the 1992 Revised Version of "Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls" (USFWS 1992). Surveys were conducted in suitable habitat located in and adjacent to the proposed project site, and included Mill Creek and Moss Creek spotted owl activity centers (Figure 3.4-5).

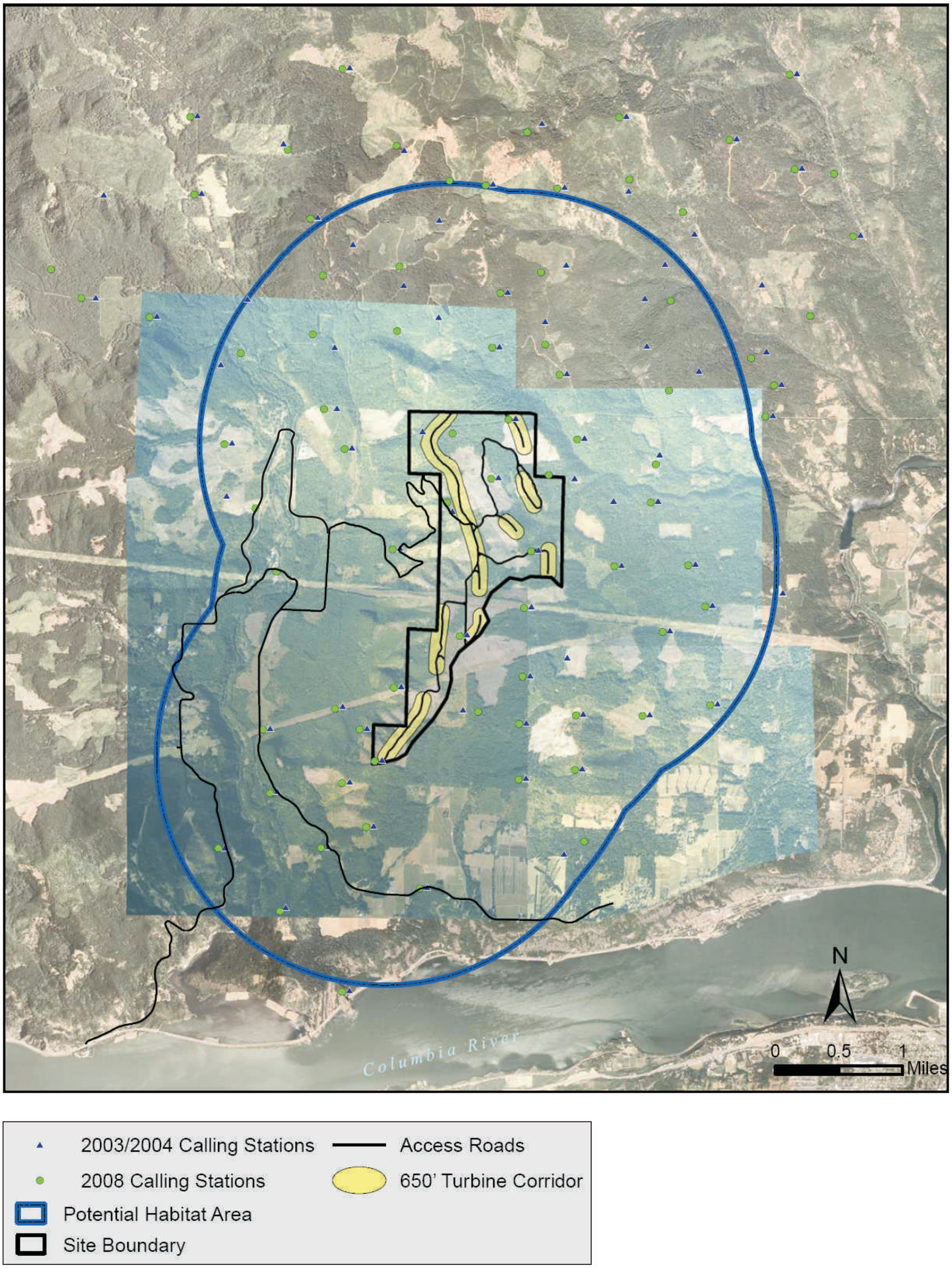
Suitable habitat was identified using topographic maps, aerial photography, and stand classification data from S.D.S Co., LLC.

During the 2003–2004 survey periods, the project site was surveyed between March 24, 2003 and July 23, 2003 using the one-year survey methodology, and between March 31, 2004 and August 18, 2004 using the two-year survey methodology. An additional survey was completed by TECI in 2004 in order to lengthen the time period in which management activities could occur before surveys would again be required. No spotted owls were detected during the 2003–2004 surveys.

Detailed methodology and results for the 2003 and 2004 northern spotted owl surveys can be found in Appendix B-3.

More recent spotted owl surveys were conducted in May 2008 and spring - summer of 2009. Surveys were conducted using the two-year survey methodology, which requires a minimum of three visits for two consecutive years in order to determine presence/absence of the spotted owl. During the three 2008 surveys, only barred owls were detected. USFWS is developing a new survey protocol addressing interactions between barred owls and spotted owls. The protocol is not due to be available until 2010, however Turnstone was able to obtain suggestions on new survey techniques to be used. One of those suggestions was to visit core areas in the day time looking for spotted owls that may not respond in the presence of barred owls. Turnstone has taken these suggestions and used them in the field, conducting four day site visits up and above the current protocol parameters. Turnstone has completed all required night visits and performed the last day visit on August 10th, all in the core areas where spotted owls were found historically. There have been no visuals or responses to date. Surveys were implemented in all potentially suitable habitat located within a 1.8 mile radius of the corridor (Figure 3.4-5). This area totaled 14,901 acres. The survey area also included the Moss Creek and Mill Creek activity centers, which expanded the survey area by 7,222 acres. No spotted owls were detected in either the survey area or historic activity centers. Detailed methodology and results for the 2008 northern spotted owl surveys can be found in Appendix B-4. The 2009 survey data will be included as part of the EIS.

33758687_92.cdr



Aerial Photo: Bergman Photographic, Portland, OR 2008
2006 USDA NAIP Imagery

Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-5

Potential Spotted Owl Habitat Area

URS

Whistling Ridge Energy Project
Skamania County, Washington

Western Gray Squirrel. The western gray squirrel is listed as a "threatened" species by the WDFW. In Washington, western gray squirrel distribution has been reduced to three geographically isolated populations: the "Puget Trough" population, centered in Thurston and Pierce counties, the "South Cascades" population, located in eastern Skamania County and Klickitat and Yakima Counties, and the "North Cascades" population, located in Chelan and Okanogan Counties. Western gray squirrels are arboreal species. Although they forage on the ground, this species rarely strays far from trees. They use tree canopies for cover and nesting. Western gray squirrels prefer areas where contiguous tree canopy allows arboreal travel in a minimum of a 198 feet (60 meters) radius around the nest (Ryan and Carey 1995). Western gray squirrels are diurnal species, with most activity occurring during morning hours. This species is most active during August and September, when this species is collecting and storing food for winter (Ryan and Carey 1995). The principal food source for the gray squirrel is acorns; however, conifer seeds are also eaten (Dalquest 1948). While pine nuts and acorns are considered essential foods for accumulating body fat in preparation for winter, green vegetation, seeds, nuts, fleshy fruits, and mushrooms also are consumed (WDW 1993, Carraway and Verts 1994, Ryan and Carey 1995).

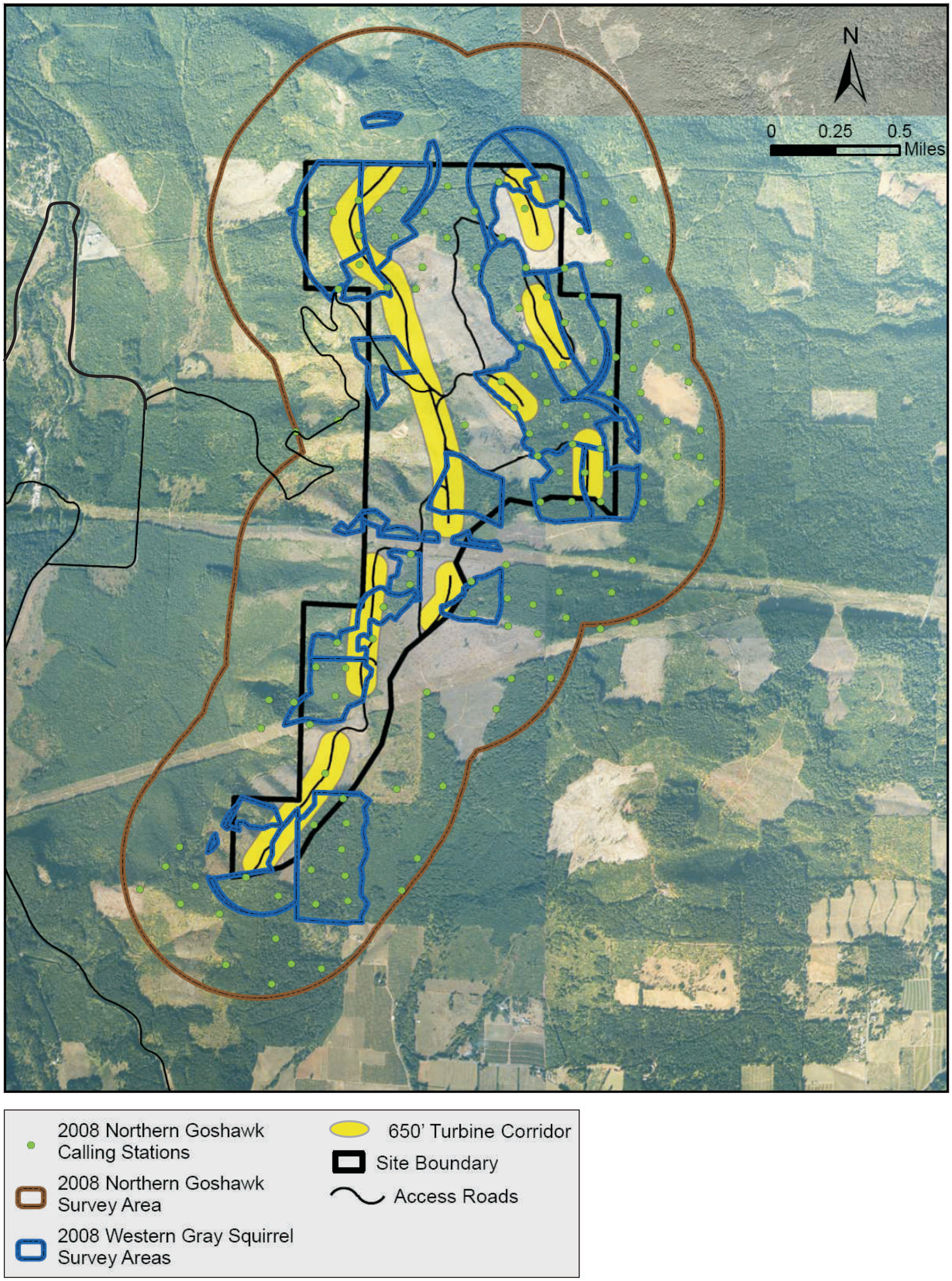
Western gray squirrel surveys were implemented by TECI on lands located in and adjacent to the project site in 2004 and 2008 (Figure 3.4-6). Surveys conducted in 2004 included a general search for western gray squirrels and nests while conducting northern goshawk station placement and surveys. Two adult western gray squirrels were identified through that effort.

An additional protocol survey was completed following methods described in "Surveys for western gray squirrel nests on sites harvested under approved forest practice guidelines: analysis of nest use and operator compliance" (Van der Haegen, Van Leuven, and Anderson 2004). No western gray squirrels were detected during protocol surveys. Detailed methodology and results for western gray squirrel surveys can be found in Appendix B-3.

Additional western gray squirrel surveys were completed by TECI in 2008. Prior to implementing field surveys, TECI consulted with a WDFW biologist to identify survey criteria and methodology. It was determined that gray squirrels surveys should be performed in areas where project activities would result in the removal of potential western gray squirrel habitat or structural modification (i.e., stand thinning), and these surveys should include unaltered habitat within 400 feet of potential disturbance.

An area consisting of a 1,050-foot buffer around the proposed turbine layout to account for lands that may be impacted by the project, and also the 400-foot buffer of undisturbed lands, was identified for potential survey. This area included 1,420 acres; however, only 738 acres was identified as potentially suitable to support western gray squirrel (Figure 3.4-6). Surveys were conducted following methods described by Van der Haegen, Van Leuven, and Anderson (2004). Surveyors searched for individuals and nests, focusing mainly on gray squirrels, but also noting other species. When possible, historical use by western gray squirrels was determined. No gray squirrels or nests were detected during these surveys. Detailed methodology and results can be found in Appendix B-4.

33758687_93.cdr



Aerial Photo: Bergman Photographic, Portland, OR 2008

Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-6

Northern Goshawk and Western Gray Squirrel Surveys

URS

Whistling Ridge Energy Project
Skamania County, Washington

Northern Goshawk. The northern goshawk is categorized as a “species of concern” by the U.S. FWS, and as a “listing candidate” for sensitive, threatened or endangered species by the State of Washington. Goshawks inhabit a wide variety of forest habitats, including true fir (red fir, white fir, and subalpine fir), mixed conifer, lodgepole pine, ponderosa pine, Jeffrey pine, montane riparian deciduous forest and Douglas fir. They are occasionally found nesting in coast redwood and mixed hardwood forest. Goshawk nest sites tend to be associated with patches of relatively large, dense forest; however, home ranges often consist of a wide range of forest age classes and conditions. Nest sites tend to be positively correlated with proximity to water or meadow habitat, forest openings, level terrain or “benches,” northerly aspects and patches of larger, denser trees, although variation in habitat associations does occur (USFWS 2002).

Northern goshawk surveys were conducted by TECI biologists in 2003 and 2008 on properties managed by S.D.S. Co., LLC and adjacent private land. In 2003, surveys were conducted in suitable habitat located in four core project sections, including the provincial home range radius of 0.5 mile around the core area (Figure 3.4-6). Suitable habitat was identified using topographic maps and aerial photography. Survey stations were establish at 0.2-mile intervals on roads and trails located in suitable habitat within 0.5 mile of a proposed wind turbine location. Potential goshawk habitat was surveyed in accordance with “Survey Methodology for Northern Goshawks in the Pacific Southwest Region” (Woodbridge and Hargis 2006). All raptor species responses detected during surveys also were recorded.

TECI completed two protocol surveys during the 2004 northern goshawk survey season. One hundred eighty five calling stations were surveyed each time. No northern goshawk responses were recorded during any of the two site visits. Detailed methodology and results for northern goshawk surveys can be found in Appendix B-3.

In 2008, the potential survey area for the northern goshawk was determined by protocol parameters outlined in the Northern Goshawk Inventory and Monitoring Technical Guide (USFS 2006), consultation with biologists from the WDFW and GIS analysis. The survey area was established by placing a 150-foot buffer around the turbine string layout, and then adding an additional 2,624 foot buffer per protocol. Forest stands with greatest potential to contain suitable habitat structure and composition to support northern goshawk were identified using GIS data and aerial photographs. Criteria for selecting stands included stand age greater than 25 years, and an average tree dbh of at least 12 inches. Based on these criteria, 1,093 acres was identified for surveys (Figure 3.4-6).

It was determined that the “Broadcast Acoustical Survey” methodology would be used for a two-year survey effort. TECI biologists completed two protocol surveys at 136 calling stations during the 2008 goshawk survey season. The first survey was conducted during the nesting period, and the second during the fledgling period. No northern goshawk responses were documented during either of the two site visits. Detailed methodology and results can be found in Appendix B-4.

Summary of Survey History. The project layout was finalized in October 2008, and included additions to proposed turbine strings, removal of previously proposed turbines, and identification of areas requiring improved roadways. Changes to the project layout resulted in lands added to the project area that, in some cases, were not included in wildlife surveys conducted prior to October 2008. The effect of these changes regarding special status species are:

- For northern spotted owls, the final turbine alignment did expand the area requiring owl surveys; however, because the survey area had included spotted owl activity centers located at the northern reach of the project site, the area was accounted for in the May 2008 surveys.

- For western gray squirrels, the final turbine alignment did expand the area requiring western gray squirrel surveys. These areas were identified after surveys were completed; however, the survey window was still open and an additional field survey was implemented in added areas.

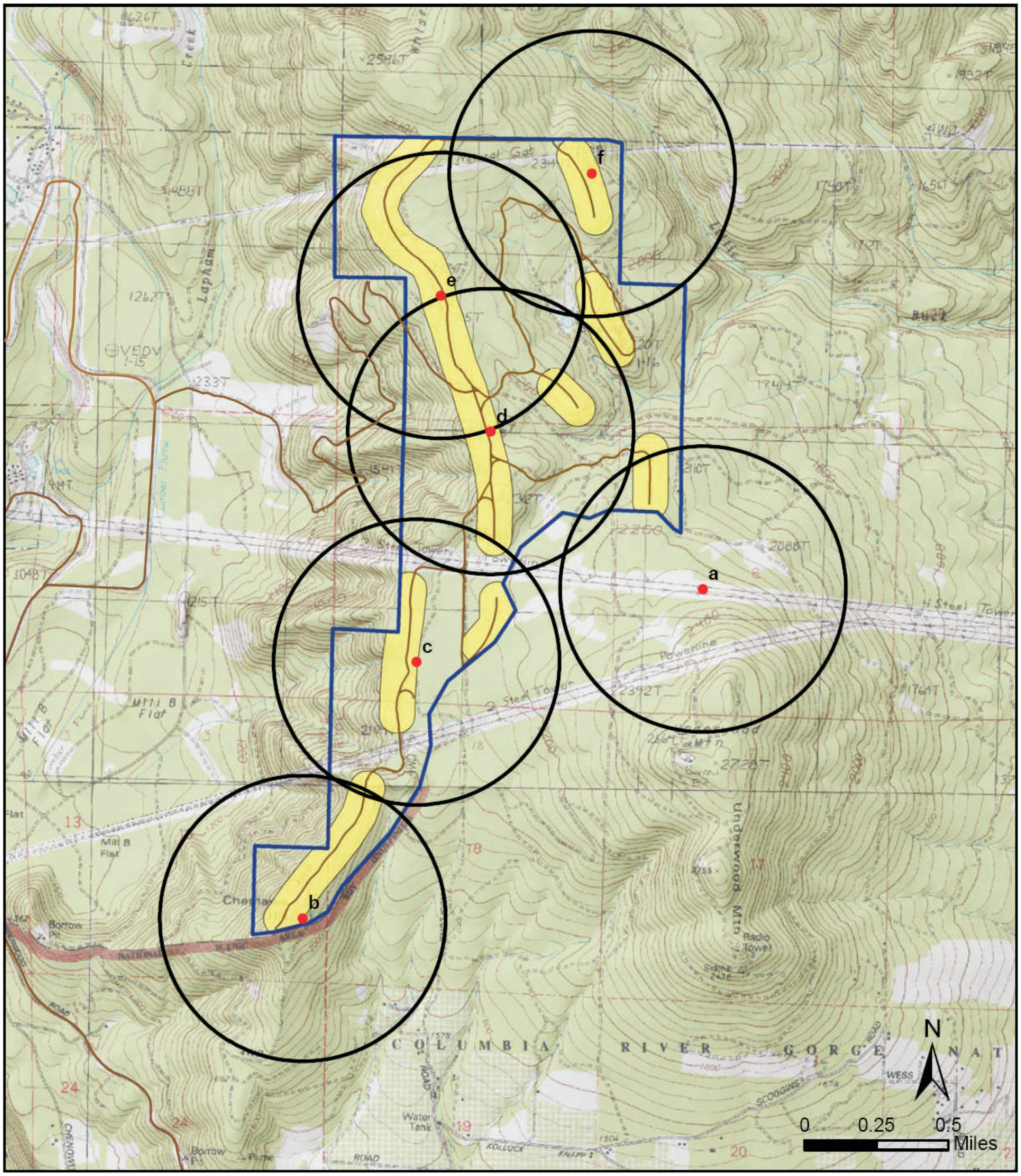
- The applicant completed northern goshawk surveys in accordance with protocols accepted and recommended by WDFW. The surveys were conducted during the relevant seasons in 2004, 2005, 2008 and again in ~~2008~~2009. No goshawks were found on the project site, nor were any observed on any surrounding properties. ~~It is highly unlikely that goshawks will be found on the project site or in areas to the north, owned and managed by WDNR.~~ The applicant ~~would~~ conducted an additional survey on the project site in spring 2009 ~~to~~ and confirmed these findings, in accordance with agreed protocols. The WDNR property near the project site has similar habitat characteristics to the project site, and was recently logged. ~~While no goshawks are expected on the area to the north, due to the proximity of turbines to the WDNR property to the north, the Applicant would conduct an intensive survey effort on approximately 360 acres to the north of the project site to confirm that the project does not present any significant impact to this species.~~

- Anabat detection surveys proposed for 2009 ~~would be~~have been started ~~implemented~~ for the~~during the~~ months of July through October, and ~~would~~ will augment our understanding of bat activity within the vicinity of the proposed micrositing corridors. Anabat detectors have also ~~would be~~been elevated to gain a better understanding of bat activity at rotor swept height.

Avian Migration and Breeding/Nesting Surveys

Avian surveys were conducted during the fall migration period (September 11 to November 4, 2004) and the breeding/nesting season (May 15 to July 14, 2006) by WEST biologists. Study protocol followed methods described by Reynolds et al. (1980). An 800-meter circular plot was centered on each observation point (Figures 3.4-7 and 3.4-8). All observations, behavior, and flight patterns of birds in and near plots were recorded. Flight patterns, such as direction of travel and flight altitude also were recorded. Observations of birds beyond the 800-meter radius were recorded; however, these data were analyzed separately from data collected from survey plots. The location of raptors, other large birds, or species of concern observed during counts was recorded on field map.

33758687_94.cdr



- Avian Observation Points
- 800 m Buffer
- 650' Turbine Corridor
- Site Boundary
- Access Roads

Source: GeoDataScape.

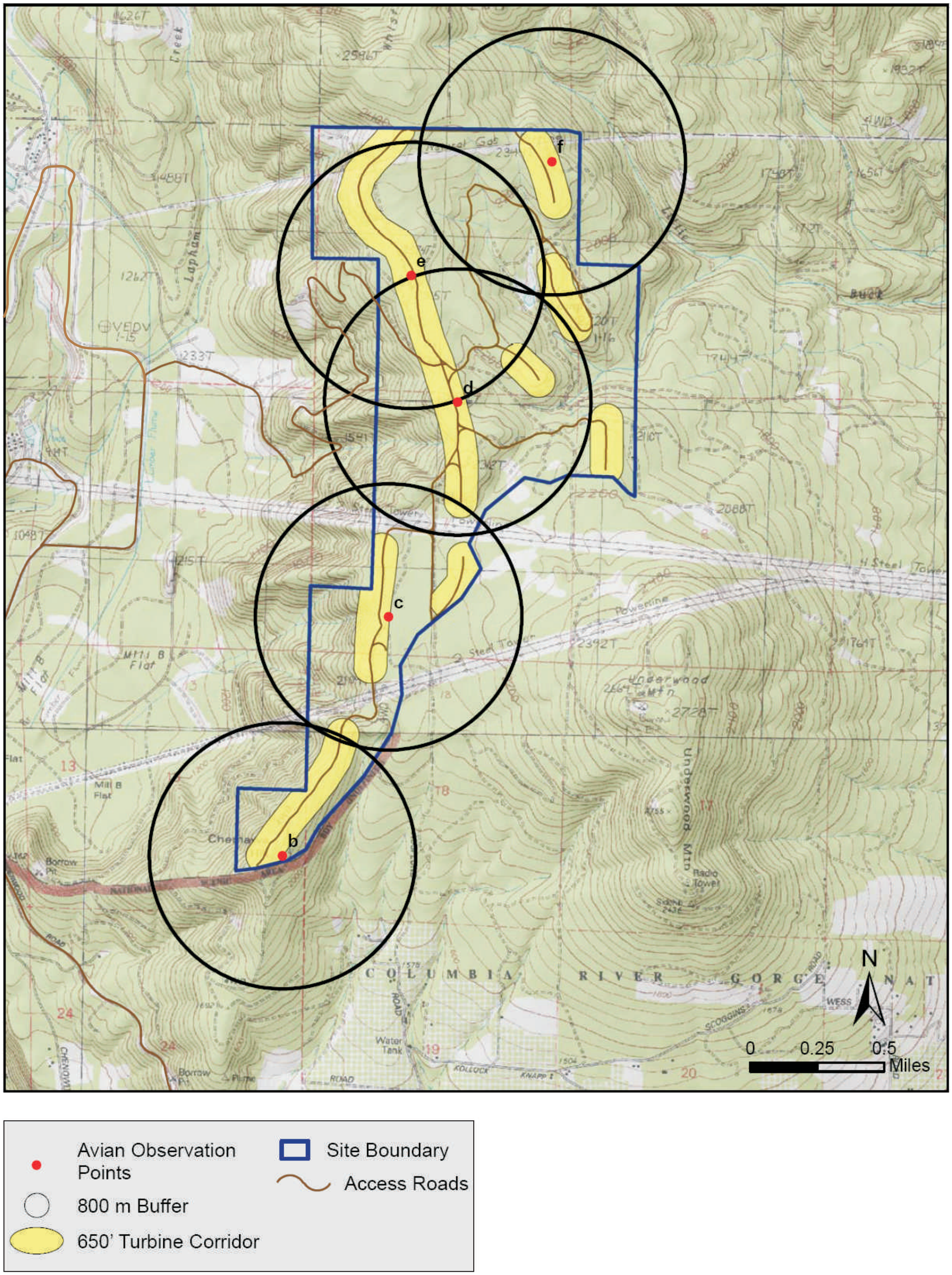
Job No. 33758687

Revised Figure 3.4-7

Location of Avian Surveys (Fall 2004)

URS

Whistling Ridge Energy Project
Skamania County, Washington



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-8

Location of Avian Surveys (Spring 2006)

URS

Whistling Ridge Energy Project
Skamania County, Washington

A relative index to collision risk (R) was calculated for bird species observed in the survey area using the following formula:

$$R = A*P_f*P_t$$

Where A = mean use for species i averaged across all surveys, P_f = proportion of all observations of species i where activity was recorded as flying (an index to the approximate percentage of time species i spends flying during the daylight period), and P_t = proportion of all flight height observations of species i within the rotor-swept height.

This index does not account for differences in behavior other than flight characteristics (i.e., flight height and proportion of time spent flying). Point count data were used to establish diurnal indices of avian use, and how these indices compare to other wind resource areas in the United States.

Fall Migration Surveys (2004). General avian surveys identified thirty-nine 39 species of bird in the survey area (Figure 3.4-8). Passerines (songbirds) were the most abundant avian group, constituting 87.4% of observations. This group was also observed with the greatest frequency (94.4% of surveys). Raptors were the second most abundant group observed; however, this group represented only 4.9% of observations. Raptors were observed during 38.5% of the surveys, followed by woodpeckers (22.6% of surveys) and doves/pigeons (9.3% of surveys).

The most common species at the project site included dark-eyed junco, American goldfinch, Steller's jay, common raven, and white-crowned sparrow. The species of birds most frequently observed during fall surveys were common raven, Steller's jay, dark-eyed junco, red-breasted nuthatch, and golden-crowned kinglet. Eight species of raptor were observed during the survey. Those with the highest use of the site were sharp-shinned hawk, Cooper's hawk, and red-tailed hawk. The highest raptor use observed at the site during 2004 surveys occurred between September 11 and October 12, 2004. These data do not indicate that any areas within the proposed site have substantially higher raptor use than others.

No federal or state listed endangered or threatened avian species were observed during the survey period. Four state candidate species were observed: golden eagle, northern goshawk, pileated woodpecker, and Vaux's swift. Two State Monitor species were also observed, including four single turkey vultures and four groups totaling 27 western bluebirds. Detailed results and summary tables can be found in Appendix B-5.

Summer Breeding Nesting Surveys (2006). Fifty-five species of birds were observed during summer breeding and nesting surveys in 2006. Passerines were the most abundant group (88.5%), followed by raptors and woodpeckers (3.3% each), and doves/pigeons (3.2%). The most frequently observed groups were passerines (100% of surveys), woodpeckers (35.6% of surveys), and raptors (31.1% of surveys). Species with the highest use of the project site included white-crowned sparrow, red crossbill, western tanager, spotted towhee, and MacGillivray's warbler. The most frequently observed species included white-crowned sparrow (77.8% of the surveys), western tanager (75.6% of surveys), spotted towhee (64.4% of surveys), MacGillivray's warbler (48.9%), and dark-eyed junco (48.9%). Three species of raptors were observed, including red-tailed hawk, northern goshawk, and sharp-shinned hawk. Raptor use in the fall was only slightly higher than during the summer breeding season. The data do not indicate that any portions of the project site have substantially higher raptor use than other areas. For all bird species combined, use of the project site by avian species was slightly higher during the summer breeding season than during the fall migration period.

Detailed results and summary tables can be found in Appendix B-6.

Bats

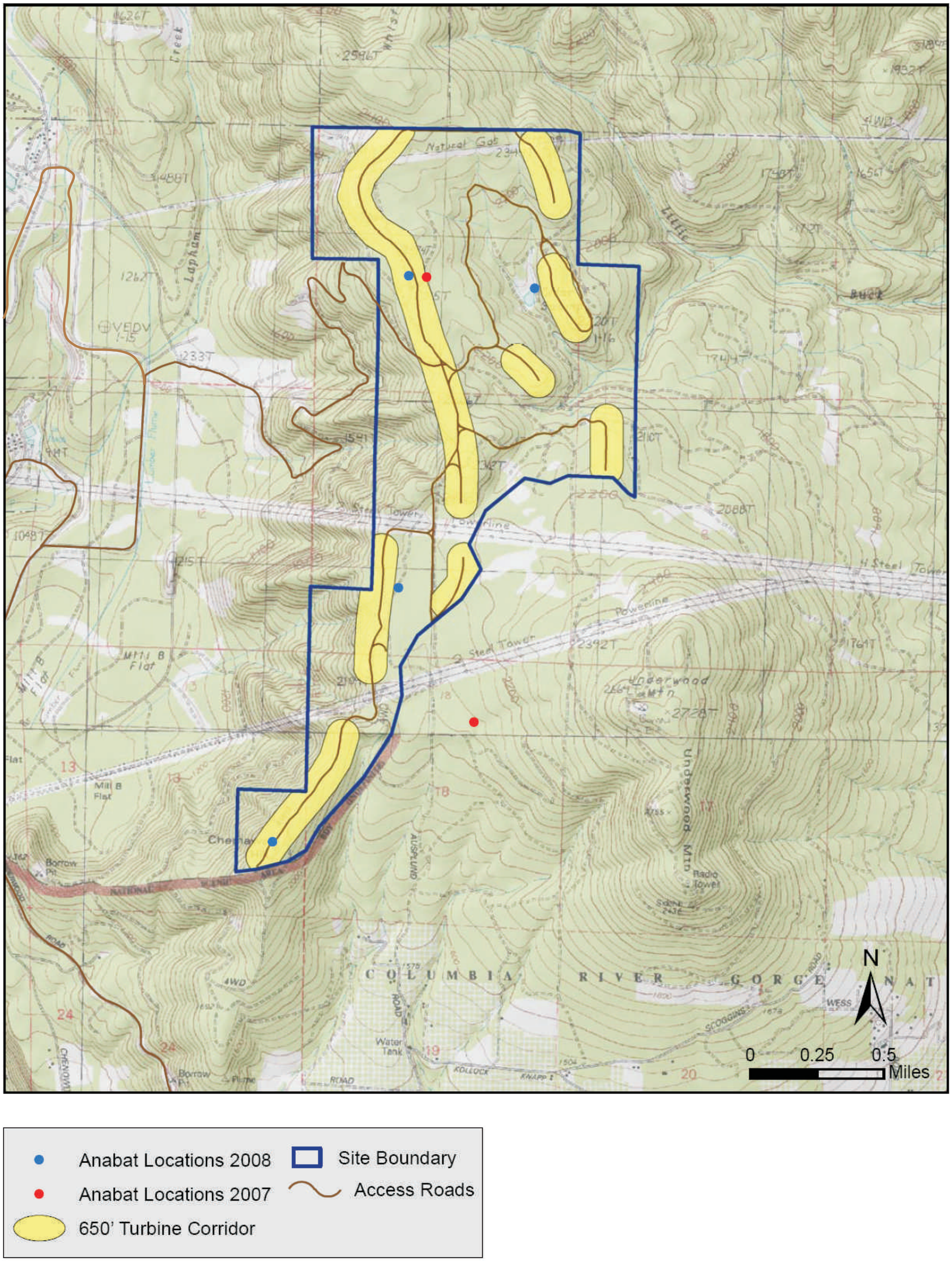
This section describes the results of bat acoustic studies conducted for the Whistling Ridge Energy Project in 2007 and 2008. Detailed information on these investigations can be found in Appendices B-7 and B-8.

Bat acoustic studies conducted in 2007 and 2008 were implemented at various locations on the project site. The purpose of these surveys was to quantify bat use of this area, and use these data to estimate the seasonal and spatial use of the project site. Passive Anabat® II echolocation detectors coupled with Zero Crossing Analysis Interface Modules (ZCAIM; Titly Electronics Pty Ltd., NSW, Australia) were used in both survey years. Anabat detectors record bat echolocation calls using a broadband microphone. Bat species are generally grouped into those that emit low frequency (<35 kHz) or high frequency (≥ 35 kHz) calls. The units of activity equaled the number of bat passes, and were used to calculate the number of bat passes per detector night (Hayes 1997). The data thus indicate the level of bat activity rather than absolute abundance.

In 2007, detectors were placed at two locations from August 20 through October 21 (Figure 3.4-9). The northernmost detector was located just outside the proposed corridor. This detector was initially placed at ground level; however, it was raised to a height of 130 feet (40 meters) on September 7. The southernmost detector was located outside the project site (i.e., outside of the Township, Range, and Section described above); however, it was placed in habitat believed to be representative of that found on the project site. The southernmost detector was placed at ground level, and remained at that location for the duration of the study.

Due to equipment failures, both Anabat detectors were only operable for 24% of the sampling period, amounting to 45 detector-nights. During this survey period, 348 bat passes were recorded. Bat activity was similar between north and south ground level Anabat units (mean = 11.67 ± 2.0 and 9.6 ± 4.1, respectively). At both ground-level locations, the number of high-frequency bat passes per detector night was approximately one and a half times greater than the number of low-frequency passes. High frequency calls are associated with species such as western red bat and mouse-eared bats (*Myotis* spp). Bat activity recorded after the northern Anabat detector was elevated was much lower (mean = 2.47 ± 1.1) than that recorded at ground level, and passes of low-frequency bats greatly outnumbered high-frequency bat passes. Low-frequency calls are associated with big brown bat, silver-haired bat, and hoary bat. Conclusive species identification was only possible for hoary bat, which accounted for approximately 5% of all species.

33758687_96.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.4-9

Location of Bat Acoustic Studies

URS

Whistling Ridge Energy Project
Skamania County, Washington

Patterns of nightly activity were similar among detector locations; however, definitive comparisons cannot be made because the timing of when the north detector was placed at ground-level did not coincide with when data was collected from the southern ground-level detector.

The bat acoustic survey effort was greater during the 2008 survey period. Four Anabat detectors were placed in the project vicinity from July 3 to October 7, 2008 (Figure 3.4-9). This period corresponded with summer breeding and fall bat migration. One detector was placed at a wetland located to the west of turbines C1–C4. Data collected at this site are use to assess activity levels of local breeding bats that may be using the wetland, but was not used to evaluate risk of bats to collision mortality. The remaining three detectors were placed in upland habitats that more closely resembled habitat where turbines may be placed (one in a linear road corridor that passed through forested habitat, and two others in clearcuts).

For the three upland survey locations, bat activity was monitored for a total of 97 nights. Anabat detectors were operational for 95.5% of the sampling period. A total of 39,326 bat passes were recorded during 278 detector-nights. Average bat passes per detector night at the upland locations equaled 138.44. A total of 80.7% of all bat passes was recorded from the detector located in the road corridor. Bat passes recorded in clearcut habitats accounted for only 19.1% of all bat passes.

Bat activity at the wetland location was monitored for a total of 97 nights, and was operational 100% of the time. A total of 17,269 bat passes were recorded during 97 detector-nights. The average number of bat passes per detector night at this location equaled 178.03.

Temporal activity patterns were similar among the upland survey locations, with the highest bat activity occurring during the months of July and August. Peak activity across all upland sites occurred between July 10 and July 16. Bat activity in the wetland area was highest during the month of July, with peak activity occurring on July 5. Bat activity in this area between July 3 through mid-August was over four times higher than activity from mid-August through October 7 (mean = 218.6/detector night and 52.3/detector night, respectively).

At the upland sites, low-frequency bats accounted for 67% of all bat passes. The opposite was true for the wetland site, where high-frequency bats accounted for 69.7% of all bat passes. As in 2007, species identification was only possible for the hoary bat. Hoary bats comprised 6.0% of passes recorded at upland locations, and use was similar across the three sites. This species comprised 2.0% of total bat passes recorded at the wetland location. Activity was relatively high at the wetland and road corridor stations, and accounted for the majority of the calls recorded. Increased activity near the wetland is likely due to bats drinking and foraging in this area. Increased activity along the linear road clearing is likely due to its use as a travel corridor by local bats.

The 2008 acoustic surveys resulted in a vastly higher detection rate than that observed during 2007 surveys. Several factors contributed to the high level of detected bat activity during the 2008 surveys, including increased number of survey sites and the fact that all detectors were placed at ground level where heightened foraging activity occurs. However, the primary reason for the greater number of detections recorded during 2008 surveys were due to timing and locations of the equipment. In 2008, four times the number of bats was recorded from July 3 to mid-August, as mid-August through October; the peak activity period recorded in 2008 was thus missed during 2007 surveys as detectors were not installed until late August.

The temporal variation in activity levels is indicative of the importance of conducting detection surveys during this period. Anabat detection surveys proposed for 2009 would behas been implemented during for the months of July through October, and would will augment our understanding of bat activity within the vicinity of the proposed corridor. Anabat detectors have also would bebeen elevated to gain a better understanding of bat activity at rotor swept height.

Priority Wildlife Habitats

Priority wildlife habitats, including mule deer and black-tailed deer winter range, are present to the east of Underwood Mountain, extending to lands located to the north/northeast. Winter range for Columbia black-tailed deer is present in lands located west of Underwood Mountain, and extends north and south from the project site. Elk winter range is present throughout the project site.

Improved Roadways outside the Site Boundary

Access to the Whistling Ridge Energy Project would require traversing lands located within the Columbia River Gorge National Scenic Areabe using Cook-Underwood Road to Willard Road, and then via a new connection to West Pit Road to the project site boundary. West Pit Road is an existing private logging road. Approximately 2.12.5 roadway miles in this area would require improvement as a result of the proposed project. This section would be used to connect existing County roads within the Scenic Area to other existing roads owned by S.D.S. Co., LLC.

3.4.3.2 Impacts

Whistling Ridge Energy Project Site

Construction and operation of the Whistling Ridge Energy Project is expected to have limited impacts on wildlife resources. Project actions would include the construction of permanent roadways, improvement (i.e. widening and resurfacing) of existing roadway, and the installation and operation of wind turbines. Impacts to wildlife habitat may result from vegetation removal in forested areas where the proposed roadway and turbine alignment is planned. Vegetation management in areas surrounding each turbine would range from complete removal of vegetation to limitations on tree height.

Wildlife and avian investigations conducted to date quantify the use of habitats located within the project site. Surveys for federally listed and candidate species, avian migration and breeding, and bat acoustic studies are ongoing, and include northern goshawk and bat surveys planned for 2009. The analysis presented below establishes an analytical framework and data for evaluation of the Application.

Special Status Species

Three federally listed or candidate species have the potential to occur within the project site, including northern spotted owl, western gray squirrel, and northern goshawk.

Northern Spotted Owl. The spotted owl prefers forest habitats characterized by multi-layered canopy, and a high incidence of large trees that provide suitable structure for nesting and roosting. No late seral forests are present within the project site. It is assumed that active timber harvest that has occurred in this area has altered the landscape such that limited suitable habitat exists. Further, no spotted owls have been detected in the proposed project site or spotted owl activity centers located in proximity to the proposed project. No impacts to northern spotted owls are expected.

Western Gray Squirrel. The gray squirrel prefers habitat where contiguous tree canopy allows arboreal travel in a minimum of a 198-foot (60-meter) radius around the nest (Ryan and Carey 1995). Ongoing forest management on lands located within the proposed project site has reduced suitable habitat for this species through fragmentation of mature forest stands. Contiguous forest habitat located on the project site would not persist indefinitely in the absence of the proposed project. The project site also contains very few oak trees, and those that were observed were of small stature (less than 20 feet tall), stunted, and growing in openings on exposed rocky slopes in shallow soils. Acorn crops from oak trees are an important food source for western gray squirrels, and the lack of this primary food source may deter use of the project site by gray squirrels. Because habitat for this species is considered rare or of moderate/poor quality on the project site, impacts to western gray squirrel are expected to be negligible.

Northern Goshawk. Goshawks inhabit a wide variety of forest habitats, including true fir, mixed conifer, montane riparian deciduous forest and Douglas fir forests. Goshawk nest sites tend to be associated with patches of relatively large, dense forest located in proximity to water; however, home ranges often consist of a wide range of forest age classes and conditions. Although no goshawks were detected during protocol surveys, individuals were spotted during general avian migration and breeding surveys. Potential impacts to this species may include turbine collision-related mortality or displacement; however, the risk for this species is considered low.

Avian Species (General)

Construction Impacts. Impacts to avian species are not anticipated during construction of the proposed project. Certain species may be temporarily displaced due to construction related noise and increased traffic volume; however, permanent impacts to these species are not expected.

Operational Impacts. Potential operation-related impacts to avian species include turbine collision and displacement. Based on the exposure index derived from abundance and flight behavior, the species most likely to collide with wind turbines located at the project are red crossbills (R = 0.77), Steller's Jay (R = 0.37), common raven (R = 0.33), American Goldfinch (R = 0.29), and western bluebird (R = 0.22). The highest index for any raptor was 0.08 for red-tailed hawk, indicating a risk approximately 10 times lower than for the red crossbill. A regression analysis using data collected during avian surveys estimated a raptor/vulture fatality rate of 0.049/MW/year, or 4–5 raptors per 100 MW per year. This fatality estimate is relatively low compared to many wind projects (Appendix B-6). Further, data collected from the project site indicate that the area is not within a major migratory pathway, at least during fall migration.

Based on the two seasons of surveys, overall use of the project site by golden eagle, northern goshawk, pileated woodpecker, prairie falcon, and willow flycatcher was very low. Adverse impacts to these species are not anticipated. Of the species that were commonly observed, turkey vultures have very low susceptibility to turbine collisions (Orloff and Flannery 1992). To date, this species has not been documented as a turbine fatality in the Pacific Northwest. Vaux's swifts, western bluebirds, and olive-sided flycatchers were commonly observed flying at rotor-swept heights, and some turbine-related mortality may occur for these species over the life of the project. These collisions would likely be rare, and it is unlikely that the Whistling Ridge Energy Project would have any negative impacts on population levels on and near the project site. Higher numbers of Vaux's swifts and western bluebirds were recorded during fall migration, whereas olive-sided flycatcher appears to primarily use the project site for breeding.

Waterfowl, waterbirds, and shorebirds were not observed using lands within the project site during this study, and mortality involving this group is expected to be rare. Based on abundance, passerines are expected to make up the largest proportion of fatalities at the Whistling Ridge Energy Project. Post-construction mortality data collected at other windfarms in Washington and Oregon indicate that less correlation between pre-construction surveys and turbine-related mortality is observed in non-raptor species. The lack of correlation may be because most fatalities are among nocturnal migrants that are not accounted for during surveys.

The avian use information for the project site is based on detections of birds seen and/or heard calling. Because songbirds are less vocal during fall, this information may be skewed toward summer use. Similarly, the level of night migration for species associated with the project site is also not known. Risk analyses presented above provide some insight into which species are most vulnerable to turbine collision; however, estimates are based on abundance, proportion of daily activity budget spent flying, and flight height of each species. Observations were made during daylight hours, and do not take into consideration flight behavior or abundance of nocturnal migrants. Further, the analysis also does not account for varying ability among species to detect and avoid turbines, habitat selection, or other factors that may influence exposure to turbine collision. As a result, actual risk may be lower or higher than indicated by these estimates (Orloff and Flannery 1992).

In addition to direct mortality through collisions, the presence of wind turbines may alter the landscape, thereby displacing wildlife away from the project facilities. Habitat for avian species may be lost through vegetation clearing for roadways construction and improvement, and in areas surrounding wind turbines. Several studies have reported on this effect and are summarized in Appendix B-6.

Bats

Construction Impacts. Impacts to bats are not expected during the construction of the proposed project.

Operational Impacts. It is likely that some bat mortality would occur during operation; however, mortality estimates are difficult due to our lack of understanding of why bats collide with wind turbines (Kunz et al. 2007, Baerwald et al. 2008). Several factors may aid in the assessment of potential impacts to bats, including site-specific habitat and topography, species composition, and activity patterns. Investigations of bat use of the project site are ongoing. Ongoing surveys would augment existing data and better define our understanding of spatial and temporal patterns of bat use of the project site. A preliminary assessment of potential impacts to bats that may result from construction or operation of the Whistling Ridge Energy Project is provided below. This assessment was completed by examining site-specific habitat features and bat acoustic data collected to date. Additional insight from investigations conducted at other wind farms is presented where relevant.

Turbine-related mortality to bats on the project site may be lower than expected based on observed bat activity levels. The majority of detected species were high-frequency species, most of which were likely from the genera *Myotis*. This genus has among the lowest recorded mortality rates at wind resource areas throughout the US, comprising only 0–13.5% of the fatalities (Arnett et al. 2008). At existing wind-energy facilities in eastern Oregon and Washington, approximately 96% of all recorded fatalities were low-frequency species. These data indicate that high-frequency species, such as *Myotis* bats, are much less susceptible to turbine collisions than low-frequency species. Ongoing studies would help to better understand whether more susceptible low-frequency species have been underestimated in surveys conducted to date.

The timing of peak bat activity on the proposed project site (July to mid-August) does not coincide with when the highest levels of bat mortality have been documented at other wind farms in the US. Fatality studies have shown a peak in mortality in August and September and generally lower mortality earlier in the summer (Johnson 2005, Arnett et al. 2008). While the survey effort varies among the different studies, the studies that combine Anabat surveys and fatality surveys show a general association between the timing of increased bat call rates and timing of mortality, with both call rates and mortality peaking during the fall (Kunz et al. 2007). The highest use of the project site occurred in July and early August, prior to the time that most bat mortality occurs at wind resource areas in the Pacific Northwest as well as throughout the US.

High bat activity in July and early August is likely due to use of the project site by local bats during the reproductive season, when pups are being weaned and foraging rates are high. Activity beyond mid-August likely represents movement of migrating bats through the area. Activity by hoary bats also was substantially higher in July, and dropped off significantly beginning in early August. After August 31, activity for all bats was very low relative to earlier dates, indicating that most bats had left the area for winter hibernacula or warmer climates. These data indicate higher use of the project site by resident populations of bats, rather than by migrants passing through the area. Further, high bat activity levels during the breeding season, as seen on the project site, do not equate to high bat fatality rates. Low mortality has been documented during the breeding season at several wind farms, even when relatively large bat populations were present in the area (Fiedler 2004, Gruver 2002, Howe et al. 2002, Johnson et al. 2004, Schmidt et al. 2003).

Finally, no known large bat colonies are present near the proposed Whistling Ridge Energy Facility. The nearest known hibernaculum is located near the town of Trout Lake, nearly 20 miles north of the proposed project (B. Weiler, personal communication). The project site does not contain topographic features, such as canyons, that may funnel migrating bats toward corridors where turbines would be placed. No turbines would be constructed near wetlands or ponds, and cleared areas surrounding turbine strings would closely mimic clearcuts, where to date, recorded bat activity levels on the project site were the lowest.

Based on data collected to date on species composition, activity patterns and habitat use, significant adverse impacts to bats are not anticipated as a result of the proposed project. Data collected during 2009 surveys would improve our understanding of bat use and activity patterns, and help to refine our assessment of the degree of impacts and potential mitigation measures, if any.

Priority Wildlife Habitats

Construction Impacts. Mule deer, black-tailed deer, and elk may be displaced temporarily from winter range if the timing of construction activities coincides with use of these habitats. Construction-related displacement is expected to be of short duration.

Operational Impacts. Because data on impacts to big game as a result of wind farm operation is limited, it is difficult to predict the impact of the proposed project on wildlife using priority habitats on the proposed project site. Additional coordination with WDFW is ongoing, and would continue to address this resource.

Improved Roadways outside the Site Boundary

A total of ~~2.1~~2.5 roadway miles located outside the proposed project site would require upgrades as a result of the proposed project. ~~These roads~~This road, West Pit Road, would traverse forests of varying stand age. ~~Half~~ Much of ~~upgraded roads~~West Pit Road ~~are~~ is adjacent to areas characterized by recent clearcut harvest. Based on minimal habitat loss as a result of roadway construction and improvement, impacts to wildlife are expected to be minimal.

Temporary impacts to wildlife may occur as a result of construction-related traffic and noise. These impacts would terminate after the project is constructed, and traffic levels similar to that currently observed would resume.

3.4.3.3 Mitigation Measures

The primary mitigation goal for the Whistling Ridge Energy facility is to avoid sensitive wildlife resources when siting turbines and access roads. Because of the relatively small footprint of wind energy facilities and the flexibility of the process, it is likely that avoidance can be achieved. Wind turbines would also be sited in areas already actively managed for timber harvest. New road construction would be minimized by improving and using existing roadways. All temporarily disturbed areas would be regraded and reseeded with an appropriate mix of native plant species to restore vegetation after the construction phase is over.

Mitigation for potential impacts resulting for the proposed project includes the following sequentially-performed actions:

- Rectify the impact by repairing, rehabilitating, or restoring the affected environment in consultation with relevant wildlife agencies.

- Conduct thorough analysis of sensitive natural resources to avoid impacts and increase avoidance during micrositing.

- Implement a two year minimum post-construction mortality study

- The Applicant plans to convene a Technical Advisory Committee to evaluate the mitigation and monitoring program and determine the need for further studies or mitigation measures. The Technical Advisory Committee would be composed of representatives from WDFW, USFWS, Skamania County, and the Applicant. The role of the Technical Advisory Committee would be to coordinate appropriate mitigation measures, monitor impacts to wildlife and habitat, and address issues that arise regarding wildlife impacts during construction and operation of the project. The post-construction monitoring plan would be developed in coordination with the Technical Advisory Committee .

- Implement project design features that would minimize project impacts, including:

    - Installing tubular steel turbine towers to eliminate perching opportunities provided by lattice towers

    - Burying electrical lines between turbines and from turbine strings to substation

    - Using the minimum amount of turbine lighting required by the FAA

    - Installing newer generation up-wind turbines

SECTION 3.5 WETLANDS AND OTHER JURISDICTIONAL WATERS (WAC 463-60-333)

3.5.1 EXISTING CONDITIONS

A wetland investigation was performed at the project site and along roads proposed to be upgraded for the project on October 26, 2006 and January 9, 2007 (CH2M Hill 2007) (Appendix C). Since the time of those surveys, a new site access route has been identified between SR 14 and the project site to be used for equipment delivery and construction and operation labor. Additional wetland field work ~~will be~~was completed in ~~-performed in spring~~July 2009 along the roadways proposed for construction access and~~to~~ confirmed that no additional wetland areas are present that would be affected by construction or operation of the project.

3.5.1.1 Project Site

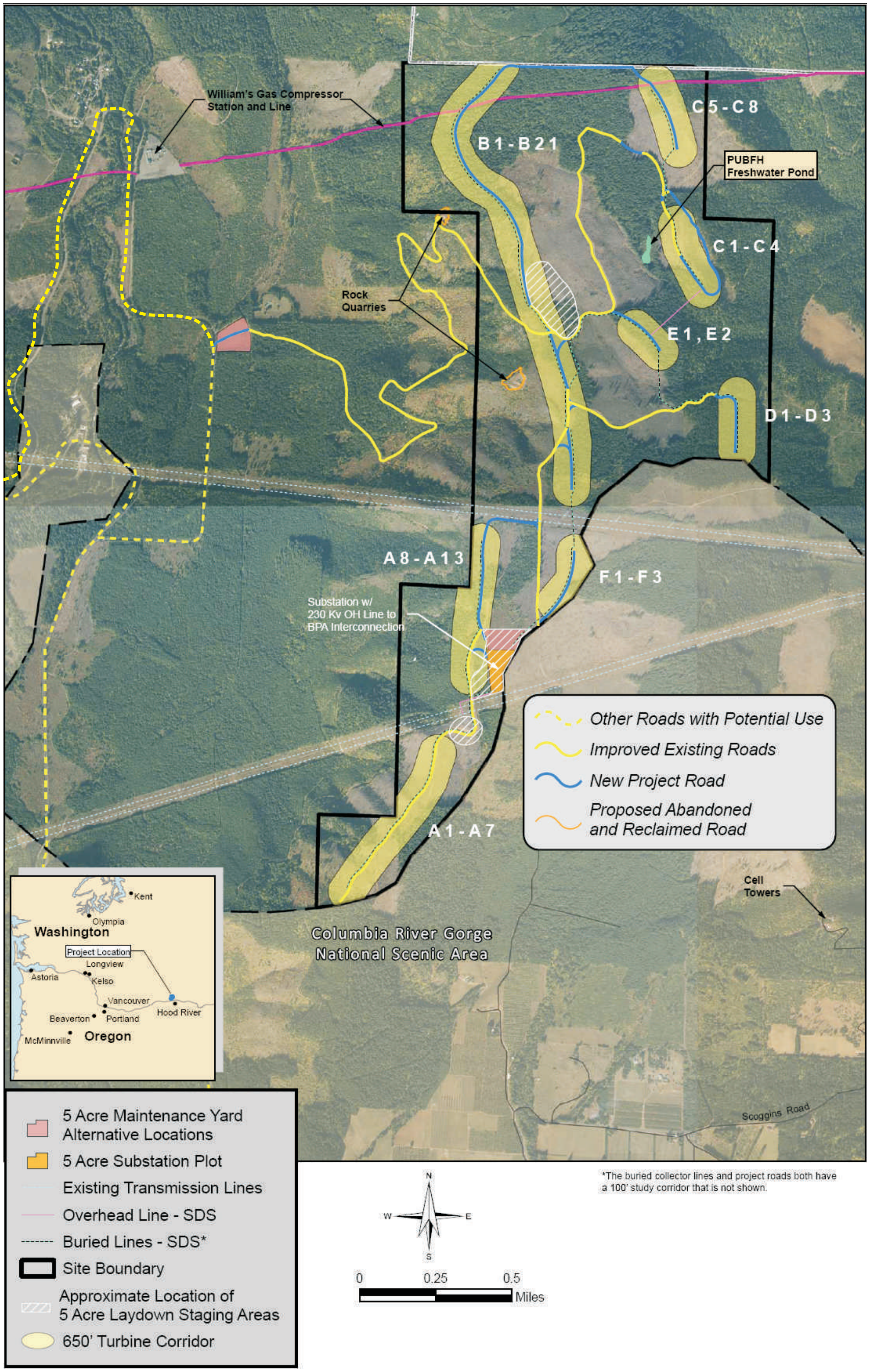
No wetlands or wetland indicators were identified within the study area (the turbine corridors and originally proposed access roadways). One undelineated wetland is identified to occur outside the study area perimeter west of turbines C1-C4 (Figure 3.5-1, Project Site Wetlands).[1] This wetland is labeled as “Cedar Swamp” on the USGS map and is listed as palustrine unconsolidated bottom, semipermanently flooded, impounded (PUBFh) on the National Wetland Inventory (CH2M Hill 2007). The Cedar Swamp wetland buffer does not extend into the study area.

Five intermittent drainage ways that provide short duration runoff during storm events or spring snowmelt meet the Skamania County Critical Areas criteria for Class V Streams (CH2M Hill 2007). The drainage ways do not contain channels, scour marks, or other characteristics that meet the definition of waters of the US or Washington state. The planned improvements to existing roads that would occur inside the Scenic Area would cross one intermittent stream (shown on Figure 3.3-1). See Section 3.3 for a discussion of surface water.

3.5.1.2 Improved Construction Access Roadways

A preliminary review of the National Wetland Inventory indicates wetlands occur along SR 14 near White Salmon, Washington (Figures 3.5-2a and 3.5-2b, Access Route NWI Wetlands). As described in Section 4.3 Transportation, ~~very minor intersection~~no improvements to SR 14 would be required ~~but~~ and no wetland impacts are anticipated to occur. The National Wetland Inventory does not show the presence of wetlands along the local secondary and forest roads proposed to be used by the project. As the National Wetland Inventory is based on historic aerial photography interpretations, a field investigation ~~will occur in spring~~was conducted in July 2009 ~~to~~ confirmed ~~whether or not~~that wetlands ~~and other regulated waters of the US or the State may~~would not be impacted by the project.

[1] The wetland on the project site results from a constructed impoundment according to National Wetland Inventory maps and so is not regulated locally as a critical area according to SCC Title 21A.04.020(A)(1)(b).



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

33758687_100.cdr

Source: GeoDataScape.

Job No. 33758687

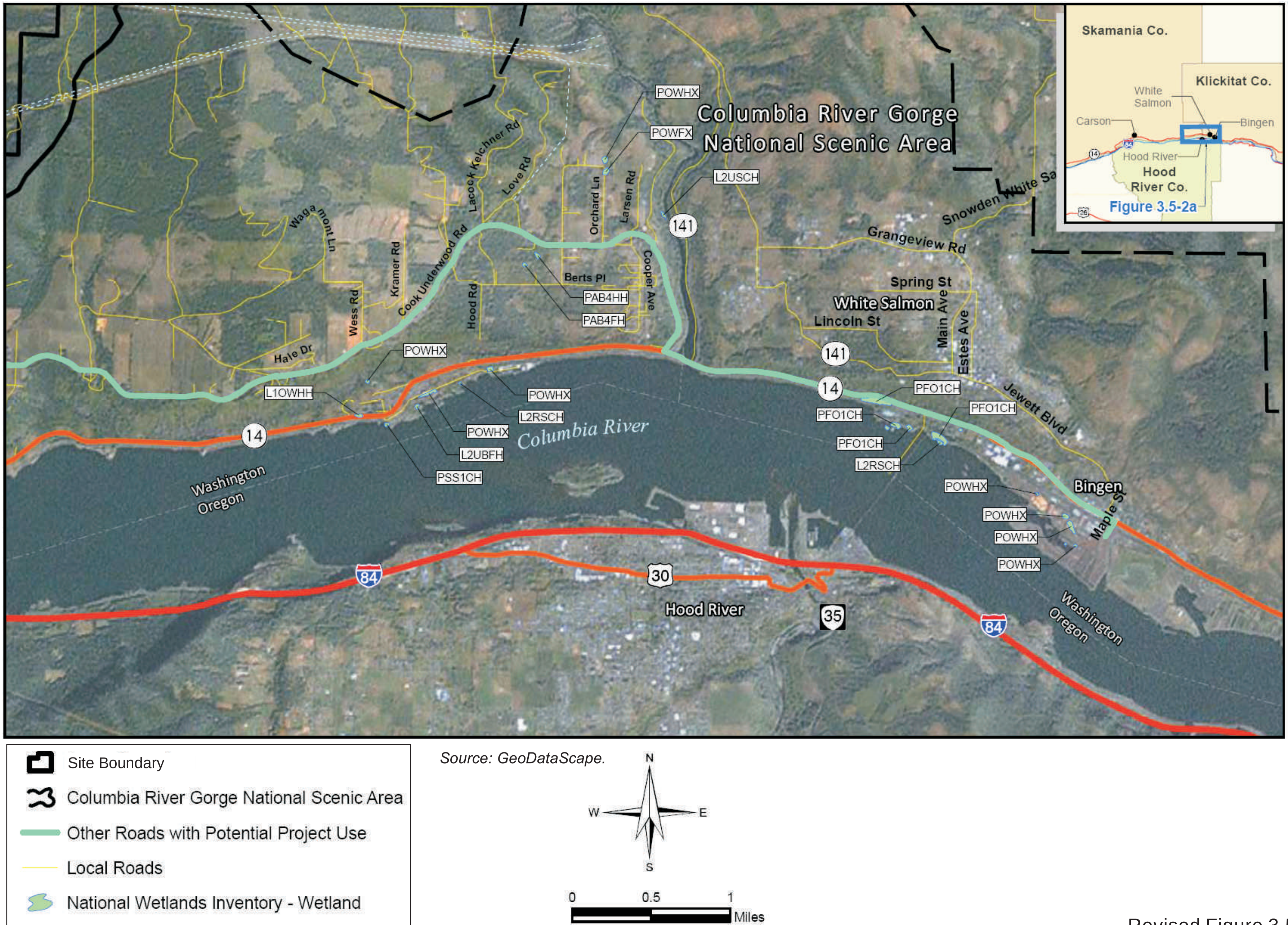
Revised Figure 3.5-1

Project Site Wetlands

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_75.cdr



Source: GeoDataScape.

Revised Figure 3.5-2a

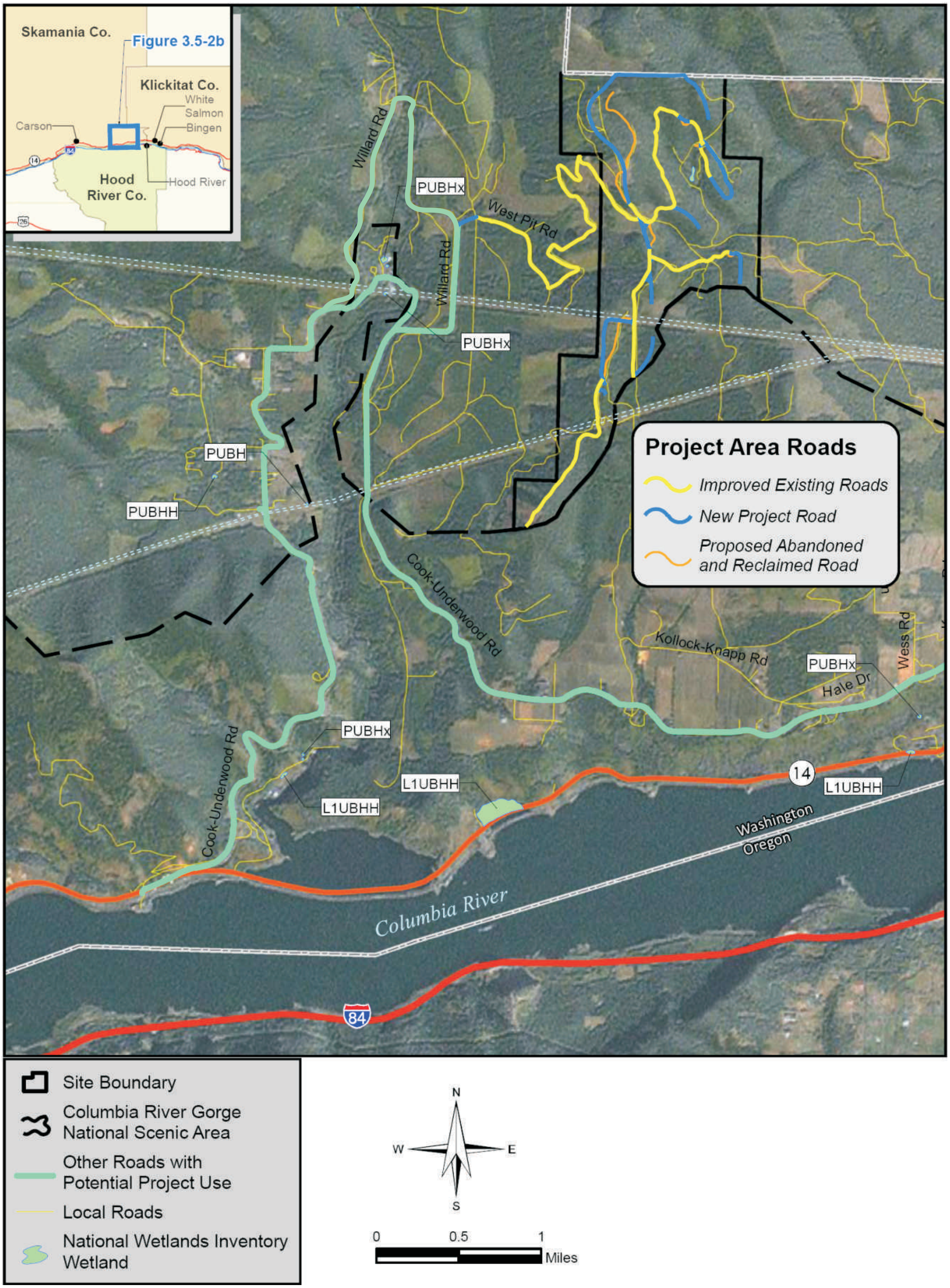
Access Route NWI Wetlands

Job No. 33758687

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_106.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 3.5-2b

Access Route NWI Wetlands

URS

Whistling Ridge Energy Project
Skamania County, Washington

3.5.2 IMPACTS

3.5.2.1 Project Site

No wetlands or wetland buffers are located within the project construction or operation area. Therefore, no wetlands or buffers are expected to be impacted by construction or operation of the project.

3.5.2.2 Improved Construction Access Roadways

A review of the National Wetland Inventory indicates that wetlands may occur along SR 14 but not along County or private roads proposed for the project's construction access and turbine delivery routes. ~~Very minor~~No intersection improvements to SR 14 are anticipated to be required, and ~~with~~ no wetland-related impacts would occur. Roadway improvements to the County or private logging roads are not expected to permanently impact wetlands or waters of the US or State. This information ~~will be~~was confirmed through field investigations ~~planned for spring~~performed in July 2009.

3.5.3 MITIGATION MEASURES

No impacts to wetlands are expected to occur and therefore no mitigation measures would be required.

SECTION 3.6 ENERGY AND NATURAL RESOURCES (WAC 463-60-342)

3.6.1 INTRODUCTION

The Whistling Ridge Energy Project would consume limited amounts of energy and natural resources, primarily during construction. Operation of the project would consume very limited amounts of natural resources, as the wind turbine generators would use wind, an abundant, naturally occurring renewable resource, to generate electricity. By using wind to generate electricity, operation of the project would help reduce overall consumption of non-renewable natural resources.

Wind farms have a very high "energy payback" (ratio of energy produced compared to energy expended in construction and operation), and wind's energy payback time is one of the shortest of any electrical generation technology. It takes approximately three to eight months, depending on the wind speed at the site, for a wind farm to produce the total amount of energy used to construct the equipment and build the project. (AWEA 2008).

3.6.2 ENERGY REQUIRED

3.6.2.1 Construction

Types and quantities of energy and natural resources consumed during construction are as follows:

- 19,250 gallons of fuel (diesel and gasoline) for construction equipment
- 3,700 tons of steel for turbine towers
- 1,000 tons of steel for tower foundation reinforcement
- 100,000 yards of gravel (aggregate) for roads and crane pads
- 10,000 cubic yards of concrete for turbine foundations
- 1.7 million gallons of water for road compaction, dust control, wetting concrete, etc., assuming plain water is used for dust control (this amount could be reduced through the use of lignin or other dust palliative if permitted by EFSEC)

3.6.2.2 Operation of Facility

Operation of the project would consume limited amounts of energy and non-renewable natural resources. During operations, electrical energy would be consumed on a limited basis during times when the wind generated on site is insufficient to power FAA lights and security lights at the Operations and Maintenance and substation facilities. In addition, turbines require electrical energy to run lubrication pumps and cooling systems, electrical monitoring systems, and positioning motors even when wind speeds are below generation levels. Energy would be generated using wind transformed into electricity by turbine generators. Types and quantities of energy and natural resources consumed during operations are as follows:

- Fuel for Operation and Maintenance vehicles (approximately 8,500 gallons annually)
- Minor quantities of lubricating oils, greases and hydraulic fluids for the wind turbine generators
- Electricity for project operations (less than approximately 600 kilowatt hours per wind turbine generator per month
- Water for use at the Operations and Maintenance facility and periodic maintenance of turbine blades (less than approximately 5,000 gpd)

3.6.3 SOURCE AND AVAILABILITY OF ENERGY AND NATURAL RESOURCES

3.6.3.1 Sources during Construction

The source of fuel for construction equipment and vehicles would be licensed fuel distributors or gas stations, as described in Section 2.9, Spill Prevention. Water for construction would be obtained from a local source, as described in Section 3.3, Water Resources. Concrete would be purchased from existing suppliers located near the project site. Electricity for construction equipment would be provided from portable generators.

3.6.3.2 Sources during Operation

Fuel used for Operation and Maintenance vehicles would be purchased from local gas stations. Lubricating oils and hydraulic fluids used for wind turbine generator maintenance would be purchased from distributors. Electricity for project operations would mostly be generated by the project itself; during periods when the wind turbines are not generating power, it would be purchased from the Skamania County Public Utility District #1.

3.6.3.3 Materials and Commodities

As described in Subsection 3.6.1, bulk materials such as aggregate gravel and sand, in addition to soils, would not be required. Any additional material would be supplied locally from existing quarries. Other building materials, equipment, and other operational commodities would be purchased from equipment and material suppliers.

3.6.4 NONRENEWABLE RESOURCES

While a wide variety of natural resources are used in the construction of a project such as the Whistling Ridge Energy Project, the amounts of most resources used are very small. The largest quantities would be steel (coming from iron ore) and concrete (coming from aggregate, sand, and cement quarries and pits). Diesel fuel and electricity also would be consumed during construction.

3.6.5 CONSERVATION AND RENEWABLE RESOURCES

The project would provide the region with low-cost, clean, renewable energy, in accordance with state and national policies and priorities. It would provide benefits because it would emit substantially lower quantities of air pollutants per unit of energy output compared to other forms of energy. The project would help maintain air quality, given that some new generation resources must be developed to meet growing energy demand and to replace generation that will be retired.

3.6.6 SCENIC RESOURCES

The project is not located inside the Columbia River Gorge National Scenic Area; ~~however, the~~nor is the proposed access road ~~for~~ to the proposed site, West Pit Road ~~is~~. ~~Conformance with the Scenic Area plan for roadway development would be followed as described in Section 2.20, Pertinent Federal, State and Local Requirements and in Section 4.2.1, Land Use~~.

State Highway 14 in this area is a recognized scenic roadway. Typically, this designation means that a scenic corridor management plan would be prepared to provide policy-level guidance in the local adoption of comprehensive plan policies, zoning, and other land use regulation. There is no scenic corridor management plan for Highway 14 and, therefore, no regulatory control of aesthetic impacts within the corridor.

3.6.7 MITIGATION MEASURES

No impacts to energy and natural resources are expected to occur and therefore no mitigation measures would be required.

SECTION 4.1 ENVIRONMENTAL HEALTH
(WAC 463-60-352)

This section contains six subsections: Noise, Risk of Fire or Explosion, Releases or Potential Releases to the Environment Affecting Public Health, Safety Standards Compliance, Radiation Levels, and Emergency Plans.

4.1.1 NOISE

4.1.1.1 Fundamentals of Acoustics

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the pitch of the sound and is measured in hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above approximately 110 dB begin to be felt inside the human ear as discomfort and eventually pain at 120 dB and higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 2 dB. A 3 to 5 dB change is readily perceived. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or if minus 10 dB, halving) of the sound's loudness.

Due to the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically; however, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

Sound level is usually expressed by reference to a known standard. This report refers to sound pressure level. In expressing sound pressure on a logarithmic scale, the sound pressure is compared to a reference value of 20 micropascals (μPa). Sound pressure level depends not only on the power of the source, but also on the distance from the source and on the acoustic characteristics of the space surrounding the source.

Hz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment do not consist of a single frequency but rather a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called "A weighting," and the decibel level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the dBA may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) may be used to describe sound that is changing in level. L_{eq} is the energy-mean dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the acoustic energy contained in the fluctuating sound level measured. In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}) indicators that represent the root-mean-square maximum and minimum noise levels measured during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe time-varying character of environmental noise, the statistical noise descriptors L_{10}, L_{50}, and L_{90} are commonly used. They are the noise levels equaled or exceeded 10 percent, 50 percent, and 90 percent of the measured time interval. Sound levels associated with L_{10} typically describe transient or short-term events. For the L_{50} descriptor, half of the sounds during the measurement interval are softer than L_{50} and half are louder. Levels associated with L_{90} often describe background noise conditions and/or continuous, steady-state sound sources.

Finally, another sound descriptor known as the day-night average sound level (L_{dn}) represents the average sound level for a 24-hour day and is calculated by adding a 10 dB penalty only to sound levels during the night period (10:00 pm to 7:00 am). The L_{dn} is typically used to define acceptable land use compatibility with respect to noise. Because of the time-of-day penalties associated with the L_{dn} descriptor, the L_{eq} for a continuously operating sound source during a 24-hour period will be numerically less. Thus, for a power plant operating continuously for periods of 24 hours, the L_{eq} will be 6 dB lower than the L_{dn} value.

Sound levels of typical noise sources and environments are provided in Table 4.1-1, Sound Levels of Typical Noise Sources and Noise Environments, to provide a frame of reference.

Table 4.1-1
Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a given distance)	Scale of A-Weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness
Military Jet Take-off with After-burner (50 feet), Civil-defense Siren (100 feet)	140, 130	Aircraft Carrier Flight Deck	
Commercial Jet Take-off (200 feet)	120	Thunderclap	Threshold of Pain 32 Times as Loud[a]
Pile Driver (50 feet)	110	Rock Music Concert	Average Human Ear Discomfort 16 Times as Loud[a]
Ambulance Siren (100 feet), Newspaper Press (5 feet), Power Lawn Mower (3 feet)	100		Very Loud 8 Times as Loud[a]
Motorcycle (25 feet), Propeller Plane Flyover (1,000 feet), Diesel Truck, 40 Miles Per Hour (50 feet)	90	Boiler Room Printing Press Plant	Likely Damage, 8-Hour Exposure 4 Times as Loud[a]
Garbage Disposal (3 feet)	80		Possible Damage, 8-Hour Exposure 2 Times as Loud[a]
Passenger Car, 65 Miles Per Hour (25[a] feet), Vacuum Cleaner (10 feet)	70	Data Processing Center, Department Store	Reference Loudness Moderately Loud[a]
Normal Conversation (5 feet), Air-conditioning Unit (100 feet)	60	Private Business Office, Restaurant	1/2 as Loud[a]
Light Traffic (100 feet)	50	Lower Limit of Daytime Urban Ambient Sound	1/4 as Loud[a]
Bird Calls (distant)	40	Quiet Urban Nighttime	1/8 as Loud[a]
Soft Whisper (5 feet)	30	Recording Studio, Library	Very Quiet 1/16 as Loud[a]
	20	Whistling, Rustling Leaves	Just Audible 1/32 as Loud[a]
	10	Breathing	Barely Audible 1/64 as Loud
	0		Threshold of Hearing 1/128 as Loud[a]

Source: URS internal information and CDOT (1998) p. 18, Table N-2136.2
a. Relative to a reference loudness of 70 decibels.

4.1.1.2 Noise Standards

WAC 463-62-030 states that energy facilities shall meet the noise standards established in chapter 70.107 RCW, the Noise Control Act of 1974 as implemented in the requirements in 173-60 WAC.

The WAC provides the applicable noise standards for Washington State. WAC 173-60 is adopted pursuant to the Noise Control Act of 1974, in order to establish maximum noise levels permissible in identified environments, and thereby to provide use standards relating to the reception of noise within such environments.

SCC Title 8 Chapter 22: Noise Regulations identifies limits and exceptions specific to noise in Skamania County. SCC 8.22 was adopted pursuant to, and is consistent with, WAC 173-60. Environmental designations for noise abatement (EDNA) are established in Section 8.22.080 and WAC 173-60-030. These rules establish maximum permissible environmental noise levels and are based on the EDNA, which is defined as an area or zone (environment) within which maximum permissible noise levels are established. There are three EDNA classes:

- Class A: Lands where people reside and sleep (such as residential)
- Class B: Lands requiring protection against noise interference with speech (such as commercial/recreational)
- Class C: Lands where economic activities are of such a nature that higher noise levels are anticipated (such as industrial/agricultural).

4.1.1.3 Affected Environment

Existing Sound Environment

The total project area encompasses approximately 1,152 acres in Skamania County, Washington. It is approximately seven miles northwest of the City of White Salmon, outside of the Columbia Gorge Scenic Area. The southernmost wind turbine is approximately 1.7 miles north of the Columbia River and is accessible by State Road 14 and Cook-Underwood Road.

As shown on Figure 4.1-1, Noise Level Contours, the two closest residences to the wind turbine tower locations are approximately 0.48 mile (2,560 feet) southeast of Tower A1 (shown on the figure as Receiver 1 or R1) and 0.8 mile (4,265 feet) southwest of Tower B16 (shown on the figure as Receiver 2 or R2). A potential future residence (shown as Receiver 3 or R3) is approximately 0.38 mile (2,000 feet) from Tower A1. Figure 4.1-1 shows that there are many potential receivers that are more distant from the project. To help establish representative baseline ambient sound levels for the project vicinity and characterize the existing noise environment in the areas occupied by the receivers shown in Figure 4.1-1, a set of long and short-term sound level measurements were conducted from January 20 to 22, 2009. The measurement locations included a position near the intersection of Ausplund Road and Kollack-Knapp Road (ST1), and a position near the intersection of Jessup Road and Manzanola Road (ST2). For purposes of the impact analysis described in this document, these measurement locations are considered reasonably representative for each general area, and more specifically R1 and R2, respectively, on the basis of similar expected ambient sound sources despite the dissimilarity of locations. For instance, the ambient sound environment measured at ST1 likely contains the same typical identifiable sound components (e.g., distant bird song, dog barks, roadway traffic) and a generally unidentifiable “background” that one might measure at the precise geographic location of R1.

33758687_83.cdr

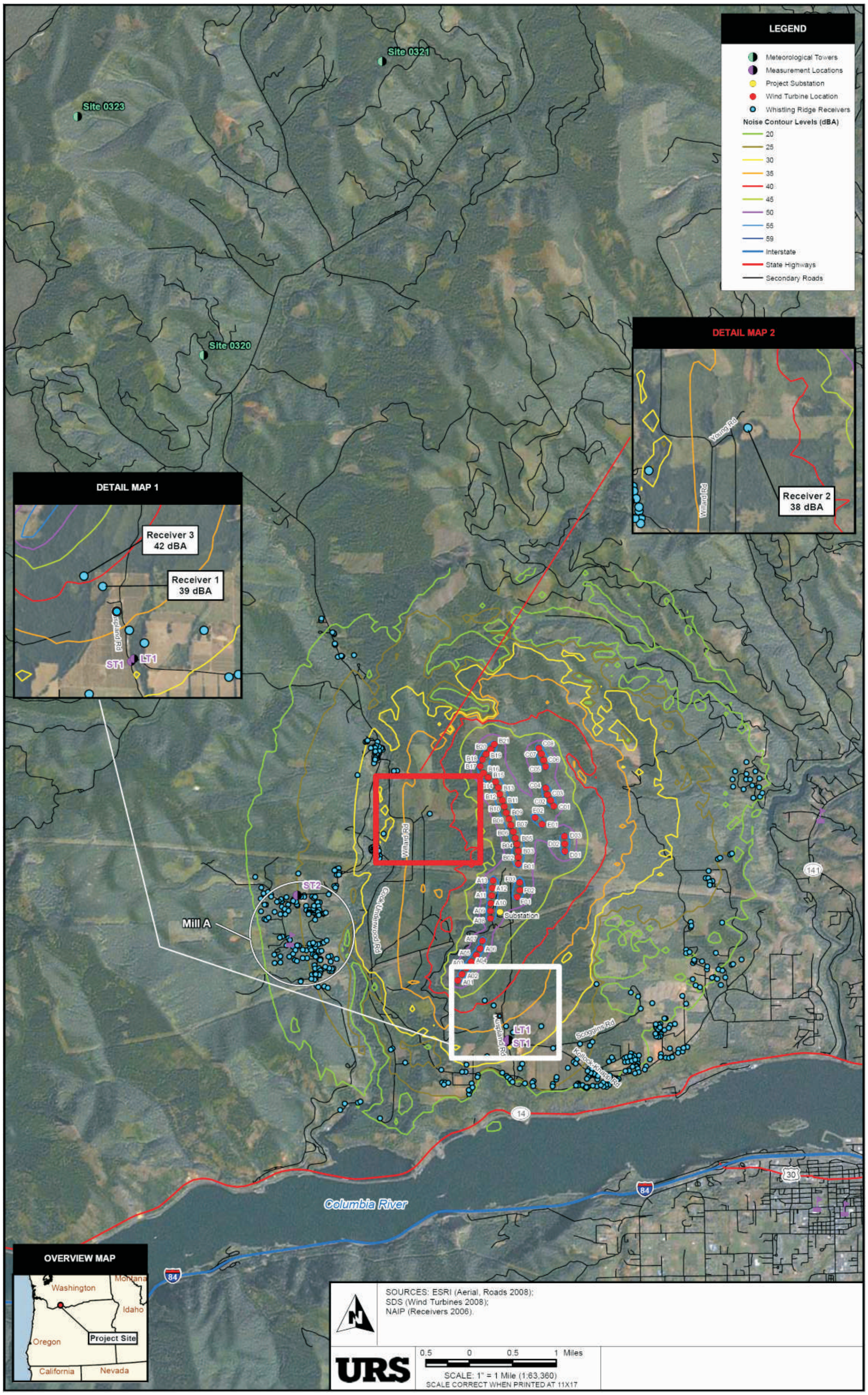


Figure 4.1-1

Noise Level Contours

Job No. 33758687

URS

Whistling Ridge Energy Project
Skamania County, Washington

A Bruel+Kjaer 2250 (SN: 2653963) ANSI Type-1 real-time sound analyzer, fitted with a standard microphone windscreen and mounted atop a five-foot tall tripod, was used for the short-term measurements. The instrument was field calibrated before and after each measurement period with an acoustic calibrator. All sound level measurements conducted by URS personnel were done so in accordance with ISO 1996a, b, and c. Weather conditions during the survey period were seasonally cold with overcast skies but no precipitation during the measurement periods. The air temperature varied from 30 to 44 degrees Fahrenheit, with 33 to 53 percent relative humidity. Measured ground wind speeds in the vicinity of the measurement positions were low, with averages ranging from 0 to 1 mph, and directed toward the north for all measurements. Detailed weather conditions for individual noise measurements and a summary of the short-term measurement data are included in Table 4.1-2.

A long-term measurement (LT1) was conducted at a position near the corner of Ausplund Road and Kollock-Knapp Road using a Larson Davis 720 (SN: 0436) ANSI Type 2 Integrating sound level meter. With only the windscreen-covered microphone exposed to the outdoor environment, the sound level meter was placed in a locked, weather-resistant case and secured to a nearby tree. The long-term measurement consisted of consecutive 15 or 30 minute averages conducted over an uninterrupted 24-hour period. The instrument was field calibrated before and after each measurement period with an acoustic calibrator (CAL 200 s/n: 5789). Data from the long-term measurement is presented in Table 4.1-3.

Field observations associated with the short and long term measurements are as follows:

ST1. This measurement location was at the corner of Ausplund Road and Kollock-Knapp Road. There are several residential receivers located in this area.

The first short-term measurement at this location was conducted between 11:52 am and 12:12 pm on January 21, 2009. The first measurement noise sources included distant aircraft, distant roadway traffic, dogs barking in the distance, and birds vocalizing. The second short-term measurement was conducted between 6:00 pm and 6:20 pm on January 21, 2009. The second measurement noise sources included distant aircraft, distant roadway traffic, and dogs barking in the distance. The third short-term measurement at this location was conducted between 11:32 pm and 11:52 pm on January 21, 2009. Noise sources during the third measurement included distant roadway traffic and dogs barking in the distance. The first measurement L_{eq} one-minute interval values ranged from 34 to 59 dBA, the second measurement 1-minute L_{eq} values ranged from 27 to 66 dBA, and the third measurement 1-minute L_{eq} values ranged from 25 to 49 dBA. L_{eq} for the entire duration of each of these three measurement periods appears in Table 4.1-2.

Table 4.1-2
Short-Term Noise Measurement Data Summary

Measurement Location		Measured Sound Data									
ID	Description	Time	L_{eq}, dBA	L_{10}	L_{50}	L_{90}	L_{eq}, dBA without Cars	Temp (F)	%RH	Wind Speed (mph)	Wind Direction
ST1	Corner of Ausplund Road and Kollock-Knapp Road	11:52 - 12:12	46	39	35	34	38	35	53	1	North
		18:00 - 18:20	49	36	31	28	32	32	35	1	North
		23:32 - 23:52	35	32	28	26	30	30	34	0	-
ST2	Just north of the John Schwab Memorial Tennis Courts	12:48 - 13:08	41	40	36	35	37	44	40	1	North
		18:36 - 18:56	44	40	36	35	36	32	34	1	North
		00:08 - 00:28	35	36	35	34	35	30	34	0	-

Measurements conducted on January 21 and 22, 2009

Table 4.1-3
Long-Term Noise Measurement Data Summary

Site ID	Measurement Location	Measurement Period			24-hr Measurement Results (dBA)			
		Start Date	Start Time	Duration (hh:mm)	L_{eq}	L_{10}	L_{50}	L_{90}
LT1	Corner of Ausplund Road and Kollock-Knapp Road	01/21/09	11:40 am	24:00	46	41	39	38

ST2. This measurement location was located in front of the John Schwab Memorial Tennis Courts on the corner of Jessup Road and Manzanola Road. The sound level meter was approximately 15 feet from Jessup Road.

The first short-term measurement at this location was conducted between 12:48 pm and 1:08 pm on January 21, 2009. The first measurement noise sources included distant aircraft, distant roadway traffic, children playing in the distance, and birds vocalizing. The second short-term measurement was conducted between 6:36 pm and 6:56 pm on January 21, 2009. The noise sources for the second short-term measurement included distant aircraft and distant roadway traffic. The third short-term measurement was conducted between 12:08 am and 12:28 am on January 22, 2009. Noise sources present during the third short-term measurement included distant roadway traffic. The first measurement L_{eq} one-minute values ranged from 35 to 52 dBA, the second measurement 1-minute L_{eq} values ranged from 34 to 54 dBA, and the third measurement 1-minute L_{eq} values ranged from 31 to 39 dBA. L_{eq} for the entire duration of each of these three measurement periods appears in Table 4.1-2.

LT1. This measurement location was at the corner of Ausplund Road and Kollock-Knapp Road, on the north side of the roadway. The sound level meter was placed in a tree near the side of the road.

Concurrent with these short and long term ambient sound measurements, S.D.S. Co., LLC meteorological stations 320, 321, and 323 collected data on wind speed, direction, and temperature at various elevations above grade. Average reported wind velocities from the station NRG Type 40 anemometers were quite low, and while apparently consistent with the low average wind velocities measured on the ground at the sound measurement positions, were considered potentially compromised by icy conditions due to the low recorded temperatures and high moisture content of the air.

Table 4.1-2 shows the considerable decibel differences between the L_{eq} measurements and the adjusted values when intervals containing documented automotive pass-by events (i.e., “without cars”) were removed from the short-term measurement data sets. This change is unsurprising due to the proximity of the real-time sound analyzer to the roadway at ST1 and ST2. Upon removing these intervals, the remaining collected data more accurately depicts the background or a measurement position that is considerably distant from passing road traffic.

Resulting from the application of a similar interval extraction technique to the concurrent LT1 data, Table 4.1-4 presents the arithmetic average L_{eq} of ST1 and LT1.

Table 4.1-4
Average Ambient for ST1/LT1 Measurement Area

	Daytime (Leq, dBA)	Evening (Leq, dBA)	Nighttime (Leq, dBA)
Average L_{eq} without cars	(39+38)/2 = 38	(39+32)/2 = 35	(38+30)/2 = 34
Average L_{eq} with cars	(44+46)/2 = 45	(42+49)/2 = 45	(38+35)/2 = 36

The location of ST1/LT1 was selected to approximate the existing ambient sound in the vicinity of Ausplund Road and hence Receiver 1. Likewise, the location of ST2 was chosen to generally represent the ambient sound level for the Mill A community and its surroundings west of the project, on which Receiver 2 is located.

Applicable Impact Criteria

The project is sited entirely on a mixture of Commercial Forestry (GF1) Land and unzoned land (Nikki Holltitz, personal communication). Consequentially, the environmental designation is considered to be EDNA Class C. Table 4.1-5 below illustrates the Class A (Residential) receiver noise level limitations for noise generated from a Class C (Commercial) EDNA (SCC 8.88.090, 100).[1]

Table 4.1-5
Class A EDNA Receiver Noise Limits
(dBA)

Equivalent Noise Level Exposure Time (Time / Statistic)	Daytime (7 am – 10 pm)	Nighttime (10 pm – 7 am)
1 hour / L_{eq}	60	50
15 minutes / L_{25}	65	55
5 minutes / $L_{16.7}$	70	60
1.5 minutes / $L_{2.5}$	75	65

Levels shown are at the property line of the receiving property and indicative of a source that is located in a Class C EDNA

Notwithstanding the above and per 173-60-050 WAC, there are exemptions to the limits for certain noise-producing activities or source types as follows:

- Construction noise (including blasting) between the hours of 7 am and 10 pm
- Motor vehicles when regulated by 173-62 WAC ("Motor Vehicle Noise Performance Standards" for vehicles operated on public highways)
- Motor vehicles operated off public highways, except when such noise affects residential receivers

The reader should bear in mind that despite these exemptions, 173-60-50(6) WAC states, "Nothing in these exemptions is intended to preclude the Department from requiring installation of the best available noise abatement technology consistent with economic feasibility."

[1] Receiver locations 1 and 3 are in agriculturally zoned lands which would normally be classified as Class C EDNA. Receiver location 2 is residentially zoned. For the purpose of this analysis, because all 3 uses are residential, they have been classified as Class A EDNA.

4.1.1.4 Impacts

Construction

Project construction would take place over a period of 12 months between the hours of 7:00 am and 7:00 pm Monday through Friday. During construction activities, a varying number of construction equipment and personnel would occupy the project area, which would result in varying levels of construction noise. The project would use conventional construction techniques and equipment including (but not limited to), excavators, bulldozers, heavy trucks (e.g., water truck, dump truck), and similar heavy construction equipment. Specialized construction for logging and other tasks using heavy duty cranes and foundation building also may be needed.

Conventional construction activities would result in a short-term temporary increase in the ambient noise level resulting from the operation of construction equipment. The increase in noise level would be experienced primarily close to the noise source. The magnitude of the noise effects would depend on the type of construction activity, noise level generated by construction equipment, duration of the construction phase(s), and the distance between the noise source and receiver.

Construction noise impacts associated with the project were assessed with spreadsheet-based noise calculations. User inputs include:

- Distance from source—the distance between the edge of the construction site and the considered receiver
- Duty cycle—the portion of an hour, in aggregate, that a piece of equipment is energized (stationary or mobile) and creating noise
- Quantity—the number of equipment pieces or noise-producing events over a specific time period (e.g., equipment utilization per month)
- Hours—the number of daytime hours (up to 12) that represent a typical daily work shift

These inputs allow sound propagation prediction using the following formula:

$$L_{eq} = \text{Source SPL} + 10 * \log_{10}(\text{Duty Cycle}) + 10 * \log_{10}(\text{Quantity}) + 10 * \log_{10}(\text{Hours}/12) - 20 * \log_{10}(\text{Distance from Source / Reference Distance})$$

where source sound pressure level (SPL) and reference distance describe the typical noise, associated with a single piece of equipment, measured at a pre-defined distance. For instance, a chainsaw may have a source SPL of 78 dBA measured at a distance of 50 feet from its operator. Values for source SPL and reference distance have either been reproduced from available manufacturers' data or calculated from industry-accepted formulas linking sound generation to the rated engine horsepower of the equipment. Note that for purposes of model conservatism, air and ground absorption effects are not included.

Table 4.1-6 shows the predicted construction noise levels experienced at the closest residences to the project. As per 173-60-050 WAC, construction noise between the hours of 7:00 am and 10:00 pm are exempt from the receiver noise limit guidelines. Consequently, the calculated values at the two closest receivers comply with the applicable noise standard.

Table 4.1-6
Construction Noise Levels at Receivers Closest to Project

ID	Description (distance/direction)	EDNA Classification	Construction Sound Level Limit (dBA)	Maximum Project Construction Sound Level (dBA)	Complies with Standard
Receiver 1	Residence 0.48 mile (2560') SE of Tower A1	Class A	Exempt	70	Yes
Receiver 2	Residence 0.8 mile (4265') SW of Tower B16	Class A	Exempt	66	Yes
Receiver 3	Residence 0.38 mile (2000') SE of Tower A1	Class A	Exempt	72	Yes

If it is determined to be necessary, blasting would occur during the turbine foundation portion of the construction schedule and only during daytime hours. Blasting noise could possibly be audible at a considerable distance from the construction site and noticeable at residences near the project area. Sound levels from blasting at a receiver would not be extreme, however, and the occurrence would be low in frequency, intermittent and confined to a period of one to two months. WAC 173.60.050 exempts temporary construction noise, including noise from blasting, from the State noise limits between the hours of 7 am and 10 pm.

The large distances between much of the project area and potentially affected residences, the temporary nature of construction, and the restriction of construction activities to daytime hours would serve to minimize potential noise impacts from construction activities. Based on the anticipated noise levels and the timing aspects of these impacts, construction noise impacts are expected to be insignificant.

If project construction occurred in phases, the effect on the level of noise impacts would be to extend the total duration of temporary disturbance from project construction, but to reduce the intensity or magnitude of impacts for any individual phase. Construction noise impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant in a phased-construction scenario.

Operation

The Cadna/A® Noise Prediction Model (Version 3.71.125) was used to estimate the project-generated sound pressure levels at the property lines and noise-sensitive receivers. Cadna/A® is a Windows® based software program that predicts and assesses noise levels near industrial noise sources based on ISO 9613-2 standards for noise propagation calculations. The model uses industry-accepted propagation algorithms and accepts sound power levels (in dB re: 1 picowatt) provided by the equipment manufacturer and other sources. The calculations account for classical sound wave divergence, plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. Intervening natural and man-made topographical barrier effects were considered as appropriate, including those from structures such as major buildings, tanks, and large equipment.

Calculations were performed using linear octave band sound power levels as inputs from each pre-defined noise source, as summarized in Table 4.1-7: Noise Model Sound Level Parameters. Given that the exact turbine model to be use for the project has yet not been determined at the time of this report, conservative but realistic and representative values for the type of equipment being considered for this project have been used. For example, the model currently uses data from an industry leading 1.8 MW 50/60 Hz Wind Turbine, at wind speeds of about six meters per second and nine meters per second at 33 feet (10 meters), in accordance with the protocol established in International Electrotechnical Commission Standard 61400-11:2002. The decibel values shown for the two wind turbine generator wind speeds in Table 4.1-7 at each octave band center frequency include a +2 dB margin, which produces an A-weighted overall that represents the top end of a range associated with the manufacturer's warranty values.

Table 4.1-7
Noise Model Sound Level Parameters

Project Component	Type of Source	Sound Power Level in dB at Octave Band Center Frequency (Hz)									Unweighted (linear)	A-Weighted	Acoustic Height (feet)
		31.5	63	125	250	500	1,000	2,000	4,000	8,000			
Wind Turbine at 6m/s wind speed	Point	82.7	88.7	95.3	99.7	101.9	100.7	97.4	88.9	82	106.8	104.7	262
Wind Turbine at 9m/s wind speed	Point	84.9	90.9	97.3	101	103.3	102.6	99.5	91.6	84.4	108.4	106.4	262
Turbine Transformers	Point	35	41	43	38	38	32	27	22	15	47	38	7
Sub Station component	Point	80	86	88	83	83	77	72	67	60	92	83	13

Source: URS internal information and Thomas Mills, personal communication

The project layout configuration (i.e., the arrangement of wind turbine generators and ancillary equipment on the site) was imported into Cadna/A® from project files provided by the client. Additional conservative measures were taken as the model assumed consistent 24-hour operation of the project. The Cadna/A model consequently predicts hourly sound levels, which would be equal at all times of day in this case. The formula used to derive the overall SPL (in dBA) from sound power level (PWL) is as follows:

$$SPL = PWL - 20 \text{ Log } (r) - 10.9 + C$$

where *r* is in meters and *C* is a dimensionless absorption constant.[2]

The predicted operational noise levels at the three closest residences to the project are supplied in Tables 4.1-8 through 4.1-11. This analysis evaluates the existing noise levels at the closest receptors, and evaluates increases in dBA at these locations. The Washington noise regulations do not require this information. The Applicant is supplying this information to fully inform EFSEC.

[2] Harris, Cyril M. 1998. *Handbook of Acoustical Measurements and Noise Control*. Third Edition. p. 3-2, Eq. 3.2a.

Figure 4.1-1 depicts these three receivers (for the 9 m/s wind speed, $10^{o}C$ temperature and 70% relative humidity operation case) in two detail maps as part of a larger aerial plan on which predicted noise contours and other known receiver locations have been superimposed. The operation of the project would comply with all applicable noise regulations.

Table 4.1-8
Operational Noise Impact Assessment, Nighttime – 6 m/sec

Receiver ID	EDNA Class	Sound Level Limit (dBA)	Existing (dBA)	Project (dBA)	Overall (dBA)	Increase (dBA)	Complies with Regulation
1	Class A	50	34	36	38	4	Yes
2	Class A	50	35	38	40	5	Yes
3	Class A	50	35	40	41	6	Yes

Table 4.1-9
Operational Noise Impact Assessment, Nighttime – 9 m/sec

Receiver ID	EDNA Class	Sound Level Limit (dBA)	Existing (dBA)	Project (dBA)	Overall (dBA)	Increase (dBA)	Complies with Regulation
1	Class A	50	34	37	39	5	Yes
2	Class A	50	35	39	40	5	Yes
3	Class A	50	35	42	43	8	Yes

Table 4.1-10
Operational Noise Impact Assessment, Daytime – 6 m/sec

Receiver ID	EDNA Class	Sound Level Limit (dBA)	Existing (dBA)	Project (dBA)	Overall (dBA)	Increase (dBA)	Complies with Regulation
1	Class A	60	38	36	40	2	Yes
2	Class A	60	38	38	41	3	Yes
3	Class A	60	38	40	42	4	Yes

Table 4.1-11
Operational Noise Impact Assessment, Daytime – 9 m/sec

Receiver ID	EDNA Class	Sound Level Limit (dBA)	Existing (dBA)	Project (dBA)	Overall (dBA)	Increase (dBA)	Complies with Regulation
1	Class A	60	38	37	41	3	Yes
2	Class A	60	38	39	41	3	Yes
3	Class A	60	38	42	43	5	Yes

Operation of the wind turbine generators is also capable of meeting the guideline criteria with respect to increase over ambient, but it depends on the ambient sound level and time of day.

Under certain conditions, there is the potential for one or more of the following phenomena to occur that may temporarily cause a variance in the predicted sound levels:

- In the Cadna/A prediction model, all studied wind turbine generators were assumed to operate at the same speed. In reality, very slight differences in operating rotor speeds due to non-uniformities in the passing wind profile can result in intermittent constructive and destructive interference—or what one might call "beats," that can have a perceptible frequency as current research suggests.[3]

- The atmosphere can either be "stable" or "unstable," which in summary are descriptors for how layers of air mass interact. The latter of these two is usually associated with cold air near the ground that is not well coupled to higher air masses. This effect can explain why high wind speeds at wind turbine generator hub height can be substantially greater than those near ground level.[4]

- The relative humidity and ambient temperature have a substantial effect on the attenuation of outdoor sound at high frequencies and long distances through air absorption. Relative humidity and temperature effects can produce a variance of approximately +/- 2dBA.

- The uncertainty range for the sound power level of each wind turbine generator is +/- 2dBA.

- Due to the very low ground wind speeds recorded during the short term measurements, actual ambient noise levels at any receiver in the project vicinity may be higher as a result of noise generated by turbulence from wind streaming through vegetative ground cover (i.e., trees and grasses).

None of these conditions would result in the project exceeding noise regulations.

Low Frequency Sound

Low frequency sound typically ranges from 100 Hz to 20 Hz, the latter of which is the generally understood limit audible to the human ear. Low frequency noise produced by a wind turbine generator can include tonal components produced by the generator and gearbox within the nacelle downstream of the rotor hub, atop the tower mast. The source sound power levels in Table 4.1-7 already include these noise contributors. Modern wind turbine design typically includes sound attenuation features in the nacelle to help reduce the magnitude of these electro-mechanical noise components to the aggregate, so that the spectrum of sound levels at the octave band center frequencies shown in Table 4.1-7 largely describes the aerodynamic effects of the rotor blades interacting with the passing wind profile.

In earlier generations of wind turbine design, the practice of downwind rotors allowed turbulence from the tower mast to disrupt favorable aerodynamic conditions for the passing blades, causing

---

[3] G. P. van den Berg. 2006. The sound of high winds: the effect of atmospheric stability on wind turbine sound and microphone noise. *Rijksuniversiteit Groningen*. p. 156.
[4] Ibid., p. 158.

considerable low frequency noise. This practice has been abandoned by the contemporary upwind rotor design of virtually all wind turbine generators built in the past five years, including the models contemplated for this project. At the low frequency end of the spectrum, where ambient levels far exceed anticipated aggregate project operation noise.

The noise produced by air interaction with the rotor blades tends to be broadband noise, but is amplitude modulated as the upstream blades pass the tower, resulting in what some call a characteristic "swoosh." The blade passage frequency of this "swoosh" is only a temporal modulation of sound and should not be confused with low frequency sounds. Virtually any sound can be time-modulated without changing its pitch. Thus, low frequency modulation of audible sound does not imply the presence of infrasound, which is discussed in the following paragraphs.

Infrasound

The term infrasound describes sound with frequencies of 20 Hz or less that are generally considered below the threshold of human hearing. Such sound, if sufficiently high in magnitude, can still be perceived or even heard as induced by vibration. Natural sources of infrasound include waves, thunder, wind, and even certain species of wildlife.

A review of wind turbine noise measurement studies conducted by Jakobsen (2005) concluded that operation of contemporary wind turbine generators featuring rotors "upwind" of tubular tower masts generated infrasound in the range of 70 G-weighted decibels (dBG) at a distance of one hundred meters.[5] (The G-weighting scale, like the oft-used A-weighting scale for audible sound spectra, is a filter applied to low-frequency sound as described in ISO 7196:1995E.) Jakobsen also notes that this infrasound, usually associated with aerodynamic effects of blade passage past the tower mast, tends to ignore atmospheric sound absorption and ground attenuating effects due its very large wavelength. Hence, one could reasonably expect infrasound to attenuate only with increasing propagation distance.

Recent studies performed for the Canadian Wind Energy Association have described usage of 85–90 dBG as a criterion for human perception of infrasound and, by reasonable extension, the likely threshold for infrasound complaint.[6]

The horizontal distances of the project wind turbines to the nearest noise-sensitive receivers are at least 615 meters, which provides sufficient attenuation to offset the amount of decibels that one might add to account for the quantity of wind turbines of the project. Thus, the expected infrasound at the nearest existing receivers (i.e., R1 and R2) should remain under an estimated value of 70 dBG, which is 15 dBG less than the previously stated criteria. This estimated project aggregate wind turbine generator infrasound level is also far below what NASA studies determined (125 dB, linear) as a threshold for potential health impacts.[7] On these bases, infrasound potential impacts are considered to be either non-existent or less than significant.

---

[5] Jakobsen, Jorgen. 2005. Infrasound Emission from Wind Turbines. *Journal of Low Frequency Noise, Vibration and Active Control* 24, no. 3: 150.

[6] HGC Engineering. 2006. Wind Turbines and Infrasound. Submitted to Canadian Wind Energy Association. November. p. 3.

[7] HGC Engineering. 2006. Wind Turbines and Infrasound. Submitted to Canadian Wind Energy Association. November. p. 3.

4.1.1.5 Mitigation Measures

Construction

Construction would generally occur only during daytime hours to reduce the potential for noise impacts from this activity. Construction noise is exempt from Washington noise limits during daytime hours. To ensure that construction noise emission assumptions relied upon herein are valid and acoustical design goals are met by the project during construction, the following mitigation measures are proposed:

- All noise-producing project equipment and vehicles using internal combustion engines would be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed “package” equipment (e.g., arc-welders, air compressors) would be equipped with shrouds and noise control features that are readily available for that type of equipment.

- All mobile or fixed noise-producing equipment used on the project that is regulated for noise output by a local, state, or federal agency, would comply with such regulation while in the course of project activity.

- The use of noise-producing signals, including horns, whistles, electronic alarms, sirens, and bells, would be for safety warning purposes only. Unless required for such safety purposes, and as allowable by applicable regulations, no construction-related public address, loudspeaker, or music system would be audible at any adjacent noise-sensitive land use.

- The EPC Contractor would implement a noise complaint process and hotline number for the surrounding community. Whistling Ridge Energy LLC would have the responsibility and authority to receive and resolve noise complaints.

Operation

The noise modeling analysis indicated that the noise levels at the three closest residences (located 0.38, 0.48 and 0.8 mile away) would be 37 to 42 dBA for the 9 m/sec wind speed case, at and above which the wind turbine generators are expected to produce the most noise. With averaged measured existing sound levels reasonably representing ambient noise levels at these nearest noise-sensitive receivers, the cumulative increase over ambient for most operating cases would remain below applicable thresholds, and would result in no need for operation noise mitigation.

4.1.2 RISK OF FIRE OR EXPLOSION

Unlike thermal power plants, wind power projects pose a much smaller risk of explosion or fire potential, as there is no need to transport, store, or combust fuel to generate power. As with any major construction undertaking, construction of the project would present some fire risks. Fire risk mitigation starts with project design, especially with electrical design which needs to comply with the National Electric Code and the National Fire Protection Agency. A strict fire prevention plan would be enforced both during construction and operations to mitigate fire risks.

4.1.2.1 Fire and Explosion Sources

The risk of unintentional or accidental fire or explosion during both construction and operations would be minimal. As the project site is located within commercial forest and rangeland, the highest expected fire risks are forest fires and brush fires during the hot, dry summer season. Fire risk potential is constantly tracked and reported during the summer fire season by the WDNR and this would be actively posted at the construction job site during the high risk season. The project site roads act as firebreaks and also would allow quick access by fire trucks and personnel in the event of a grass fire. As is the case with almost any complex machines, there is some potential for fire inside the wind turbine generators.

4.1.2.2 Mitigation Measures

The construction manager would be responsible for staying abreast of fire conditions in the project area by contacting WDNR and implementing any necessary fire precautions. A Fire Protection and Prevention Plan would be developed for EFSEC approval and implemented, in coordination with the Skamania County Fire Marshall and appropriate agencies. Table 4.1-12 lists sources of potential fire and explosion along with measures to mitigate the risk of either occurring.

Lightning-induced fires are rare in the project area and both the wind turbine generators and the substation are equipped with specially engineered lightning protection systems. With the types of modern wind turbines proposed for the project, however, turbine malfunctions leading to fires in the nacelle are extremely rare. The turbine control system detects overheating in turbine machinery, and internal fires would be detected by these sensors, causing the machine to shut down immediately and send an alarm signal to the central SCADA system, which would notify operators of the alarm by cell phone or pager.

The potential fire risks are similar in nature but lower for project decommissioning. Fire prevention measures during decommissioning would be similar to those for project construction.

Table 4.1-12
Fire and Explosion Risk Mitigation Plan

C / O[a]	Potential Fire or Explosion Source	Mitigation Measures
C & O	General Fire Protection	• All on-site service vehicles fitted with fire extinguishers • Fire station boxes with shovels, water tank sprayers, etc. installed at multiple locations on site along roadways during summer fire season • Minimum of one water truck with sprayers must be present on each turbine string road with construction activities during fire season
C & O	Dry vegetation in contact with hot exhaust catalytic converters under vehicles	• No gas powered vehicles allowed outside of graveled areas • Mainly diesel vehicles (i.e. w/o catalytic converters) used on site • Use of high clearance vehicles on site if used off-road
C & O	Smoking	• Restricted to designated areas (outdoor gravel covered areas)
C & O	Explosives used during blasting for excavation work	• Only state licensed explosive specialist contractors are allowed to perform this work – explosives require special detonation equipment with safety lockouts • Clear vegetation from the general footprint area surrounding the excavation zone to be blasted • Standby water spray trucks and fire suppression equipment to be present during blasting activities
C & O	Electrical Fires	• Use of generally high clearance vehicles on site • No gas powered vehicles allowed outside of graveled areas • All major construction equipment used is to be diesel powered (i.e. w/o catalytic converters)
C & O	Lightning	• Specially engineered lightning protection and grounding systems used at wind turbines and at substation • Footprint areas around turbines and substation are graveled with no vegetation
C	Portable Generators – hot exhaust	• Generators not allowed to operate on open grass areas • All portable generators to be fitted with spark arrestors on exhaust system
C	Torches or field welding on-site	• Immediate surrounding area would be wetted with water sprayer • Fire suppression equipment to be present at location of welder/torch activity
C & O	Electrical Arcing	• Electrical designs and construction specifications meet or exceed requirements of the National Electric Code and National Fire Protection Agency

a. Indicated risk during construction (C) and/or operations (O)

4.1.3 RELEASES OR POTENTIAL RELEASES TO THE ENVIRONMENT AFFECTING PUBLIC HEALTH

4.1.3.1 Construction

Diesel fuel would be the only potentially hazardous material used in any significant quantity during construction of the project. Construction of the project would require the use of diesel fuel for operating construction equipment and vehicles. Measures to prevent and contain any accidental spills resulting from this fuel storage and use are described in detail in Section 2.9, Spillage Prevention and Control. Construction of the project would not result in the generation of any hazardous wastes in quantities regulated by state or federal law. During construction, the primary wastes generated would be solid construction debris such as scrap metal, cable, wire, wood pallets, plastic packaging materials and cardboard. The total volume of construction wastes is expected to be less than ten tons. This waste would be accumulated on site in drop boxes until hauled away to a licensed transfer station or landfill by either the EPC contractor or the Skamania County Solid Waste Division.

4.1.3.2 Operations

Operation of the project would not result in the generation of regulated quantities of hazardous wastes. As no fuel would be burned to power the wind turbine generators, there would be no spent fuel, ash, sludge or other process wastes generated. The primary type of waste generated by operations the project would be municipal solid waste generated at the Operations and Maintenance facility, consisting of typical office wastes (paper, cardboard, food waste, etc.), which would be stored in a dumpster until it is collected by the Skamania County Solid Waste Division. Periodic changing of lubricating oils and hydraulic fluids used in the individual wind turbine generators would result in the generation of small quantities of these materials. These waste fluids would be generated in small quantities because they need to be changed only infrequently and the changing of these fluids is not done all at once, but rather on an individual basis. These waste fluids would be stored for short periods of time in appropriate containers at the Operations and Maintenance facility for collection by a licensed collection service for recycling or disposal. Procedures for collecting, storing and transporting these materials for recycling or disposal are described in detail in Section 2.9, Spillage Prevention and Control.

4.1.4 SAFETY STANDARDS COMPLIANCE

Whistling Ridge Energy LLC and its contractors would comply with all applicable local, state and federal safety, health, and environmental laws, ordinances, regulations, and standards (Appendix D). Some of the main laws, ordinances, regulations and standards that would be reflected in the design, construction, and operation of the project are as follows:

- Occupational Safety And Health Act Of 1970 (29 USC 651, et seq.) and 29 CFR 1910, Occupational Safety and Health Standards
- Uniform Fire Code
- Americans with Disabilities Act
- Uniform Fire Code Standards
- Uniform Building Code
- National Fire Protection Association, which provides design standards for the requirements of fire protection systems
- National Institute For Occupational Safety And Health, which requires that safety equipment carry markings, numbers, or certificates of approval for stated standards
- American Society Of Mechanical Engineers, which provides plant design standards
- American National Standards Institute, which provides plant design standards
- National Electric Safety Code
- American Concrete Institute Standards

- American Institute of Steel Construction Standards
- American National Standards Institute
- American Society for Testing and Materials
- Institute of Electrical and Electronic and Installation Engineers
- National Electric Code

4.1.4.1 Blade Throw

Blade throws were common in the industry's early years, but are unheard of-today because of better turbine design and engineering (AWEA 2008). While cases of blade drop/throw have occurred, these incidents are rare and have generally been linked to improper assembly or exceedance of design limits. Modern turbine braking systems, pitch controls, and other speed controls should prevent exceedance of design limits (AWEA 2008).

4.1.4.2 Tower Failure

Reasons for collapse can vary depending on conditions and tower type, but may include blade strikes, very strong winds, and improper maintenance. While structural failure is more damaging than blade failure, the consequences and risks to human health are far lower since risks are confined to within a relatively short distance from the turbine (Caithness 2006).

There is only one recorded death from a tower collapse, which occurred in Sherman County, Oregon. A six-month investigation found that the operating company "failed to properly instruct and supervise workers in the safe operation of tools and equipment. It also found that company procedures for working under potentially dangerous conditions fell short of OSHA [Occupational Safety and Health regulations" (Hill 2008). The investigation did not find any structural problems with the tower itself.

4.1.4.3 Ice Throw

Ice storms, both mild and occasionally severe, may occur within the project area (see Section 2.1.3.2, Climate). During periods of ice build-up, the exposed parts of the turbine may be coated with ice. According to the AWEA, "the moving turbine rotor is liable to accrete heavier quantities of ice than the stationary components of the wind turbine" (AWEA 2008). Most modern turbines include sensors that will shut down the turbine when ice build-up is detected.

If the ice on the moving rotor is cast off, it could pose a threat to people, animals and buildings on the ground. However, the same setbacks used to minimize noise are sufficient to protect against danger to the public. The results of a questionnaire sent to a large number of wind turbine operators found most fragments found on the ground measured approximately 0.2–2.2lbs within an area of approximately 49–328 feet from the wind turbines (Morgan et. al. 1998). Anecdotal evidence suggests that ice tends to drop off the rotor, rather than being thrown off. Also, ice tends to shed more from the blade tips, and larger pieces of ice debris tend to fragment in flight.

4.1.5 RADIATION LEVELS

Pursuant to WAC 463-60-115, Whistling Ridge Energy LLC requests a waiver of the the information required by WAC 463-60-352(5), which call for information relating to radioactivity. No radioactive materials would be used, consumed, or released during construction or operation of the project.

4.1.6 EMERGENCY PLANS

The Emergency Plan for the project would consider the actions and responsibilities of personnel and off-site assistance groups during situations that may require physical corrective actions. The plan would include procedures designed to outline preventive measures for specific conditions that could evolve into an emergency situation, and outline procedural methods for mitigating an emergency should one occur.

The fundamental objective of the plan is to provide the necessary prearrangements, directions, and organizational structure such that all plant emergencies can be effectively and efficiently resolved to safeguard the public, plant personnel, and property.

In all instances associated with this plan, the manager or designee would be responsible for taking immediate action to safeguard the public, plant personnel, the environment, and equipment. The protection of personnel, the public, and the environment would always take precedence; plant systems and equipment would be secondary. In any situation the more conservative approach would always be considered.

4.1.6.1 Responsibility and Authority

The Whistling Ridge Energy Project would be staffed with at least one on-site manager. Off-site, the project would be supported by the Project Manager under the auspices of Operations and Maintenance services, corporate regulatory services, and corporate safety.

The responsibility and authority for day-to-day operations would be delegated to the manager and, as such, the manager would have direct responsibility to ensure that all routine and emergency site operations are conducted in a manner to protect the public, the environment, personnel and equipment. Overall responsibility and authority shall remain with the manager, or designee. The manager would ensure implementation and compliance with the plan and component procedures, direct emergency response actions, account for personnel, and direct evacuation actions as appropriate.

The individual employee would be responsible for being knowledgeable of the general guidance provided in the current Emergency Plan and its component procedures, for actively participating in drills and training in support of the plan and procedures, and for complying with policies set forth in the plan and procedures. Each employee would be responsible for notifying the manager of any potentially dangerous situation of which he or she has knowledge, and of any emergency situation (e.g., fire, oil spill, vehicle accident). The manager would notify the Project Manager and others as necessary to comply with the plan and procedures.

4.1.6.2 Components of the Emergency Plan

The following procedures would be components of the Emergency Plan.

- Fire Plan
- Personal Injury Response Plan
- Safety Plan
- SWPPP
- SPCC Plan
- Hazardous Waste Management Plan

Other Emergency Situations

Meteorological. This type of emergency includes hail, high winds, thunderstorms, extreme cold weather, and any other naturally occurring weather situation that may endanger, equipment, or require adjustments to the normal operations of the facility. Depending on the specific hazard, and available information, it is the responsibility of the manager or his designee to take the appropriate action to safeguard the public, the environment, personnel, the facility and its equipment.

Geological. This type of emergency deals with seismic activity and related geological phenomena. Depending upon the specific details available, it is the responsibility of the manager or his designee to take the appropriate action to safeguard the public, the environment, plant personnel, the plant and its equipment.

Man-Made. This type of emergency includes bomb threats, civil unrest, sabotage, or any other man made threats to the facility or personnel. This type of emergency must first be validated using the following criteria:

- Source of the information
- Reliability of the information
- Ability to confirm the information

Once the information has been validated then the decision must be made whether it would impact the facility or not. Once the decision is made, it is the responsibility of the manager or his designee to take the appropriate action to protect the public, the environment, plant personnel, the plant and its equipment, or to limit the impact on these elements.

The manager would coordinate response actions with the Skamania County Sheriff's office and Whistling Ridge Energy Project personnel, and provide support as requested and available.

Equipment Failure. This type of emergency is primarily failure of equipment that may result in hazards to personnel.

4.1.6.3 Reporting Requirements to the Energy Facility Site Evaluation Council

Conditions affecting the safety of the project, including any condition, event, or action that might compromise the safety, stability, or integrity of any facility or the ability of any equipment to function safely; or that might otherwise adversely affect the life, health, or property, would be reported to EFSEC.

Any condition affecting project safety would be reported orally to the EFSEC contact by the manager as soon as practicable after that condition is discovered. A written report would be submitted to EFSEC within the time specified by the EFSEC, and would contain any information EFSEC directs, including:

1. The causes of the condition
2. A description of any unusual occurrences or operating circumstances preceding the condition
3. An account of any measure taken to prevent worsening of the condition
4. A detailed description of any damage to the facility and the status of any repair
5. A detailed description of any personal injuries
6. A detailed description of the nature and extent of any private property damage
7. Any other relevant information requested by EFSEC

4.1.6.4 Review and Updating

The Emergency Plan would be reviewed annually, and changes made during the annual review or anytime a significant change has occurred in the information contained in this plan. The manager would be responsible for scheduling the annual review and having the plan and procedures updated as needed. The procedures would also be reviewed and revised as necessary, to reflect lessons learned from accidents, emergency situations, and tests of the procedures.

4.1.6.5 Training and Drills

Site personnel involved in emergency plan procedures would be trained annually and would be documented. Training would include a review of procedures, definitions, and regulations. All new employees would receive training as part of their orientation. Staff would periodically test emergency plan procedures by either performing a table top drill or, where practicable, a field drill. If necessary, as a result of the drill(s), procedures would be revised to take advantage of lessons learned.

4.1.6.6 Agreements Related to Emergency Planning

Prior to construction of the project, Whistling Ridge Energy LLC would develop agreements related to emergency planning with Skamania County Emergency Medical Services. This agreement would be provided to EFSEC and attached to the Emergency Plan prior to implementation.

SECTION 4.2 LAND AND SHORELINE USE
(WAC 463-60-362)

This section addresses the land and shoreline use issues applicable to the proposed Whistling Ridge Energy Project and includes the following subsections:

- Land Use (Section 4.2.1)
- Light and Glare (Section 4.2.2)
- Aesthetics (Section 4.2.3)
- Recreation (Section 4.2.4)
- Historic and Cultural Preservation (Section 4.2.5)
- Agricultural Crops/Animals (Section 4.2.6)

4.2.1 LAND USE

Skamania County is governed by two independent sets of development regulations. The first is a stand-alone zoning code (SCC Title 22) that regulates uses and development within the Columbia River Gorge National Scenic Area GMA and SMA. The Scenic Area Code is based on the Management Plan for the Scenic Area, which is overseen by the USFS and Columbia River Gorge Commission, as directed by the National Scenic Area Act. The remainder of unincorporated Skamania County, including Scenic Area Urban Areas, is governed by zoning regulations in SCC Title 21 and related Titles 20 Shorelines and 21A Critical Areas. The proposed project site and access road (West Pit Road) ~~is~~ are regulated by SCC Titles 20, 21 and 21A.~~, but the access roadways up to the project boundary~~ Neither of the site or West Pit Road are regulated by SCC Title 22 Scenic Area. The site and access roadways are evaluated ~~separately~~ together with respect to land use in Section~~s~~ 4.2.1.2~~ and 4.2.1.3~~.

4.2.1.1 Existing Land Uses

Existing Land Use Conditions

The project site has been in commercial forestry use for the last century. During this time, the owners and operators have logged the property over a series of approximately 50-year logging rotations. The property is permanently committed to commercial tree farming and harvesting. Regardless of whether the wind energy facility is built, the project area will be, and will remain in, commercial forestry production. Ongoing activities will include regular clearing, replanting, and harvesting. The purpose of this project is to introduce an additional and compatible land use (wind energy generation), timed and implemented in sync with ongoing commercial forestry operations and rotations. This combination of natural resource uses (logging and renewable, clean wind energy production) is intended to better diversify the use of the property and the Skamania County economy as a whole. This diversification would ensure ongoing commercial forestry in concert with another natural resource-based land use that would better insulate the Applicant from economic cycles that have undermined similar timber operations both in the county and the Pacific Northwest as a whole, compelling multiple, large, irreversible conversions to residential, resort, and other uses.

The project would be sited within an existing utility corridor. There are two large, lattice electrical towers, four high-voltage transmission lines, two communications towers, a natural gas pipeline, and a rock pit to supply materials for forest road maintenance and construction within the project's immediate vicinity (see Figure 2.1-1 in Section 2.1). The proposed Whistling Ridge Energy Project would be connected to the existing BPA transmission lines and would be consistent with existing utilities and commercial timber operations.

To maximize the project's compatibility with ongoing timber harvest and other forestry operations, a number of design features have been incorporated into the project. For example, some of the turbine corridors would be sited on ridgelines to minimize clearing while maximizing wind exposure; existing private forest roads would be used for access to minimize new construction; and forest rotation length and tree heights have been factored into the design life of the project so that it would be compatible with tree growth rates in surrounding forest blocks. As noted above, the project would help diversify the income potential from these forest lands while minimizing conversion to other uses.

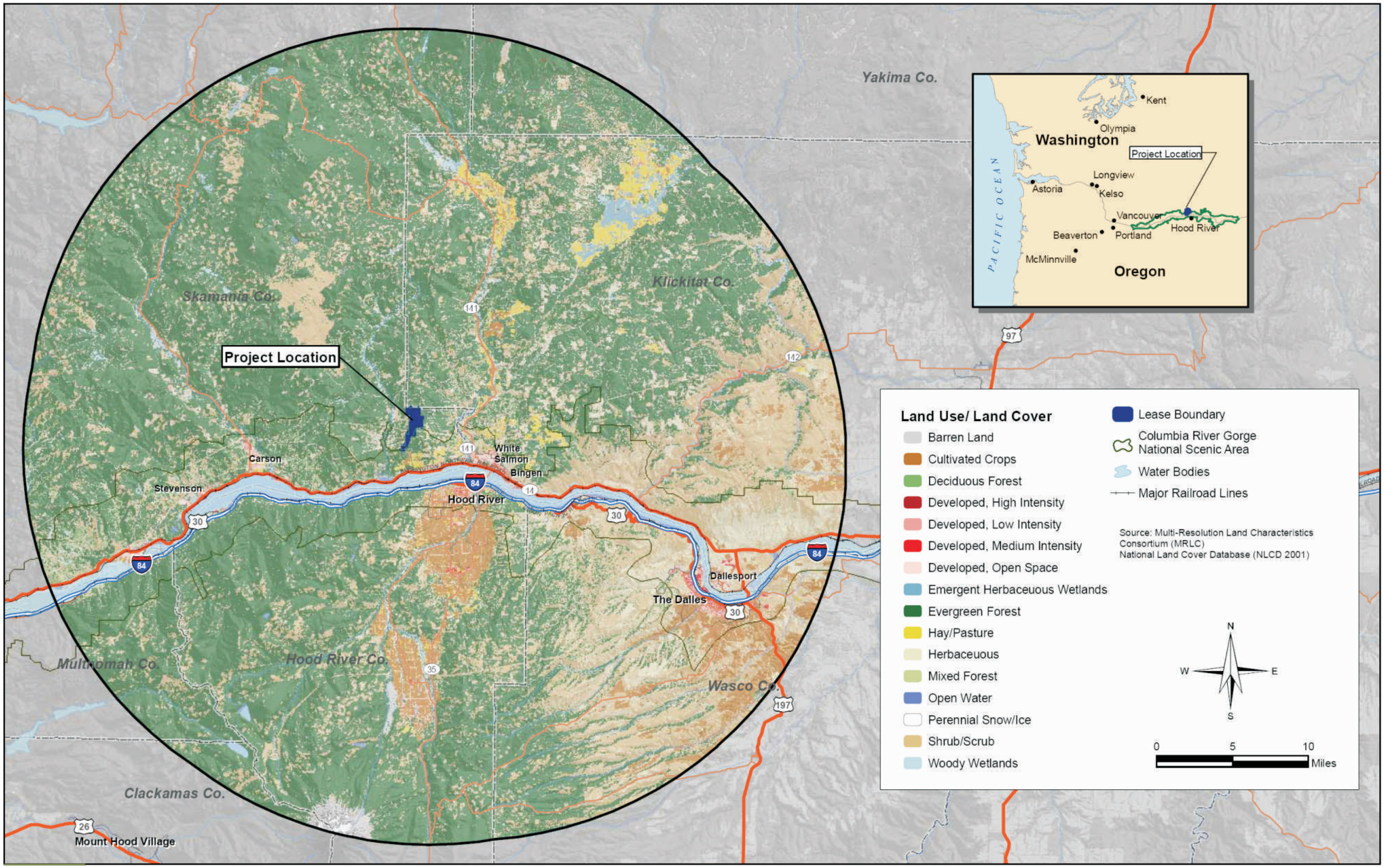
Other uses permitted within the For/Ag-20 ~~and R-10~~ zones include telecommunication facilities, log storage and sorting areas, scaling stations, temporary crew quarters, forest industry storage and maintenance facilities, farm use, single-family dwellings for farm or forest operators, home occupations, rooftop wind turbines, small-scale solar energy systems, and management of fisheries, biological areas, and conservations areas. Further, Washington's Forest Practices Act allows timber harvest and surface mining as part of commercial forest practices.

The proposed alternative 5-acre Maintenance and Operations facility would be located on land zoned Residential 5 (R-5), a zoning requiring a minimum of 5 acre sites. In addition to residential, other non-residential uses permitted outright in the R-5 zone include commercial and domestic agriculture, forestry, and public facilities and utilities. Non-residential uses allowed by conditional use approval include surface mining, recreational facilities, professional services, geothermal energy facilities, semi-public facilities, small and large-scale recreational vehicle parks, and child day care centers.

Land Uses within 25 Miles of the Site

To consider the proposed land use of wind energy in a broader context, land uses within 25 miles of the site were considered. The area encompassing a 25-mile radius of the site is transected east-west by the Washington-Oregon border, Columbia River Gorge, Columbia River Gorge National Scenic Area , SR 14, BNSF Railway, the Columbia River, and I-84 (on the Oregon side of the Columbia River). The Gifford Pinchot National Forest is located north of the project in Washington State (Figure 4.2-1, Land Uses within 25 Miles of Site).

33758687_31.cdr



Job No. 33758687

Figure 4.2-1

Land Uses Within 25 Miles of Site

URS

Whistling Ridge Energy Project
Skamania County, Washington

On the Washington side of the Columbia River, land use is predominantly commercial forestry and residential in numerous small, unincorporated communities. There is some limited agriculture, mostly pear and apple orchards recently augmented with some wine grape vineyards, within the Scenic Area. On the Oregon side of the Columbia River land use in the Scenic Area is predominantly commercial timber production and residential. South of the Scenic Area, on the Oregon side, land uses include commercial forestry, agriculture, and some residential. The primary Oregon orchard crops are pears, apples, and cherries. The project is not located near or on any shorelines of State, County or other significance.

The project is located in Skamania County, but is adjacent to Klickitat County to the north. The incorporated cities of White Salmon and Bingen are located approximately 7 miles southeast of the site on and near the Columbia River. The Skamania County seat is located in the incorporated city of Stevenson, approximately 15 miles southwest along the Columbia River. Directly south and across the Columbia River from Bingen is the city of Hood River, Oregon. These incorporated cities have mixed urban uses, but their populations remain low, as do the overall populations of Skamania and Klickitat Counties (Table 4.2-1).

Table 4.2-1
Populations of Counties and Incorporated Cities in the Vicinity of the Proposed Whistling Ridge Energy Project

City	Population (2000 U.S. Census)
Skamania County	9,872
Klickitat County	19,161
Bingen, WA	672
White Salmon, WA	2,193
Hood River, OR	5,831
Stevenson, WA	1,200

The Scenic Area extends 85 miles along the Columbia River and includes portions of three Oregon and three Washington counties. The project site is located roughly north of the center of the Scenic Area on the north side of the Columbia River. The National Scenic Area Act designated for special protection 292,500 acres on both sides of the Columbia River from the outskirts of the Portland-Vancouver metropolitan area in the west to the semi-arid regions of Wasco and Klickitat counties in the east. Although both the project site and the access road are located completely outside the Scenic Area, the proposed Whistling Ridge Energy Project does extend up to its outermost boundary~~, and access is through the Scenic Area~~. ~~Scenic Area access roads already exist, but require improvement for the delivery of components and related equipment into the project site (See Section 4.3 Transportation for further details on road improvements).~~

Recreation facilities in the vicinity of the development are discussed in Section 4.2.4.

Impacts to Existing Land Uses

Construction

During construction at the development site, earth movement and construction-related traffic would generate noise and dust that would impact nearby businesses. Impacts and mitigation related to dust, noise, and traffic during construction are addressed in Sections 3.2, 4.1, and 4.3, respectively.

Operation

The Whistling Ridge Energy Project would provide approximately 75 MW of renewable energy resources. Wind energy has been proven to be a safe, effective, and efficient use of alternative energy. No negative impacts to existing or planned land uses are anticipated.

On the Washington side of the Columbia River, land use is predominantly commercial forestry and residential in numerous small, unincorporated communities. There is some limited agriculture, mostly pear and apple orchards recently augmented with some wine grape vineyards, within the Scenic Area. On the Oregon side of the Columbia River land use in the Scenic Area is predominantly commercial timber production and residential. South of the Scenic Area, on the Oregon side, land uses include commercial forestry, agriculture, and some residential. The primary Oregon orchard crops are pears, apples, and cherries. The project is not located near or on any shorelines of State, County or other significance.

The wind turbines would likely be painted a non-reflective flat neutral gray or light color to blend in with the natural setting and the sky. Visual impacts are addressed in Section 4.2.3.

The project's electrical system would consist of two key elements: 1) a collector system, which would collect energy generated at 575 volts from each wind turbine, transform the voltage to 34.5 kV using a pad-mounted transformer, and deliver the energy via underground collector cables to 2) the project substation, which would further transform the energy delivered by the underground collector system from 34.5 kV to 230 kV and deliver it to the adjacent BPA transmission line and into the regional transmission system. If unforeseen physical constraints prohibit underground placement of all lines, aboveground lines would be required.

Permanent Operations and Maintenance facilities would be constructed on an approximately ~~3.1~~5-acre ~~area~~ site located either adjacent to the substation, or west of the project area along West Pit Road. Facilities would likely include office and workshop areas, a kitchen, bathroom, shower, and utility sink. At least one structure would be constructed of sheet metal, and would be approximately 16 feet tall (to the roof peak) and enclose approximately 3,000 square feet. A graveled parking area for employees, visitors, and equipment would be located adjacent to the building. The entire area would be fenced and have a locked gate.

Security lighting would be minimized and directed downward and toward the facilities to protect from light spill over onto adjacent properties.

The project would operate in compliance with applicable Washington State Environmental Noise Levels, Chapter 173-60 WAC.

If the project were terminated, the necessary authorization from the appropriate regulatory agencies would be obtained to decommission the facilities in accordance with the approved Site Restoration and Decommissioning Plan. All aboveground facilities would be removed from the site, and unsalvageable material would be disposed of at authorized sites. To avoid environmental damage and unnecessary land disturbance, the underground collector cables likely would be retired in place, and turbine foundations would be removed to a depth of approximately four feet bgs, with the remainder likely retired 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 regrading, adding topsoil, and replanting of 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.

4.2.1.2 Relationship of Project Site to Existing Land Use Plans and Policies

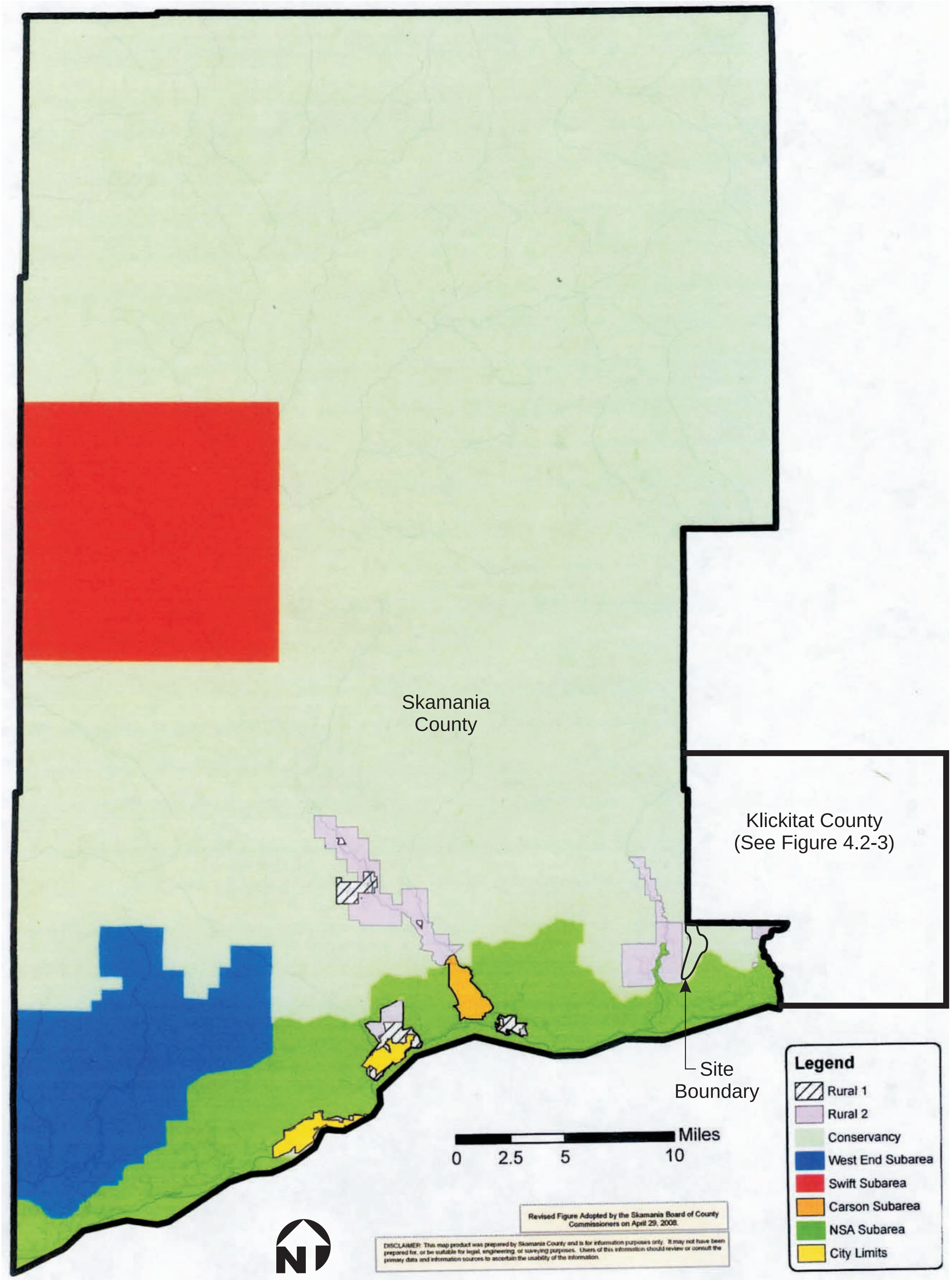
2007 Comprehensive Plan

The proposed Whistling Ridge Energy Project site is located within Skamania County. On July 10, 2007, Skamania County adopted its current Comprehensive Plan, which includes three Subarea Plans (Figure 4.2-2 Comprehensive Plan Designations). The project site is not located in one of these subareas. There are three land use designations outside of the specific subarea plans: Rural I, Rural II, and Conservancy. The project area is designated as "Conservancy." Table 2-1 of the Comprehensive Plan identifies zones that are consistent with the Conservancy designation, including: Residential 10 (R-10), Rural Estates 20 (RES-20), Forest Land 20 (FL 20), Commercial Resource Land 40 (CRL 40), Natural (NAT) and Unmapped (UNM). The project site is located in the FL 20~~, R-10,~~ and UNM zones, ~~all~~ both of which are consistent with the Conservancy designation. The alternative Operations and Maintenance facility site would be located in the R-5 zone, a zone shown as consistent with the Rural II designation. The project site also is located adjacent to (but not within) southwestern Klickitat County (see Figure 4.2-3, Klickitat County Land Use Designations). In a letter to EFSEC, dated May 4, 2009, Karen Witherspoon, Skamania County Community Development Department Director, found that the proposed project is consistent with the Skamania County Comprehensive Plan, and resource maps. A similar letter has been requested regarding the alternative location of the Operations and Maintenance facility.

The overall Skamania County comprehensive plan vision statement is:

> *"Skamania County is strongly committed to protecting our rural character and natural resource based industries while allowing for planned future development that is balanced with the protection of critical resources and ecologically sensitive areas, while preserving the community's high quality of life."*

33758687_19.cdr



Source: Skamania County.

Job No. 33758687

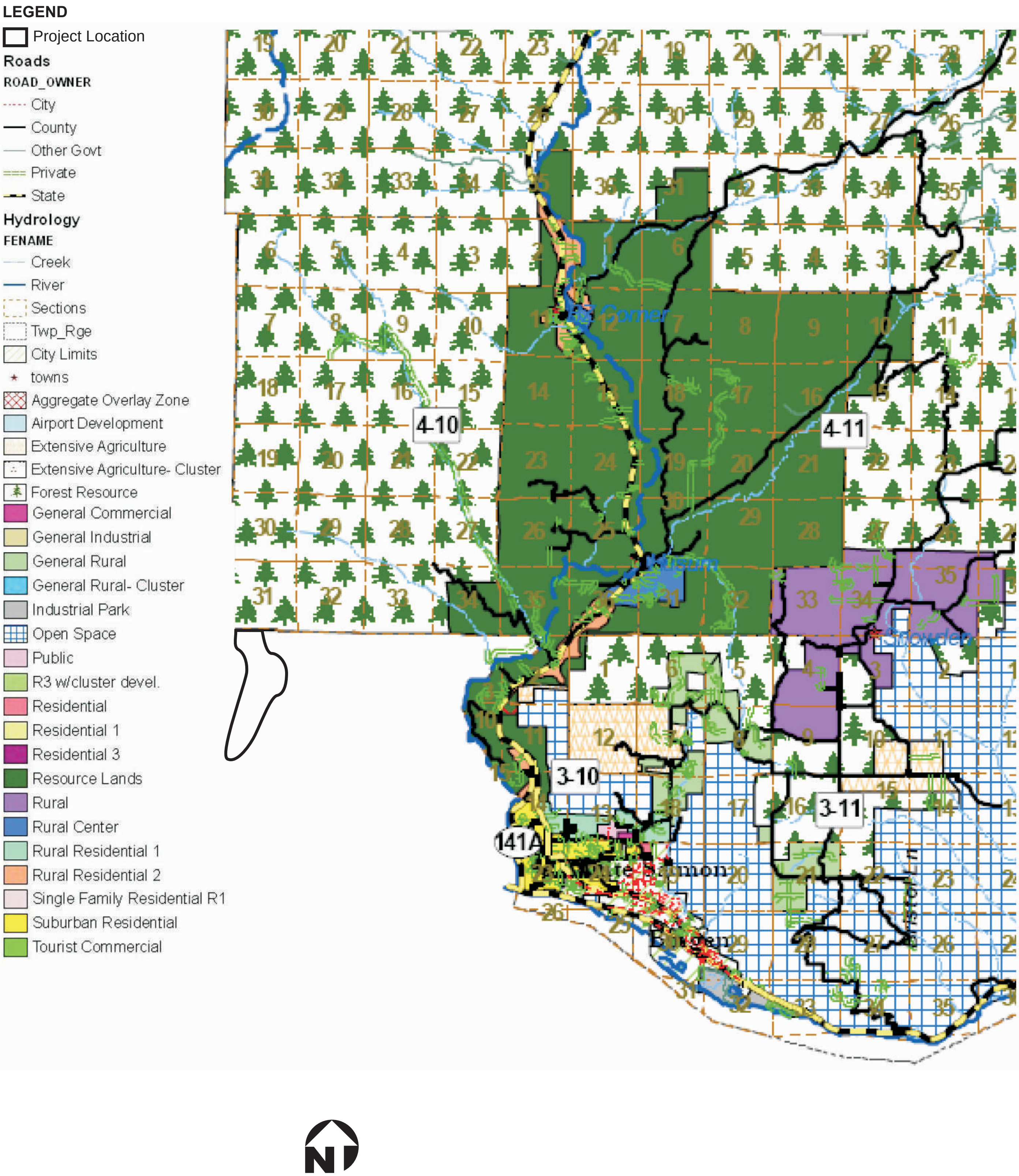
Figure 4.2-2

Comprehensive Plan Designations

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_32.cdr



Source: *Klickitat County.*

Job No. 33758687

Figure 4.2-3
Southwestern Klickitat County Land Use Designations

URS

Whistling Ridge Energy Project
Skamania County, Washington

Natural resources based industry is further encouraged in the Conservancy land use designation. Beginning on page 25 of the Comprehensive Plan is a description of the intent of the Conservancy designation:

> *"The Conservancy land use area is intended to provide for the conservation and management of existing natural resources in order to achieve a sustained yield of these resources, and to conserve wildlife resources and habitats. Much of the Conservancy land use area is characterized by rugged terrain, steep in slope, and unsuitable for development of any kind. Logging, timber management, agricultural and mineral extraction are main use activities that take place in this area. Recreational activities of an informal nature such as fishing, hunting, and hiking occur in this area, although formal recreational developments may occur from time to time. Conservancy areas are intended to conserve and manage existing natural resources in order to maintain a sustained resource yield and/or utilization."*

The land proposed for the project is in an area of rugged terrain and steep slopes. The land is used primarily for logging and timber management. Informal recreation activities take place in the area of the proposed project, although access to the project site for these activities is limited by the Applicant. The Whistling Ridge Energy Project would be consistent with the Comprehensive Plan vision and the Conservancy designation, in that it would conserve and manage existing natural forest and wind resources to maintain a sustained yield and utilization of both.

Among the uses identified by the 2007 Comprehensive Plan as appropriate in the Conservancy designation are: public facilities, utilities, utility substations, forest management (including temporary logging and mining camps), and surface mining (by conditional use). Wind energy facilities are consistent with the Conservancy designation because they are utilities. The project would provide an alternative source of electrical energy generation that is not reliant on either fossil fuels or hydropower, while allowing forest management activities to continue around the turbine corridors. The Whistling Ridge Energy Project would be a utility consistent with the Conservancy designation's appropriate uses.

The use of Rural II land is described beginning on page 24 of the Comprehensive Plan:

> *"The Rural II land use area is intended to provide for rural living without significant encroachment upon lands used for agriculture and timber. This land use area is the middle developmental range level suggested by this plan. The lower density will help to protect agricultural and timber lands from dense residential type development, and should maintain the rural character of this designation."*

The Operations and Maintenance facility would include an approximately 3,000 square foot building, located on a 5-acre parcel in an area designated as Rural II in the Comprehensive Plan. The facility would be similar in size to a larger single family home. Among the non-residential uses identified in the 2007 Comprehensive Plan as appropriate in the Rural II designation are: public facilities, utilities, utility substations, telecommunication facilities, hospitals, meeting halls, agriculture, forest management, including temporary logging and mining camps, and surface mining.

The project would not be in conflict with any of the goals or policies expressed in the 2007 Comprehensive Plan. A number of these specifically encourage projects similar to the Whistling Ridge Energy Project:

Land Use (beginning on page 26 of the Comprehensive Plan)

Goal LU.1: To integrate long-range considerations (comprehensive planning) into the determinations of short-term action (individual development applications).

> *Policy LU.1.2: The plan is created on the premise that the land use areas designated are each best suited for the uses proposed therein. However, it is not the intention of this plan to foreclose on future opportunities that may be made possible by technical innovations, new ideas and changing attitudes. Therefore, other uses that are similar to the uses listed here should be allowable uses, review uses or conditional uses, only if the use is specifically listed in the official controls of Skamania County for that particular land use designation.*

Goal LU.2: To provide for orderly future physical development of Skamania County.

> *Policy LU.2.4: Encourage new commercial enterprises to locate within or near existing commercial areas to avoid further scattering and to better serve the public.*

Goal LU.3: To coordinate public and private interests in land development.

> *Policy LU.3.3: Encourage industry that would have minimal adverse environmental or aesthetic effects.*

Goal LU.4: To promote interagency cooperation and effective planning and scheduling of improvements and activities so as to avoid conflicts, duplication and waste.

> *Policy LU.4.3: Land use patterns, which minimize the cost of providing adequate levels of public services and infrastructure, should be encouraged.*

Goal LU.5: To promote improvements which make our communities more livable, healthy, safe and efficient.

> *Policy LU.5.5: Promote compatibility of industry with the surrounding area or community by fostering good quality site planning, landscaping, architectural design, and a high level of environmental standards.*

> *Policy LU.5.6: Encourage commercial development that is convenient, safe and pleasant to the general public by: requiring that new establishments provide off-street parking adequate for its needs. Encourage pooled or joint use parking areas for adjacent developments may be utilized; Regulate access points for vehicular traffic for commercial areas to prevent unsafe conditions; the design of commercial sites, buildings,*

and signs should be compatible with surrounding areas; and, landscaping may be required as a buffer when commercial use adjoins residential or farm property.

Environmental (beginning on page 43)

Goal E.1: To ensure the proper management of the natural environment to protect critical areas and conserve land, air, water, and energy resources.

Transportation, Public Facilities and Services (beginning on page 58)

Goal T.1: Transportation – Encourage an efficient multi-modal transportation network that is based on regional priorities and coordinated with county and city comprehensive plans.

Goal T.2: Continue the priority of increasing safety of the Skamania County rural 2-lane road system. The majority of the Public Works Department's future efforts will be to reduce the accident rate with Skamania County.

Goal T.3: Public Facilities and Services – Ensure that those public facilities and services necessary to support development should be adequate to serve the development at the time the development is available for occupancy and use without decreasing current service levels below locally established minimum standards.

Archeology and Historic Preservation (beginning on Page 68)

Goal AHP.1: Identify and encourage the preservation of lands, sites, and structures that have historical or archaeological significance.

Goal AHP.2: Increase recognition of historic, archaeological, and cultural resources.

Goal AHP.3: Protect historic, archaeological and cultural resources through a comprehensive planning approach.

Skamania County Code, Title 21 Zoning

At the time of this Application, the existing SCC Title 21 remains in effect. However, extensive updates have been proposed for adoption, but they are under appeal by local interest groups and so are indefinitely on hold. The project site's relationship to the existing Title 21 zoning is discussed in this section. ~~Even though not in effect or even in a final form, a discussion of the project site's relationship to the most recent version of the proposed Title 21 zoning update is presented in Appendix E to demonstrate the Whistling Ridge Energy Project would be consistent with both.~~ In a letter to EFSEC, dated May 4, 2009, Karen Witherspoon, Skamania County Community Development Department Director, found that the proposed project is consistent with SCC Title 21 Zoning Code, SCC 21A Critical Areas, Title 24 Clearing and Grading, the Comprehensive Plan, and resource maps.

Approximately 400 acres of the 1,152-acre site ~~are~~ is within areas zoned Resource Protection (For/Ag-20) ~~and Residential 10 (R-10)~~ by Skamania County. Turbine corridor A1-A7 with approximately seven turbines is proposed in these areas. The proposed alternative Operations and Maintenance facility located along West Pit Road would be within an area zoned Residential 5 (R-5). The existing SCC Title 21 would require a conditional use permit for both this the A1-A7 turbine corridor and the alternative location along West Pit Road for the Operations and Maintenance facility. A letter similar to the County's May 4, 2009 Certificate of Land Use Consistency has been requested regarding the alternative location for the Operations and Maintenance facility and will be provided to EFSEC.

The remainder of the project site is in the UNM zone. In UNM zones wind energy facilities would be outright permitted uses (Figure 4.2-4 Skamania County Zoning). *"In the UNM zone all uses which have not been declared a nuisance by statute, resolution, ordinance or court of jurisdiction are allowable. The standards, provisions, and conditions of this title [SCC Title 21] shall not apply to unmapped areas (SCC 21.64.020)."* SCC 8.30.010 enumerates the sum total of the nuisances established by the Board of County Commissioners by resolution and ordinance.

Neither the RCW nor the WAC includes statutes designating wind energy facilities as a nuisance. Such facilities have not been designated a nuisance in any court of jurisdiction.

The project would conform to the purpose and intent outlined in current zoning code for each of the three zones in which it would be located. The purpose of each applicable zone is listed below:

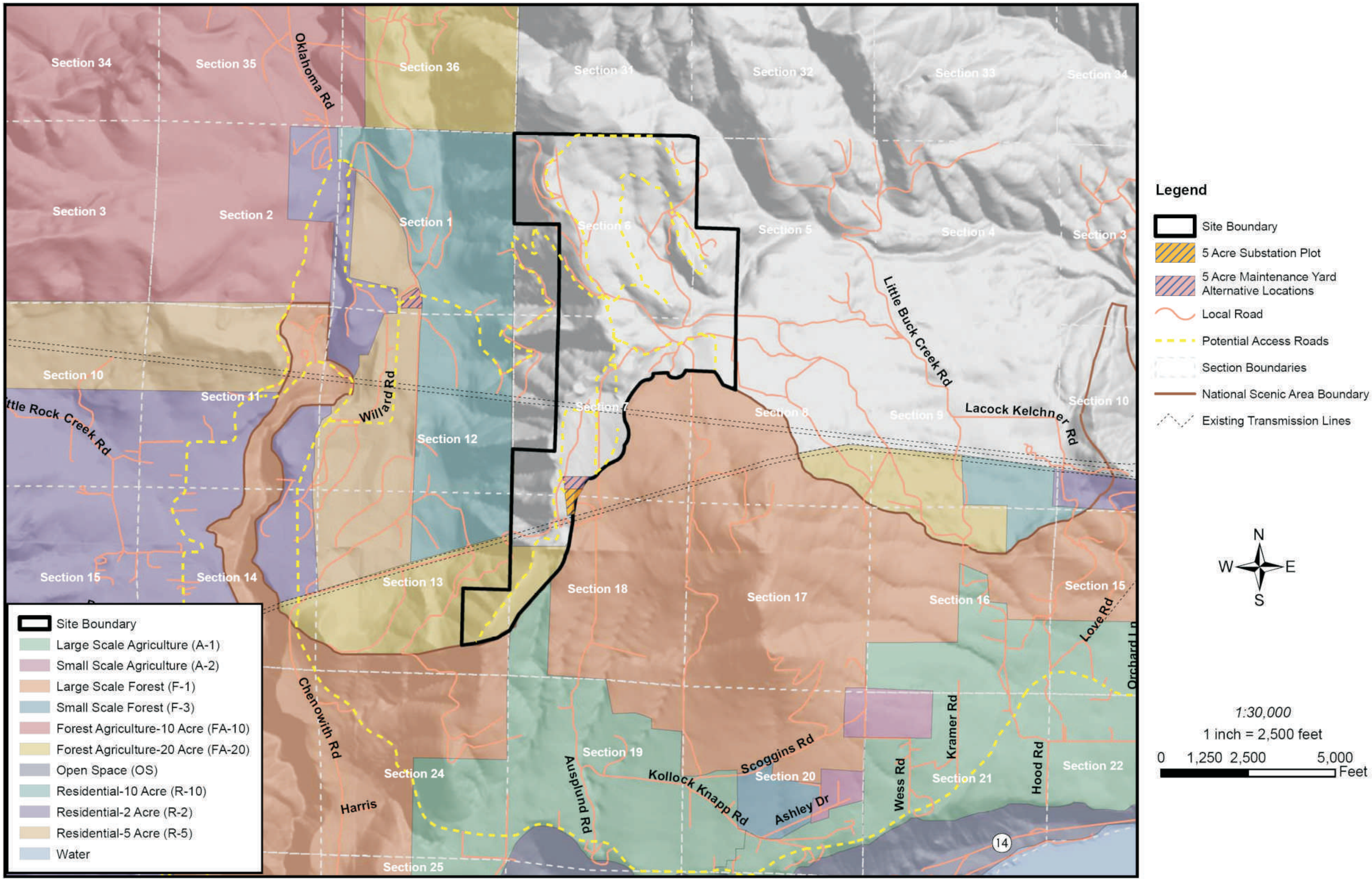
- ~~Residential 10 (R-10) - *"The R-10 zone classification is intended to provide a transition zone of low density rural residential development which will maintain the rural character of areas within the rural II and conservancy land use areas of the county comprehensive plan" (SCC 21.40.010).*~~

- Residential 5 (R-5) – *"To provide a transition zone of medium to low density residential development which will maintain a rural character of the area in the Rural II Land Use Area of the County Comprehensive Plan A." (SCC21.36.010).*

- Resource Production (For/Ag-20) - *"To provide land for present and future commercial farm and forest operations in areas that have been and are currently suitable for such operations, and to prevent conflicts between forestry and farm practices and nonresource production uses by not allowing inappropriate development of land within this zone classification" (SCC 21.56.010[A]).*

- UNM – *"The provisions of this chapter shall apply to all zone classifications (except for the unmapped classification) unless otherwise noted in a particular zone classification" (SCC 21.70.010).*

33758687_84.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 4.2-4

Skamania County Zoning

URS

Whistling Ridge Energy Project
Skamania County, Washington

In the surrounding area between Underwood Mountain and the Little White Salmon River, the predominant land use is commercial forestry. East of the Little White Salmon River, there is some land zoned Residential (R-2, R-5, and R-10). However, all of the R-10 and R-5 lands, and most of the R-2 lands, are currently being used for commercial timber production under ownership by S.D.S. Co., LLC, Broughton Lumber Company, and Washington State. The Washington State lands are managed by WDNR for commercial harvest to support the State's schools.

West of the Little While Salmon River are the unincorporated rural communities of Mill A and Willard. Mill A is located at least 1.5 miles from the nearest turbine corridor and Willard is at least 2.25 miles north of the nearest turbine corridor. Both Mill A and Willard are predominantly zoned Residential (R-2 and R-5).

Skamania County has been updating its comprehensive plan and existing Title 21 zoning since 2005. In July 2007, the County adopted a moratorium on unincorporated UNM-zoned lands outside the Swift Subarea. The moratorium does not prohibit all development in UNM lands. Rather, it restricts three types of land uses: 1) issuance of building permits on lands created by deed since January 2006 that are 20 acres or larger; 2) land divisions (short plat and subdivision); and 3) acceptance of SEPA checklists in support of converting land to non-forestry uses. The project is not sited on lands created by deed since January 2006 and does not involve any land division. Because of EFSEC's well-established preemptive role in permitting wind energy facilities, including acting as Lead Agency for associated SEPA review, the County's moratorium on acceptance of SEPA checklists for forest practices conversions does not affect the project.

Conditional Use Approval

The R-~~10~~ 5 and For/Ag-20 zones list semi-public utilities as conditional uses under SCC ~~21.40.030(G)~~21.36.031(G) and SCC 21.56.030(C), respectively. Semi-public utilities are defined in SCC 21.08.010 as *"facilities intended for public use which may be owned and operated by a private entity."* Thus, the proposed Whistling Ridge Energy Project would be a semi-public utility under SCC Title 21 with turbine corridor A1-A7, located ~~partially in the R-10 and partially~~ in the For/Ag-20 zone~~s~~ and the alternative Operations and Maintenance facility along West Pit Road located in the R-5 zone (Figure 4.2-~~3~~4, ~~Klickitat County Land Use Designations~~Skamania County Zoning). Absent EFSEC review, the A1-A7 ~~this~~ turbine corridor and the alternative location for the Operations and Maintenance facility along West Pit Road would be subject to the conditional use provisions outlined in SCC 21.16.070, as amended in Ordinance 2007-02. The zoning code would require a determination of whether the proposed use is compatible with existing or permitted uses in the specific area according to six criteria. Conditions may be imposed based on the health, safety, and general welfare of the public, any environmental standards in force, and provisions of SCC Title 21. The conditional use permit criteria that would be relevant to the project are included in SCC 21.16.070(A)(1) and are listed and analyzed below.

a. *Be either compatible with other uses in the surrounding area or is no more incompatible than are other outright permitted uses in the applicable zoning district;*

Response: The project site and the site proposed for the alternative Operations and Maintenance facility along West Pit Road ~~is~~ are used for commercial timber operations and construction characterized by regular timber management activities, including timber cutting and heavy equipment usage. The project site has been harvested for many years, based on established harvest schedules using an approximate 50-year rotation. In the surrounding area, between Underwood Mountain and the Little White Salmon River, the predominant land use is commercial forest production. Immediately east of the Little White Salmon River, there is some land zoned Residential (R-2, R-5, and R-10). However, most of this land is currently being used for commercial timber production and is owned by S.D.S. Co., LLC, Broughton Lumber Company, or WDNR. Only one 40-acre parcel adjacent to the east project boundary is owned by a private individual not involved in the project. This parcel is in commercial forest production and contains no residential structures.

~~Only~~ The proposed turbine corridor A1-A7 would be subject to a conditional use permit. The nearest residence outside the National Scenic Area, on lands zoned R-2, R-5 or R-10, is located at least 0.5 mile from this proposed corridor (Figure 4.1-1, Noise Level Contours). The rural communities of Mill A and Willard are located west of the Little While Salmon River. Mill A is approximately 1.5 miles from proposed turbine corridor A1-A7 and Willard is approximately 2.25 miles north.

The proposed alternative site along West Pit Road for the Operations and Maintenance facility would also be subject to a conditional use permit. The nearest residence is located along Young Road, approximately 0.25 mile from the facility site (Figure 4.1-1, Noise Level Contours).

The project has been designed to be compatible with commercial forest use. For example, some turbines are proposed on ridgelines, existing private forest roads would be used for access, and forest rotation schedules and tree heights have been considered so that the design life of the project would be compatible with the growth rate of the trees in surrounding forest blocks. The Applicant has established a replanting and timber management profile to provide the maximum ongoing use of the project site for commercial forestry operations, minimizing the need for permanent or temporary conversion to non-forestry uses (Figure 2.3-2, Forest Management).

The project would help diversify the income potential for the landowner while minimizing conversion of timber lands to other uses. The project site and vicinity are within an existing utility corridor already characterized by massive electrical transmission facilities operated by BPA, a natural gas pipeline, two cellular communication towers, and rock pits for forest operations. There are large lattice electrical towers and four high-voltage transmission lines crossing turbine strings A and B (Figure 2.1-1, Location of Proposed Whistling Ridge Energy Project). Allowable administrative and conditional uses that would be permitted within the R-~~10~~ 5 and For/Ag-20 zones are shown in Table 4.2-2. These uses are subject to standards in the R-~~10~~ 5 and For/Ag-20 zones according to SCC 21.~~40~~36.050 and SCC 21.56.050, respectively, as well as code sections specified for particular listed uses.

Table 4.2-2
Uses by Class Which Are, or May Be Authorized Subject to Standards in the R-~~10~~ 5 and For/Ag 20 Zones under Existing SCC Title 21

Class of Use	R-~~10~~5	For/Ag 20
Allowable Uses	Single-family dwellings	Forestry practices and associated management activities of any forest crop in accordance with Washington Forest Practices Act of 1974 including timber, Christmas trees, nursery stock, and surface mining
	Commercial and domestic agriculture	
	Forestry	
	Public facilities and utilities	
	Cottage occupation	Commercial and domestic agriculture
	Light home industry	Orchards and vineyards
	Residential care facilities	Horticulture
	Family day care home	Cottage occupation
	Safe home	Light home industry
	Accessory equipment structures	Management of unique biological areas
	Attached communication facilities on BPA towers	Water resources management facilities
		Storage of explosives, fuels and chemicals
		Accessory uses normally associated with an allowable use
		Public and private conservation areas or structures for retention of water, soil, open space, forest or wildlife resources
		Log sorting and storage areas, scaling stations, temporary crew quarters, forest industry storage and maintenance facilities
		Up to one individual single-family dwelling units used as the principal residence for the farm or forestry operator
		Family day care home
		Residential care facilities
		Farm labor housing
		Accessory equipment structures
		Attached communication facilities not located on BPA towers
Administrative Review Uses	Child mini-day care center (subject to 21.83.030)	Attached communication facilities not located on BPA towers
	Attached communication facilities not located on BPA towers (subject to 21.70.160)	Communication towers
	Communication towers	Co-location of communication towers
	Co-location of communication towers	
Conditional Uses	Recreational facilities	Single-family residences not in conjunction with forest or farm management
	Geothermal energy facilities	Recreational facilities
	Public displays	Semi-public facilities and utilities
	Professional services	Sawmills, shake and shingle mills, chippers, pole and log yards
	Surface mining	Geothermal energy facilities
	Cluster developments	Aircraft landing fields
	Semi-Public facilities	Cluster developments
	Small and large-scale recreational vehicle parks	Child mini-day care center
	Child day care center	Child day care center

Standards in SCC 21.~~40~~36.050 and 21.56.050 include limitations as to lot size, density, and setbacks; a 35-foot building height limit; off-street parking requirements; and prohibition of building location within easements. In the R-~~10~~ 5 zone, minimum lots size is ~~10~~ 5 acres with a maximum density of one single family dwelling unit per ~~10~~ 5 acres. Setbacks in this zone are as follows:

- Front Yard: 50 feet from the centerline of the public road right of way or ~~34~~ 35 feet from the centerline of a private road, or 20 feet from the front property line, whichever is greater
- Side Yard: 20 feet from all side property lines
- Rear Yard: 20 feet from the rear property line

In the For/Ag-20 zone, minimum lot size is 20 acres with each single-family dwelling unit requiring at least an acreage amount equal to the required minimum lot size. Setbacks in this zone are as follows:

- Front Yard: Same as R-~~10~~ 5 zone
- Side Yard: 25 feet from all side property lines
- Rear Yard: 25 feet from all rear property lines

As proposed, the project would meet all these requirements.

Washington's Forest Practices Act allows timber harvest and surface mining as part of commercial forest practices. The turbine corridor proposed within the For/AG-20~~ and R-10~~ zone~~s~~ would be visible from Mill A and Willard. However, they are no more incompatible with the surrounding area than other uses permitted in the County's zoning code (Table 4.2-2) and by Washington's Forest Practices Act. The project would in no way impair the use of any of the surrounding lands in accordance with applicable zoning codes and land use plans. The wind turbine generators also would be compatible with the other major electrical and communications systems already present in the project vicinity. Information contained in this Application, and the EIS to be prepared for the project, will fully consider the potential project impacts including visual impacts, noise, and impacts to wildlife.

b. Not materially endanger the health, safety, and welfare of the surrounding community to an extent greater than that associated with other permitted uses in the applicable zoning district;

Response: A Geotechnical Report has been prepared to analyze existing soil and subsurface conditions and to determine the appropriate foundation design (see Section 3.1 and Appendix A). Turbines are designed to meet industry standards in all wind conditions, including shutting down during certain wind conditions. The wind turbine corridors are proposed at a minimum distance of, 4,265 feet (0.8 mile) from any residences on R-2, R-5 or R-10 lands, and 2,000 to 2,560 feet (0.38–0.48 mile) from the nearest residence in the Scenic Area (Figure 4.1-1, Noise Level Contours).

Vegetation clearing around each proposed turbine corridor would allow for safe construction, and would reduce the potential for growing trees to interfere with the wind resource on the site during the commercial life of the project (at least 30 years). Typically, a permanently cleared area would extend 50 feet in all directions from each turbine. Between 50 feet and 150 feet from the base of the turbines, tree heights would be limited to 15 feet above the turbine base elevation. Extending from 150 feet to 500 feet from the base of the turbines, a tree-height restriction of 50 feet in height would be maintained for trees located within an area formed by a 90 degree angle centered on the prevailing wind direction (Figure 2.3-4, Turbine Timber Buffer).

In addition to the clearing around turbines, there would be a 50-vertical-foot limitation placed on trees along any overhead electrical cable corridors, or such other height as may be required by BPA. Where underground cables are not installed along existing roads, no trees would be planted within 5 feet from the centerline of the cable trenches.

Improvements to forest roads for construction and access would provide improved access for fire and other emergency response vehicles in an emergency situation. As documented in Section 4.1.1 Noise, the project would comply with Washington's applicable noise standards. As discussed in that Section and in Section 4.2.2 Light and Glare, no glare impacts are anticipated.

c. Not cause the pedestrian and vehicular traffic associated with the use to conflict with existing and anticipated traffic in the neighborhood to an extent greater than that associated with other permitted uses in the applicable zoning district;

Response: Access to the project area is provided via County roads that extend north from SR 14. From SR 14, access is provided via County roads (Cook-Underwood Road to ~~Kollock-Knapp~~Willard Road~~ onto Scoggins Road~~) and via a new connection to West Pit Road, an ~~network of~~ existing private logging road~~s~~. ~~The private logging roads are~~West Pit Road is on S.D.S. Co., LLC and Broughton Lumber Company property, and would provide access to most areas where project facilities are proposed.

Constructing the project would require 2.4 miles of new construction and ~~5.1~~5.4 miles of improvements to existing private logging roads outside the Scenic Area. All these improved and constructed roads would continue to be used during the project's operational phase.

Within the project area and its access roads, both pedestrian use and traffic volumes are currently very low, and would remain so during project construction and operation. During the 12-month construction period, an average of 143 workers would be employed. Peak work force would be 330 workers. Labor and equipment access would be via existing logging roads. Because the project is proposed on land that would remain in the commercial forest operator's ownership, the use of private forest roads for project construction would be easily coordinated to minimize impacts to forest operations.

When the project is operational, eight to nine permanent full-time and/or part-time employees are proposed as Operations and Maintenance staff. This number is similar to, or less than, staff numbers currently involved in on-going timber management.

Further information regarding the transportation impacts of the project is presented in Section 4.3 Transportation.

d. Be supported by adequate service facilities and would not adversely affect public services to the surrounding area;

Response: The construction period is anticipated to last 12 months and employ up to 330 workers. Not all workers would be on site during the same period. The work force at the site would average 143 workers per day, and peak at 265 workers. Because of the site's commuting proximity to the Vancouver, Washington and Portland, Oregon labor pools, it is not anticipated that there would much of a demand for temporary housing or school enrollment in the immediately-surrounding communities (Section 4.4, Socioeconomics). The construction management plan would include provisions for site security and on-site initial emergency response (see Section 2.16). Whistling Ridge Energy LLC would negotiate with existing service providers to ensure there would be adequate response from potential emergency service needs during the construction period.

A well and on-site septic system would be installed to provide potable water for the Operations and Maintenance facilities. The anticipated demand for fire and police services is estimated to be low, and similar to other commercial operations in the project vicinity (Section 4.4 Socioeconomics).

e. Not hinder or discourage the development of permitted uses on neighboring properties in the applicable zoning district as a result of the location, size or height of the buildings, structures, walls, or required fences or screening vegetation to a greater extent than other permitted uses in the applicable zoning district;

Response: All property immediately east of the project is owned by the Applicant and is in the UNM zone. There are no neighboring off-project properties located within the For/Ag-20 zone. Adjacent off-project lands to the north are located in Klickitat County and are under State ownership, managed by WDNR for timber production.

There are ~~seven~~ six properties adjacent to the west project boundary that are zoned R-10. Of these, only ~~three~~ two are owned by a person or entity other than the Applicant. Two are owned by the State and managed by WDNR~~, and one totaling 40 acres is in private ownership~~. All these neighboring properties are managed as commercial forest land with no residential structures. The nearest residence to the alternative Operations and Maintenance facility site is approximately 0.25 mile away. It is located in an area zoned R-10.

There are five adjacent off-project properties to the south located within the Scenic Area. These are primarily zoned GMA large-scale agricultural (GMA Ag-1) or commercial forest (GMA F-1). Of these five properties, only one totaling 29 acres is owned by someone other than the Applicant. The 29-acre parcel is primarily managed as forest and orchard lands with 1 acre used for residential purposes. The owners of this property have been vocal opponents of the proposed wind energy facility. They submitted a Scenic Area application, and received approval from Skamania County, to re-locate their existing home to within 50 feet of their north property line. This new location would bring the residence to within 2,000 feet of the closest proposed turbine corridor. Except for this parcel, all adjacent lands to the south are in commercial timber production.

Approximately ~~three~~ seven turbines are proposed within the For/Ag-20 zone~~, and approximately four are proposed in the R-10 zone~~ (those that require a conditional use permit). These turbines proposed in corridor A1-A7 would be in a somewhat isolated part of the For/Ag-20~~ and R-10~~ zone~~s~~. Washington's Forest Practices Act allows timber harvest and surface mining as part of commercial forest practices. Other uses permitted within the ~~R-10 and~~ For/Ag-20 zones are listed in Table 4.2-2.

The turbines in the corridor proposed in the ~~R-10 and~~ For/Ag-20 zone~~s~~ would be approximately 426 feet tall (measured to the blade tip). Their height and visibility would not hinder or discourage the development of any of the uses identified in Table 4.2-2. Impacts related to commercial resource production and harvesting are considered part of the existing working landscape. The proposed turbines would be taller than other structures permitted outright in the For/Ag-20 zone; however, they would be considerably quieter than other uses allowed in the zone, such as some forestry or surface mining operations. Except for areas to be cleared for the proposed project, regular timber harvest would continue within the project site.

Neighboring forest lands are subject to regular harvest, which is generally accomplished through clear cutting. After timber harvest, areas not converted to a non-forestry use must be re-planted within a time frame specified in Washington Forest Practices rules. Project retirement is likely to coincide with the regular harvest cycle on the project property. The project would in no way hinder the use or development of surrounding properties in accordance with existing land use planning and zoning. Further, the project would create an additional revenue stream for the Applicant, which would encourage continued use of the site for commercial timber harvest. Thus, the owner would be better able to weather timber industry economic down-cycles, and the project would create disincentives for potential conversion to other uses such as residential.

f. Not be in conflict with the goals and policies expressed in the current version of the County's comprehensive plan.

Response: See above for a detailed discussion of the project's relationship to, compliance with, Skamania County's 2007 Comprehensive Plan.

Skamania County Code, Title 21A, Critical Areas

Title 21A only applies outside the Scenic Area. It regulates development in areas identified by the Washington State Legislature in RCW 36.70A.060 as being critical to the ongoing health of the state's natural and built environment. These critical areas include:

- Wetlands
- Areas with a critical recharging effect on aquifers used for potable water
- Fish and wildlife habitat conservation areas

- Frequently flooded areas
- Geologically hazardous areas
- Ponds and lakes
- Streams, creeks, and rivers

The project is not located within any critical recharge areas, frequently flooded areas, ponds and lakes, or rivers. Portions of the project site would be located near geologically hazardous steep slopes classified as Class II and III Landslide Hazard Areas (See Section 2.15 for a detailed discussion of hazards). There are wetlands, fish and wildlife habitat conservation areas, streams, and creeks on the site[1].

No new construction would occur within wetlands, streams, or their buffers. The proposed access road, West Pit Road, crosses one unnamed drainage in the Lapham Creek watershed. This stream had observed flow through the existing culvert under West Pit Road at the time of the July 2009 field visit. However, the surface flow and the channel disappear downstream of the culvert.~~The planned improvements to existing roads that would occur inside the Scenic Area would cross one stream~~ (shown on Figure 3.3-1 Waterways in the Project Vicinity). This stream has no defined channel ~~and carries water only during runoff events~~downstream of the culvert. It is classified as a Class V stream under SCC 21A~~.04.020(B)~~ Appendix C. Buffers are established for Class V streams. However, expansion of existing uses is allowed within these water resource buffers. Development review would be required under SCC 21A.05 and SCC 21A.06 in Fish and Wildlife Protection Areas and Geologically Hazardous Areas in consultation with WDFW. However, existing roadways would be allowed without review so long as any expansion is 100% or less of the original footprint. The road improvements in these regulated fish and wildlife protection areas do not exceed the allowed expansion threshold. For a full discussion of fish, wildlife, their habitats, and project impacts to these, please see Section 3.4 Habitat, Vegetation, Fish and Wildlife.

In a letter to EFSEC, dated May 4, 2009, Karen Witherspoon, Skamania County Community Development Department Director, found that the proposed project is consistent with SCC Title 21A Critical Areas. A similar letter will be requested of the County to address the new access road and the alternative location for the Operations and Maintenance facility.

~~4.2.1.3 Relationship of Project Site Access Route to Existing Land Use Plans and Policies~~

~~Skamania County Code, Title 22, Columbia River Gorge National Scenic Area~~

~~The Project is proposed adjacent to the Scenic Area. Access to the site would be through the Scenic Area. The National Scenic Area Act expressly states: "*Nothing in Sections 544 to 544p of this title shall - *** establish protective perimeters or buffer zones around the scenic area or*~~

[1] The wetland on the project site results from a constructed impoundment according to National Wetland Inventory maps and so is not regulated locally as a critical area according to SCC Title 21A.04.020(A)(1)(b).

~~*each special management area. The fact that activities or uses inconsistent with the management directives for the scenic area or special management areas can be seen or heard from these areas shall not, of itself, preclude such activities or uses up to the boundaries of the scenic area or special management areas (16 USC § 544(o) Section 17(a)(10).*" Thus, siting the project up to the Scenic Area boundary is acceptable under the Act as approved by the United States Congress.~~

~~The Scenic Area is comprised of three land use classifications: GMAs, SMAs, and Urban Areas. SMAs, which contain the most sensitive resources, are managed by the US Forest Service. GMAs include a mixture of historic land uses such as farming, logging, residential, and cattle grazing. Development on GMA lands is administered by five of the six Gorge Counties and the Columbia River Gorge Commission. Both SMAs and GMAs are subject to local Scenic Area codes deemed consistent with the Scenic Area Management Plan by the Columbia River Gorge Commission and the US Secretary of Agriculture prior to adoption. In Skamania County, Scenic Area development regulations are codified in SCC Title 22.13. Urban Areas (including Cascade Locks, Hood River, Mosier, and The Dalles in Oregon, and North Bonneville, Stevenson, Carson, Home Valley, White Salmon, Bingen, Lyle, Dallesport, and Wishram in Washington) are exempt from Title 22 Scenic Area regulations.~~

~~The Act has two purposes (16 USC § 544(a) Section 3):~~

1. ~~*"To establish a national scenic area to protect and provide for the enhancement of the scenic, cultural, recreational, and natural resources of the Columbia River Gorge; and*~~
2. ~~*To protect and support the economy of the Columbia River Gorge area by encouraging growth to occur in existing urban areas and by allowing future economic development in a manner that is consistent with paragraph (1)", the Act's first purpose."*~~

~~The project would be located entirely outside the Scenic Area, not just in an exempt Urban Area. As a result, the project itself would not conflict with the Act's first purpose of protecting scenic, cultural, recreational, and natural resources in the Scenic Area.~~

~~Improvements to 2.1 miles of private road (CG2930) would be required to access the project. This road crosses lands that are in the GMA but outside the project boundary. These lands are zoned large-scale agriculture (GMA A-1) and commercial forest (GMA F-1). Improvement of the existing access road CG 2390 through the Scenic Area would fulfill the Act's second purpose by supporting the Columbia River Gorge economy in areas exempt from Scenic Area regulations. Further, the road improvements within the Scenic Area would be designed to comply with applicable provisions of SCC Title 22.~~

~~As indicated in Section 4.3 Transportation, the proposed CG2930 private road improvements would require a haul route agreement and negotiated road approach permit. These also would cover required improvements to four existing County right of way intersections in the Scenic Area GMA, which are described in detail in Section 4.3. Intersection improvements would be subject to review under Title 22.~~

GMA Ag-1 and F-1 Standards

The GMA Ag-1 zone does not impose further restrictions on road construction, reconstruction and modification (SCC 22.14.010). However, fire safety provisions (22.14.030(A)) and siting criteria (22.14.030(B)) apply to this review use in the GMA F-1 zone (SCC 22.14.030[E][1][h]).

Scenic Resource Protection Standards

GMA scenic resource protection provisions require the Administrator to make *"a determination of compatibility with the landscape setting based upon information submitted in the site plan (SCC 22.18.020[A][4])."* Landscape settings in the Scenic Area are *"designated on a map entitled 'Landscape Settings' adopted on October 15, 1991"* as part of the Management Plan for the Columbia River Gorge National Scenic Area (Management Plan) (SCC 22.18.040[A]). According to the Landscape Settings map, the proposed road improvements are located in the Coniferous Woodland landscape setting, which is governed by standards in SCC 22.18.040(C).

Additional scenic resource standards apply to new developments topographically visible from key viewing areas (KVAs) SCC 2.18.030. The Management Plan designates "important public roads, parks, and other vantage points providing public scenic viewing opportunities" as KVAs (GMA Policies Part I-1-6). Designated KVAs are listed in the Management Plan's glossary of terms (Glossary-11). The proposed road improvements would be potentially visible from the KVAs listed in Table 4.2-3.

Table 4.2-3
KVA Locations from Which the Road Improvement Area is Likely Visible

KVA	Length of KVA Segment from which Road CG2930 is Visible	Length of CG2930 Segment Visible from KVA
I-84, including rest stops	1.11 miles	236 ft
SR 14	1,333 ft	571 ft
Panorama Point Park	Not Applicable	1,395 ft
Dog Mountain Trail	468 ft	1.06 miles
Cook-Underwood Road	3,051 feet total from 3 segments of 1,256 feet, 1,144 feet, and 651 feet, respectively, from east to west	1.64

If a subject site is topographically visible from any KVA (see Figure 4.2-27, Key Viewing Areas and Recreational Facilities Within Approximately 25 Miles of the Site in Section 4.2.4.1), the Administrator would make findings of factors influencing potential visual impact (SCC 22.18.030[C][1]) and may apply conditions pertaining to siting, retention of existing vegetation, design, and new landscaping (SCC 22.18.030(C)(2) according to SCC 22.18.030(E) through SCC 22.18.030(I).

~~Existing vegetation would be retained to the maximum extent practicable along improved Scenic Area roadways, and any disturbed areas would be re-vegetated to maximize vegetative screening of the site from KVAs where topographic screening is not possible. It is likely that most, if not all, of the proposed road improvements would be fully screened from KVAs by a combination of existing and planted vegetation and topographic screening. Visual impacts are discussed in detail in Section 4.2.3.~~

~~Natural Resource Protection Standards~~

~~SCC 22.20.010 requires evaluation of all uses against the Practicable Alternatives Test, which is satisfied by the alternatives analysis in Section 2.19. Natural resource protection provisions in SCC 22.20 apply to all uses "in a water resource or its buffer" (22.20.020), review uses "within 1,000 feet of a sensitive wildlife area or site" (SCC 22.20.030), and review uses "within 1,000 feet of a sensitive plant" (SCC 22.20.040). Figure 3.3-1 Waterways in the Project Vicinity shows all water resources in the vicinity of the proposed Scenic Area road improvements. Figures included in Section 3.4 show sensitive wildlife areas and sites, and sensitive plants. The project crosses one water resource zone, but does not lie within 1,000 feet of sensitive wildlife areas or sites, or sensitive plants. SCC 22.20.020 applies, but SCC 22.20.030 through SCC 22.20.040 do not.~~

~~The existing CG2930 road in the Scenic Area crosses one seasonal stream located roughly in the middle of its length (Figure 3.3-1 Waterways in the Project Vicinity). This stream does not support any resident or anadromous fish species (Section 3.4). Expansion of existing roadways is allowed within water resource zones or their buffers so long as the Practicable Alternatives Test is satisfied and the proposed expansion does not exceed 100% of the original footprint or encroach further on the water resource or its buffer.~~

~~Cultural Resource Protection Standards~~

~~SCC 22.20 contains standards for cultural resource protection. According to SCC 22.22.010(A), all cultural resource information is confidential and exempt from public records requests according to § 6(a)(1)(A) of the Act. Cultural reconnaissance surveys are required and have been performed (see Section 4.2.5). All proposed uses must follow SCC 22.22.060 "when cultural resources are discovered during construction activities" and SCC 22.22.070 "when human remains are discovered during a cultural resource survey or during construction." These standards would be followed in the event of any such discovery.~~

~~Recreational Resource Protection Standards~~

~~SCC 22.24 applies only to resource-based recreation uses, development, and facilities. The proposed road improvements are not associated with any recreation uses, developments or facilities whether resource-based or not. Hence, SCC 22.24 does not apply.~~

~~4.2.1.4~~4.2.1.3 Relationship of State of Washington to Existing Land Use Policies and Plans

At the option of the Applicant, the siting of energy facilities such as Whistling Ridge Energy Project is regulated at the state level by EFSEC, under Chapter 80.50 RCW (Energy Facilities - Site Locations) and Title 463 WAC. Applicants for certification from EFSEC are required to submit detailed information on the proposed development and the impacts the development may have on the natural and built environments. The applicant is also required to describe the means to be utilized to minimize or mitigate possible adverse impacts on the physical or human environment (WAC 463-60-085). Further, the applicant is required to set forth insurance, bonding, or other arrangements proposed in order to mitigate for damage or loss to the environment (WAC 463-60-075). Whistling Ridge Energy LLC has requested the jurisdiction of EFSEC for the project.

Chapter 80.50 RCW operates to preempt all state and local matters relating to energy facility sites that are under the jurisdiction of EFSEC. Certification pursuant to Chapter 80.50 RCW is given in lieu of any permit, certificate, or similar document that might otherwise be required. Procedures to be followed by EFSEC in determining whether or not to recommend that the state pre-empt local land use plans or zoning ordinances for a site or portions of a site for an energy facility are set forth in WAC 463-28. In a letter to EFSEC, dated May 4, 2009, Karen Witherspoon, Skamania County Community Development Department Director, found that the proposed project is consistent with SCC Title 21 Zoning Code, SCC 21A Critical Areas, Title 24 Clearing and Grading, the Comprehensive Plan, and resource maps.~~The Applicant anticipates that the project would be consistent with applicable local land use plans, zoning ordinances, and other local development regulations.~~ A similar letter will be requested from the County addressing the West Pit Road for project access and the alternative location for the Operations and Maintenance facility. To the extent the application may be inconsistent with local land use plans, zoning ordinances, and other local development regulations, the Council has the statutory authority to recommend that the Governor exercise preemption. The Applicant does not anticipate such action in these proceedings.

~~4.2.1.5~~4.2.1.4 Mitigation Measures

No impacts to land use are anticipated, and no mitigation measures are required.

See Sections 2.15 Protection from Natural Hazards, 3.2 Air Quality, 3.3 Water, and 3.6 Energy and Natural Resources for a description of the measures included in the project design to ensure the proper management of the natural environment.

See Sections 2.7 Characteristics of Aquatic Discharge Systems, 2.15 Protection from Natural Hazards, 3.3 Water, 3.4 Habitat, Vegetation, Fish and Wildlife, and 3.5 Wetlands for a description of the measures included in the project design to enhance water quality and protect environmentally sensitive areas.

See Sections 2.15 Protection from Natural Hazards and 3.1 Earth for a description of the measures included in the project design to minimize the loss of life and property from landslides, seismic, volcanic, or other naturally occurring events, and minimize or eliminate land use impacts on geologically hazardous areas.

See Sections 3.3 Water, 3.4 Habitat, Vegetation, Fish and Wildlife, and 3.5 Wetlands for a description of the measures included in the project design to protect fish and wildlife habitats.

4.2.2 LIGHT AND GLARE

4.2.2.1 Existing Environment

Ambient Light Levels

At present, the project site and surrounding area are relatively dark at night with low levels of ambient lighting. Primary light sources are from the small residential areas nearby and ambient light from cities and towns and industry along the Columbia River Gorge. The major sources of light come from outdoor lights at the residential properties and headlights on the surrounding roads. These are considered minor light sources because of their low density.

Glare

Currently no reflective objects or facilities exist in the project area that could provide a source for glare. Occasional timber harvest activities such as truck movement and potential helicopter harvest could be considered a source for glare. Beyond these activities no other manufactured sources of glare exist within the project area.

Shadow Flicker

The existing changes in light intensity in the project area consist of movement of the sun through the trees and other vertical land forms. This light reflects and changes in intensity as the sun moves to differing quadrants, which are seasonally different and are considered slow in movement and intensity. Beyond these changes in light intensity from natural sources, no shadow flicker exists in the area.

4.2.2.2 Impacts to Ambient Light Levels

Construction

Most construction would occur during daylight hours; however, minimal lighting would be used on the site at night for safety purposes. Impacts would be negligible or minimal and construction or short-term related.

Operation

In response to the FAA aviation safety lighting requirements, the wind turbines must be marked with lights for nighttime lighting. Under recently released guidelines, the FAA no longer requires daytime lighting of the turbines if the turbines are painted a non-reflective flat neutral gray or light color. Whistling Ridge Energy LLC is proposing to paint the turbines a non-reflective flat neutral gray or light color, and is not proposing to install white daytime aviation warning lights unless required by FAA as part of the No Hazard Determination.

Nighttime lighting would be limited to the minimum allowed by the FAA, which would likely consist of two lights on the first and last turbine of every string, and two lights on turbines located every 1,000 to 1,400 feet between the ends of the strings (Patterson 2005). The number of red nighttime aviation warning lights would consist of approximately 24 lights based on these parameters. The flashing red lights would add a new visual element into the project area's nighttime landscape. The flashing red lights would be most noticeable within one mile of the project and would be visible at night from residential properties in these areas, including some residents on or near the hillside east of the site, and some residents across the Columbia River in Oregon.

Other project facilities that would require outdoor lighting at night for operational safety and security include the proposed Operations and Maintenance facility and substations. These facilities would create sources of light in areas where there is no nighttime lighting other than vehicle headlights and would contribute to the overall increase of nighttime illumination in the project area. Sensors and switches would be used to keep lights turned off when lighting would not be required. All lights would be hooded and directed to minimize backscatter and illumination of areas outside the Operations and Maintenance area and the substation sites.

The facility is expected to make a slight contribution to overall ambient light levels in the immediate vicinity, which would constitute a minimal change to residents within one mile of the site.

4.2.2.3 Impacts from Glare

Construction

Most construction would occur during daylight hours, minimizing construction lighting at during hours of darkness. With the proposed daytime construction hours, and the relative remoteness of the project site, glare impacts during construction are not anticipated.

Operation

As a safety requirement, the Operations and Maintenance building would be illuminated at night. Because the building is located away from commercial or residential development, and there are few neighboring properties, light and glare impacts on are expected to be negligible.

During the day, potential glare impacts would be minimal because of the planned use of non-reflective earth-tone/light paint colors on exterior building or facility surfaces. There would be no anticipated glare impacts to vehicular drivers using I-84, SR 141, SR 14, or local access roads.

Proposed mitigation measures are outlined in Section 4.2.2.5. These measures include restricting lighting at the Operations and Maintenance facilities and substation to the minimal required lighting, and assuring that all lighting is appropriately hooded and directed downward into the areas where it is needed. With these measures in place, the potential for the buildings to create skyglow or backscatter would be limited and considered a negligible impact.

4.2.2.4 Impacts from Shadow Flicker

Construction

No shadow flicker impacts are expected to occur during construction.

Operation

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity as the moving blade casts shadows on the ground and objects (including windows at residences). Analyses previously conducted at other wind energy facilities approved by EFSEC (Kittitas Valley Wind Power Project and the Wild Horse Wind Power Project) examined the potential effects of shadow flicker for residents near the proposed projects and recommended certain measures for minimizing these effects. However, due to the significant distance of the project to residences, shadow flicker is not anticipated to be noticeable for this project.

Shadow flicker, or strobe imparts, can only occur if the location of the turbine is close to a receptor that is in a position where the blades interfere with very low-angle sunlight. As the Council found in the Kittitas Valley Wind Power Project, as the distance between the wind turbine generators and residences increases, the perception of shadow flicker decreases or attenuates. The impact of shadow flicker at a particular residence depends on the location of the residence and the position of features of the home (e.g., windows) in relation to the wind turbines. At a distance beyond 2,500 feet, shadow flicker is considered to be imperceptible. The project is not expected to result in any shadow flicker effects due to the distance of more than 2,500 feet to the nearest existing residence (Figure 4.1-1 Noise Level Contours shows locations of closest residences.) This distance is beyond the distance of which shadow flicker can cause an impact. Moreover, the topography of the project site in relation to the existing residences, orientation of residences, and the tree cover between residences and the wind turbine generators are expected to further eliminate any risk of perception of shadow flicker. Even if shadow flicker were a proven impact (as the Council found in the Kittitas Valley Wind Power Project case) for proven significant impacts, operational controls can be implemented to completely eliminate this perceived impact.

4.2.2.5 Mitigation Measures

Mitigation measures for light and glare would be as follows:

- Most construction would occur during daylight hours, minimizing construction lighting at during hours of darkness
- Turbines and blades would be painted with a non-reflective gray finish to blend in with the background, and to eliminate the need for white daytime aviation warning lights
- To prevent glare, non-reflective earth-tone/light paint colors would be used on exterior surfaces of buildings or other facilities
- The facility lights outside the Operations and Maintenance area and the substation sites would be hooded and directed downward to minimize backscatter and illumination of off-site areas
- Lights would be the minimum wattage required for safety
- Sensors and switches would be used to keep lights turned off when lighting is not required

See Section 4.2.3.4 for a discussion of recommended mitigation measures for visual impacts.

4.2.3 AESTHETICS

This section describes the existing visual environment in and around the project area. It assesses the potential for visual impacts using accepted methods of evaluating visual landscape quality and predicts the type and degree of changes the project would likely have on the sensitivity of those attributes. Additionally, this project would incorporate previous project lessons and experience including design principles and the latest aesthetic design refinements. This section also identifies mitigation measures designed to minimize those impacts.

Each landscape has a specific quality that gives a geographic area its visual and cultural image, and consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. An existing landscape character may range from a predominantly natural landscape to landscapes that are heavily culturally influenced. The existing scenic quality of an existing landscape includes the natural scenic attributes of the landscape in combination with the existing land use patterns. The list of attributes includes naturally evolving, natural appearing, pastoral, agricultural, or even urban landscapes and generally are at the broadscape or landscape level of the analysis but can be analyzed for each specific viewpoint at a project level.

The sensitivity of a landscape or view of that landscape is based on the scenic integrity of the landscape and the types of viewers. A landscape that has a high degree of integrity is a landscape that has a sense of wholeness, intactness, or being complete. Its scenic quality is near-perfect, with no evident discordant elements or deviations from the existing character, making it highly sensitive to most changes and to the perceptions of the viewer types.

The consideration of the alteration of the landscape by the introduction of wind turbines, and the visual impacts of wind turbines on the landscape is a complex issue, and factors other than the attributes described above play a major role in the observer's reaction or perception of the visual impacts or change. Moreover, in an era when Washington and the United States are mobilizing to address the perils of climate change, the aesthetic impacts of renewable energy raises critical policy issues of statewide and national significance.

Surveys have been taken of viewers of existing wind projects. The findings showed that some viewers had a positive reaction in that they saw wind projects as a progressive step in fighting climate change. Those who had a negative reaction were more concerned with the localized perceived visual "clutter" and "unattractiveness" of the facilities on any landscape (Thayer and Freeman 1987). Understanding the types of viewers in, around, and through the project area is important in making sure that these types of perceptions are considered in the visual sensitivity assessment for this project. This analysis establishes an analytical framework and data for evaluation of the Application. It does not come to the conclusions of environmental impact or the balancing of environmental and policy considerations that are inherent in the SEPA process. How these perceptions and impacts are addressed and balanced against competing policy issues is ultimately an issue for the Siting Council and the Governor.

4.2.3.1 Methodology

The visual impact assessment used the Scenery Management System defined in *Landscape Aesthetics, A Handbook for Scenery Management* (USFS 1995) and *Visual Impact Assessment for Highway Projects* (FHWA 1988). The study is also designed to respond to the provisions of WAC 463-42-362, Built Environment – Land and Shoreline Use, which specify the analysis of aesthetic and light and glare issues as part of the EFSEC process.

The analysis of the visual effects of changes that might occur with implementation of the proposed wind energy facility is based on field observations and review of wind energy facilities visual effects, public perception, design measures to reduce visual impacts, and local planning documents. Additionally, project maps, drawings, technical data, and computer generated maps provide an assessment of areas where the project would be visible and generated visual simulations representing the contrast from the existing conditions if the project is implemented. The analysis includes systematic documentation of the visual setting, evaluation of visual changes associated, and measures designed to mitigate the visual effects. These measures include restoration or enhancement activities to areas that have been disturbed during construction.

Scenic Quality Assessment

To assess the scenic quality of the landscapes potentially affected by the proposed project, the analyses of views toward the project site from selected viewpoints includes an overall rating of the scenic quality prevailing in the existing views. Scenic quality ratings were developed based on observations in the field, photographs of the affected area, methods for assessment of visual quality, and research on public perceptions of the environment and scenic quality ratings of landscape scenes. The final assessment of scenic quality was made based on professional judgment that took a broad spectrum of factors into consideration, including:

- Natural features, including topography, watercourses, rock outcrops, and vegetation
- The positive and negative effects of human alterations and built structures on visual quality
- Visual composition, including an assessment of the vividness, intactness, and unity of patterns in the landscape, defined as follows:
    - Vividness refers to the memorability of the visual impression received by the viewer from contrasting landscape elements as they combine to form a striking and distinctive visual pattern
    - Intactness is the integrity of visual order in the natural and human landscape, and the extent to which the landscape is free from visual encroachment
    - Unity is the degree to which the visual resources of the landscape join together to form a coherent and harmonious visual pattern

Each viewpoint was assigned a final rating based on the rating scale shown in Table 4.2-4. This rating scale incorporates landscape assessment concepts developed by USFS and U.S. Department of Transportation.

Table 4.2-4
Landscape Scenic Quality Scale

Rating	Explanation
Outstanding Visual Quality 6	A rating reserved for landscapes with exceptionally high visual quality. These landscapes are significant nationally or regionally. They usually contain exceptional natural or cultural features that contribute to this rating. They are what we think of as “picture postcard” landscapes. People are attracted to these landscapes to view them.
High Visual Quality 5	Landscapes that have high quality scenic value. This may be due to cultural or natural features contained in the landscape or to the arrangement of spaces contained in the landscape that causes the landscape to be visually interesting or a particularly comfortable place for people. These landscapes have high levels of vividness, unity, and intactness.
Moderately High Visual Quality 4	Landscapes that have above average scenic value but are not of high scenic value. The scenic value of these landscapes may be due to human or natural features contained within the landscape, to the arrangement of spaces in the landscape, or to the two-dimensional attributes of the landscape. Levels of vividness, unity, and intactness are moderate to high.
Moderate Visual Quality 3	Landscapes that are common or typical landscapes with average scenic value. They usually lack significant human or natural features. Their scenic value primarily results from the arrangement of spaces contained in the landscape and the two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are average.
Moderately Low Visual Quality 2	Landscapes that have below average scenic value but not low scenic value. They may contain visually discordant human alterations, but these features do not dominate the landscape. They often lack spaces that people perceive as inviting and provide little interest in terms of two-dimensional visual attributes of the landscape.
Low Visual Quality 1	Landscapes that have below average scenic value. They may contain visually discordant human alterations, and often provide little interest in terms of two-dimensional visual attributes of the landscape. Levels of vividness unity, and intactness are below average.

Source: Buhyoff et al. (1994), FHWA (1988), and USFS (1995)

Visual Sensitivity Assessment

Assessing visual sensitivity involves predicting the general impact on the quality of views from a given viewpoint. A combination of three factors determines how sensitive a landscape scene is:

- The number and type of viewers
- The viewing conditions
- The quality of the view

Residential areas with unobstructed views of a regionally important and memorable scene would be very sensitive to objects or structures that would impede views. A view from a seldom-traveled rural road where motorists have only distant, oblique views of wind turbines in an unremarkable setting would likely qualify as an area of low sensitivity.

The principal types of viewers in the project area who have predictably high levels of sensitivity to visual impacts include:

- Resident viewers
- Roadway viewers (drivers and passengers)
- Recreating viewers such as hikers, water recreationists, and mountain bikers

This analysis of visual sensitivity defines three levels as follows:

- ***Low 1.*** Viewer types representing low visual sensitivity include agricultural and industrial/warehouse workers. Compared with other viewer types, the number of viewers is generally considered small and the duration of view is short. Low levels of sensitivity are assigned to areas 5 miles or more from the closest turbine, where a wind power project would be a distant and a relatively minor element in the overall landscape.

- ***Moderate 2.*** Viewer types representing moderate visual sensitivity consist of highway and local travelers. The number of viewers varies depending on location; however, on average they tend to be moderately large, based on overall densities of surrounding areas and highway commuters. Viewer awareness and sensitivity are also considered moderate because destination travelers often have a focused orientation. Moderate levels of sensitivity were assigned to areas where turbines would be visible from 0.5 mile to 5 miles within the primary view of residences and roadways. The primary view refers to the central area that the eye can see clearly without moving and is surrounded by the peripheral vision. In distinguishing between moderate and low levels of sensitivity in the 0.5-mile to 5-mile zone, contextual factors were also considered, including the viewing conditions in the immediate foreground of the view.

- ***High 3.*** Residential, recreational, and viewers congregating in public gathering places (churches, schools, trails, etc.) are considered to have comparatively high visual sensitivity. The visual setting may in part contribute to the enjoyment of the experience. Views may be of long duration and high frequency. High levels of sensitivity are generally assigned in those cases where turbines would be potentially visible within 0.5 mile or less from residential properties, heavily traveled roadways, or heavily used recreational facilities.

These criteria were used to establish the sensitivity levels of each view using a systematic approach based on the distance of the project from the viewpoint, the number of turbines or percentage of the project area that could be viewed from this viewpoint, and the dominant viewer types for each view. Through this process, an overall sensitivity rating was established for each existing landscape view.

Preparation of Visual Simulations

The visual simulations were developed using photographs taken with a 35 mm digital SLR camera. Various focal lengths from 40 to 70 mm were used with the intent to capture the maximum pixels and resolution for the simulation. Visual Nature Studio, widely used 3D GIS software, was used to model the turbine locations on terrain built from USGS digital elevation model data. The photo locations were camera matched in the software to render the turbines from the same viewpoint as the photographs taken on the ground. The resulting rendered turbine images were then photo composited into the photographs to create the simulations. Existing topographic and site data provided the basis for developing the initial digital model.

Site plans and digital data for the proposed wind turbines were used to create three-dimensional digital models of the planned turbine placements. These models were combined with the digital terrain model to produce a complete computer model of the wind farm. For each viewpoint, a render camera was placed in the Visual Nature Studio software. The aspect ratio of each render was then matched to the corresponding photograph and the rendered terrain was visually matched to the photographed terrain to confirm scale. Finally the resulting turbine images are matched in perspective, scale, and aspect ratio, are photo composited into the original digital photo base using Adobe Photoshop. This process produces accurate portrayals of how the given turbine models and placements would look on the given terrain and from the specified viewpoints after construction. Seasonal conditions including weather, air quality, vegetation (foreground and background) and color impact the quality of the compositions. These compositions are a representative example of the area without subjectivity.

4.2.3.2 Existing Environment

The existing visual resources are the natural and built features open to view in the project landscape. The combination of land, water, and vegetation patterns represent the natural landscape features that define an area's visual character, while built features such as buildings, roads, and other structures reflect human or cultural modifications to the landscape. These natural and built landscape features or visual resources contribute to the public's experience and appreciation of the environment. This section describes the broad scale regional and local landscape settings that were used to establish appropriate viewpoints from which the project would be visible.

Regional Landscape Setting

The project is set in two distinct landscapes. One landscape is the areas were the turbines would be sited along ridges located on the northern plateau of the Columbia River Gorge on Underwood Mountain (Figure 2.1-1 Location of Proposed Whistling Ridge Energy Project). The other landscape is the Columbia River Gorge National Scenic Area which is outside the project but within the viewshed looking into the project area.

The Scenic Area extends 85 miles along the Columbia River, and includes portions of three Oregon and three Washington counties. Formed by ancient volcanoes and sculpted by floods, the Columbia River Gorge carves a corridor through the Cascade Mountains in Oregon and Washington as the river journeys to the Pacific Ocean.

The National Scenic Area Act designated for special protection 292,500 acres on both sides of the Columbia River from the outskirts of Portland-Vancouver in the west to the semi-arid regions of Wasco and Klickitat counties in the east. The Scenic Area is categorized into three areas: SMAs, GMAs, and Urban Areas:

- SMAs, which contain the most sensitive resources, total 114,600 acres and are managed by the USFS.

- GMAs, with 149,400 acres, include a mixture of historic land uses such as farming, logging, and cattle grazing. The Columbia River itself is currently designated as a GMA as well. Development on GMA lands is administered by the Gorge Counties and the Gorge Commission.

- Thirteen Urban Areas in the Gorge are exempt from any Scenic Area regulations: Cascade Locks, Hood River, Mosier, and The Dalles in Oregon, and North Bonneville, Stevenson, Carson, Home Valley, White Salmon, Bingen, Lyle, Dallesport, and Wishram in Washington. The Act's second purpose is to protect and support the economy of the Gorge by encouraging growth in existing Urban Areas and by allowing future economic development in a manner that is consistent with protection and enhancement of resources.

The project area is outside of the Gorge Plan and no visual quality objectives or management designations have been established for the area. Areas south of the project within the Scenic Area are designated as Urban or GMA. The views from the Gorge into the project area were examined through viewpoint selection. This area of the Gorge, closest to the project, is considered to have a high visual quality with a moderate sensitivity based on the vividly memorable, and although the area is not free of visual encroachment, the visual resources join together with a moderate degree of unity.

Local Landscape Setting

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 stands of trees on the sections of land that would have turbines on them are recently harvested and reforested. S.D.S. Co., LLC and Broughton Lumber Company implemented timber harvest plans on approximately 50 acres during 2003. Additional harvests covering approximately 100 acres are planned.

In areas that have not been recently harvested or that are not planned to be harvested before project construction surrounding the proposed wind turbines, trees would be harvested and most of the land would be replanted with seedlings. This clearing would allow for safe construction, and would reduce the potential for tree growth to interfere with the wind resource on the site during the commercial life of the project.

No visual quality objectives have been established in the project area beyond the harvest size and configuration requirements of the Washington Forest Practices Act. These cleared areas are considered a "forest conversion" under the Forest Practices Act and have no established visual quality objectives. These openings, to the extent feasible, would be reforested in accordance with typical commercial forestry management practices.

S.D.S. Co., LLC and Broughton Lumber Company own this commercial property in Skamania County, Washington. While the project is not located inside the Scenic Area, the access road for the proposed site is located in the Scenic Area. The Scenic Area requirements are addressed in Sections 2.20 and 4.2.1. In relationship to the visual quality of the area, there are views from the Scenic Area into the project area. The viewpoints and viewer types in relation to the roadway improvements within the Scenic Area have been considered in this analysis for consistency with the Scenic Area guidance and conformance.

SR 14 in this area is a recognized scenic roadway. Typically, this designation means that a scenic corridor management plan would be prepared to provide policy-level guidance in the local adoption of comprehensive plan policies, zoning, and other land use regulation. There is no scenic corridor management plan for SR 14 and, therefore, no regulatory control of aesthetic impacts within the corridor. However, the scenic roadway designation carries an additional level of care and scrutiny in the review of potential aesthetic impacts based on recognition, but not regulation.

The local landscape visual appearance is of moderate visual quality with a moderate level of sensitivity. The levels of vividness (memorable), intactness (free from visual encroachment), and unity are average within the broader landscape.

Viewpoints

To analyze the project's effects on visual resources, viewpoints were selected to characterize the aesthetic character of the project area and the differing landscapes in or near the project. The existing views from these viewpoints are described below and illustrated with photographs.

Most of the viewpoints are at publicly accessible locations where most people would view the project. Individual viewpoints were chosen as being the most representative views for the different roads, population areas, and recreation areas where views of the wind turbines would occur. Figure 4.2-5 Locations of Simulation Viewpoints shows the locations of these viewpoints from outside and within the project area, and the distance and visible turbines from each viewpoint. Because the focus is on locations that are publicly accessible and would have the largest number of viewers (including residences), not every residential location has been studied. Residences from 5 miles to 1 mile of the project site are depicted on Figure 4.1-1.

Each viewpoint was assessed using the methodology described in Section 4.2.3.1, Methodology, as well as for its scenic quality and viewer sensitivity, and a rating was applied to provide an overall average for the area. This process established the existing conditions for each of the individual viewpoints from which the visual contrast or impacts of the project on these parameters could be measured. Viewpoints 6 and 9 were eliminated from additional analysis due to changes in the distribution of the turbine strings and inability to view the project from these viewpoints. Viewpoint simulations can be found on Figures 4.2-6 to 4.2-26.

Pucker Huddle - Viewpoint 1 – Figure 4.2-6

Scenic Quality

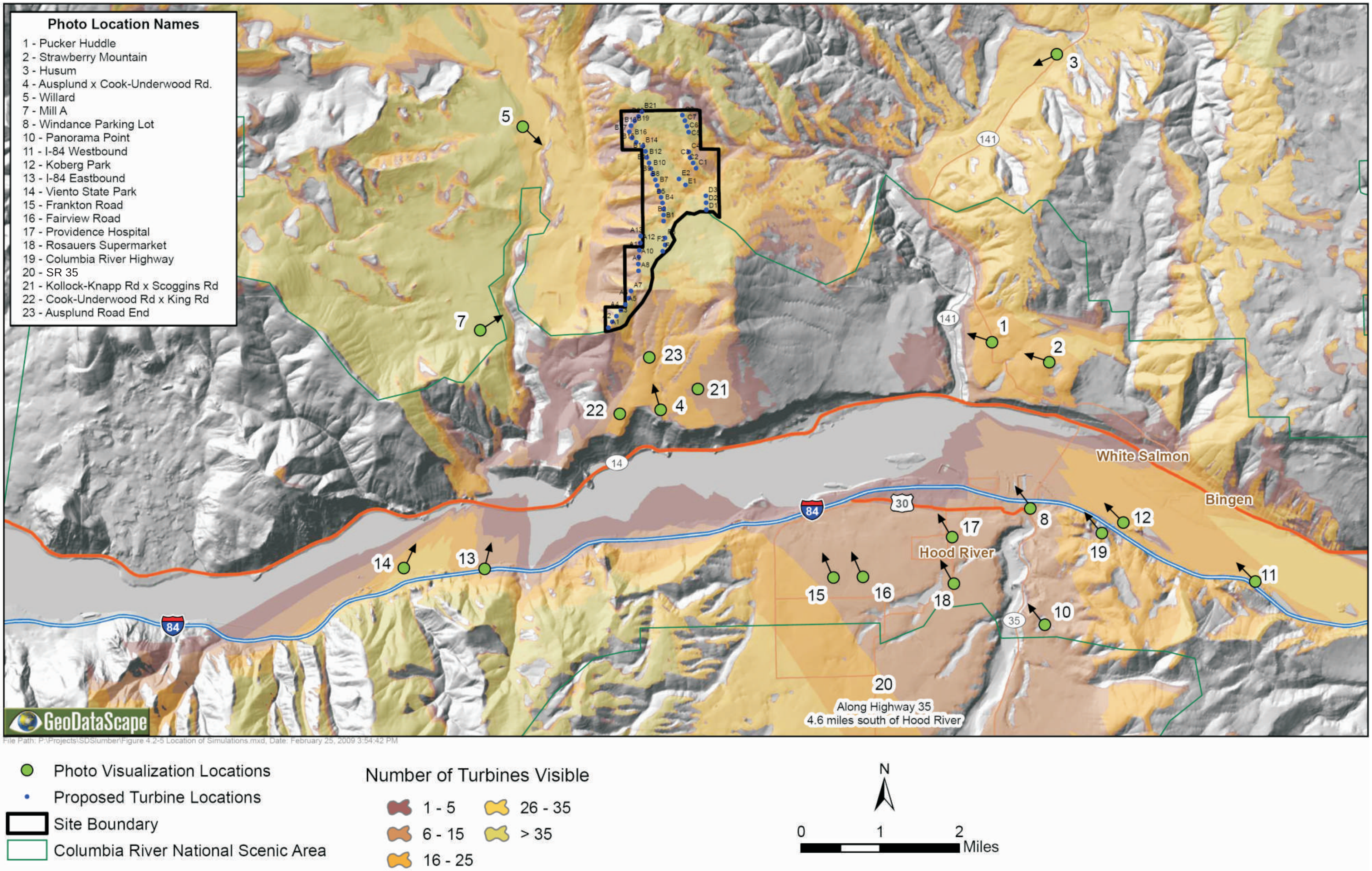
Viewpoint 1 is taken from SR 141, which is approximately 4 miles from the project and is a small connector providing access to the Indian Heaven Wilderness in the Gifford Pinchot National Forest. This highway also allows access to several rural communities including White Salmon, Husum, and Pucker Huddle. Most areas are unincorporated and several of the residences are recreational in nature with some year-round residences. As discussed in the review of the regional and local landscapes, no public roads pass through or are immediately adjacent to the project. Viewpoint 1 is a wide panoramic view of Underwood Mountain from SR 141 adjacent to the Pucker Huddle area.

The view encompasses the east side of the project area and the ridged lines of forest management areas are visible in the middleground of the viewshed. Natural openings are prevalent from this viewpoint with several natural appearing features of openings and vegetation that provide an interesting view. The BPA transmission lines bisecting the project area on the north and south ends can be seen from this viewpoint. The quality of the views from this viewpoint along SR 141 was rated as moderate, reflecting the fact that the landscape visible is relatively common in the region and has average scenic value. The ridge line along Underwood Mountain, which is in the area of the project, provides a degree of topographic interest when viewed with the other natural appearing features. The landscape visual scenic quality from this viewpoint is moderate.

Viewer Sensitivity

Traffic volumes along SR 141 are minimal and used for local traffic and recreating traffic in the summer months. Considering the distance of the project from this viewpoint (less than 5 miles), the minimal use of the highway, and the portion of the project that is visible from the viewpoint, the level of view sensitivity is considered low. This is based on the duration of the view from SR 141 and the low level of residential viewers from this viewpoint and the scenic quality rating.

33758687_20.cdr



Source: GeoDataScape.

Job No. 33758687

Figure 4.2-5

Locations of Simulation Viewpoints

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_21.cdr

Photo Date/Time:
8/8/2007 2:15 PM

Focal Length:
70

Camera Direction:
WNW

Visible Turbines:
B11-B15, B20, C1-C5
D1-D3, E1-E2

Source: GeoDataScape.

Job No. 33758687

URS

Figure 4.2-6

Viewpoint 1 - Pucker Huddle

Whistling Ridge Energy Project
Skamania County, Washington

33758687_22.cdr

Photo Date/Time:
8/8/2007 2:24 PM

Focal Length:
67

Camera Direction:
WNW

Visible Turbines:
B5-B16, B20, C1-C5, D1-D3, E1-E2

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-7

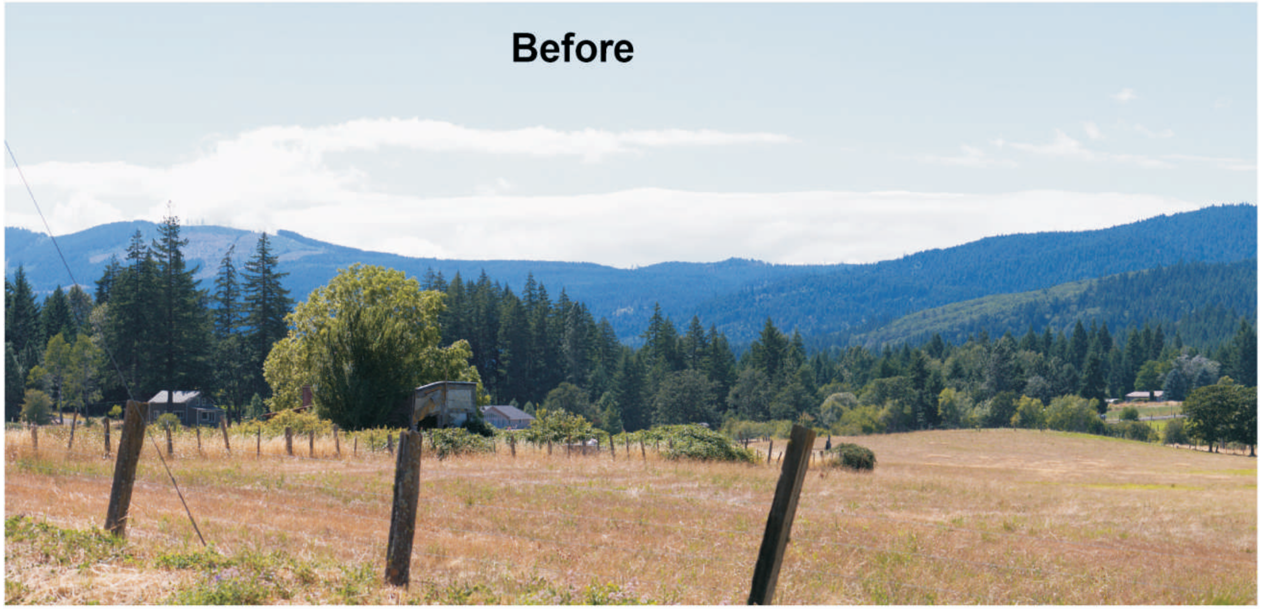
Viewpoint 2 - Strawberry Mountain

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_23.cdr

Before



After

Photo Date/Time:
8/8/2007 2:41 PM

Focal Length:
68

Camera Direction:
WSW

Visible Turbines:
B1-B16, C1-C5, D1-D3, E1-E2, F2-F3

Source: GeoDataScape.

Job No. 33758687

URS

Figure 4.2-8

Viewpoint 3 - Husum

Whistling Ridge Energy Project
Skamania County, Washington

33758687_24.cdr

Photo Date/Time:
8/8/2007 3:05 PM

Focal Length:
70

Camera Direction:
NNW

Visible Turbines:
A1-A13, F1-F3

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-9

Viewpoint 4 - Ausplund Road and Cook-Underwood Road

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_25.cdr

Before

After

Photo Date/Time:
8/8/2007 2:15 PM

Focal Length:
70

Camera Direction:
WNW

Visible Turbines:
B11-B15, B20, C1-C5, D1-D3, E1-E2

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-10

Viewpoint 5 - Willard

URS

Whistling Ridge Energy Project
Skamania County, Washington

Photo Date/Time:
8/8/2007 3:43 PM

Focal Length:
67

Camera Direction:
ENE

Visible Turbines:
A1-A13, B1-B16, B20,
E1-E2, F1-F3

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-11
Viewpoint 7 - Mill A

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_27.cdr

Photo Date/Time:
5/27/2007 5:32 PM

Focal Length:
50

Camera Direction:
WNW

Visible Turbines:
A1-A13, B1-B16, B20, E1-E2, F1-F3

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-12

Viewpoint 8 - Windance

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_28.cdr

Photo Date/Time:
8/8/2007 5:27 PM

Focal Length:
50

Camera Direction:
NW

Visible Turbines:
A1-A7, C2-C5

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-13

Viewpoint 10 - Panorama Point

URS

Whistling Ridge Energy Project
Skamania County, Washington

Photo Date/Time:
8/8/2007 5:52 PM

Focal Length:
55

Camera Direction:
WNW

Visible Turbines:
B9-B16, B20, C1-C5, D1-D3, E1-E2

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-14

Viewpoint 11 - I-84 Westbound

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_33.cdr

Photo Date/Time:
8/8/2007 6:58 PM

Focal Length:
70

Camera Direction:
WNW

Visible Turbines:
B10-B16, B20, C1-C5, D1-D3, E1-E2

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-15

Viewpoint 12 - Koberg Beach State Park

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_34.cdr

Photo Date/Time:
8/8/2007 7:15 PM

Focal Length:
60

Camera Direction:
NNE

Visible Turbines:
A1-A5, B15-B16

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-16

Viewpoint 13 - I-84 Eastbound

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_35.cdr

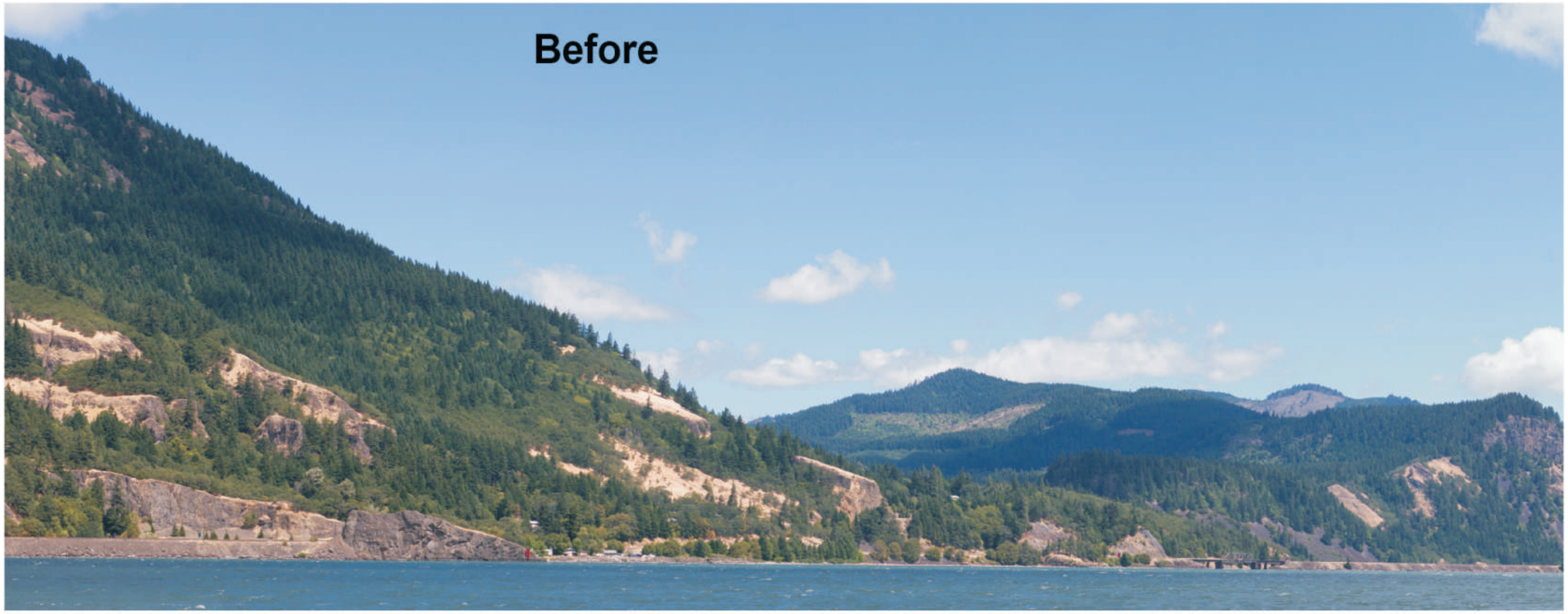


Photo Date/Time:
8/8/2007 13:33 PM

Focal Length:
64

Camera Direction:
NE

Visible Turbines:
A1-A13, B1-B9

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-17

Viewpoint 14 - Viento State Park

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_36.cdr

Photo Date/Time:
9/12/2007 8:31 AM

Focal Length:
50

Camera Direction:
NNW

Visible Turbines:
A1-A10

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-18

Viewpoint 15 - Frankton Road

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_37.cdr

Photo Date/Time:
9/12/2007 8:28 AM

Focal Length:
50

Camera Direction:
NNW

Visible Turbines:
A1-A8

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-19

Viewpoint 16 - Fairview Road

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_38.cdr

Before

After

Photo Date/Time:
5/27/2008 5:19 PM

Focal Length:
51

Camera Direction:
NW

Visible Turbines:
A4-A5

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-20

Viewpoint 17 - Providence Hospital

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_39.cdr

Photo Date/Time:
5/27/2008 5:06 PM

Focal Length:
50

Camera Direction:
NW

Visible Turbines:
A5-A7

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-21

Viewpoint 18 - Rosauers

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_40.cdr

Photo Date/Time:
5/27/2008 3:49 PM

Focal Length:
40

Camera Direction:
WNW

Visible Turbines:
B16-B17, C1-C5, D1-D3

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-22

Viewpoint 19 - Columbia River Highway

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_41.cdr

Photo Date/Time:
5/27/2008 4:12 PM

Focal Length:
40

Camera Direction:
NNW

Visible Turbines:
A1-A13, F1-F3

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-23

Viewpoint 20 - State Route 35

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_42.cdr

Photo Date/Time:
9/10/2008 1:32 PM

Focal Length:
48

Camera Direction:
NW

Visible Turbines:
A1-A3

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-24

Viewpoint 21 - Kollock-Knapp and Scoggins Road

URS

Whistling Ridge Energy Project
Skamania County, Washington

Photo Date/Time:
9/10/2008 2:12 PM

Focal Length:
48

Camera Direction:
N

Visible Turbines:
A1-A8

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-25

Viewpoint 22 - Cook-Underwood and King Road

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_44.cdr

Photo Date/Time:
9/10/2008 1:59 PM

Focal Length:
34

Camera Direction:
NNW

Visible Turbines:
A1-A7

Source: GeoDataScape.

Job No. 33758687

Figure 4.2-26

Viewpoint 23 - Ausplund Road End

URS

Whistling Ridge Energy Project
Skamania County, Washington

Strawberry Mountain- Viewpoint 2 – Figure 4.2-7

Scenic Quality

Viewpoint 2 is an elevated view of the project from Strawberry Mountain east of the project area. The viewpoint encompasses the view that many of the residence would see from an elevated position above SR 141. This view is similar to Viewpoint 1 except that the man-made lines and features from forest management and power transmission are more prevalent. Several natural appearing features, including openings and vegetation, provide an interesting view in the middle ground with Underwood Mountain in the background. The quality of the views from this viewpoint above SR 141 was rated as moderate, reflecting the fact that the landscape visible is relatively common in the region and has average scenic value.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles) and the portion of the project that is visible from the viewpoint, the viewer types (residential/ recreational), and the scenic quality rating, the level of visual sensitivity is considered moderate.

Husum - Viewpoint 3 – Figure 4.2-8

Scenic Quality

This viewpoint captures the view from SR 141 northeast of the project area. This viewpoint would be the first view of the project from travelers moving south into the project area. The viewpoint encompasses the northern portion of the project from the highway, which is the closest viewing area from that vantage point. The foreground of the viewpoint is pastoral with a middle ground view of the hillsides and a background view of Underwood Mountain and the project area. The view is natural appearing with moderate to high levels of vividness, unity, and intactness in the foreground, middle ground, and background of the photo. The quality of the view from this viewpoint was rated moderately high because of the above-average quality and the unity of the man-made and natural features on the landscape.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles), the duration of the view (roadway travelers), the portion of the project that is visible from the viewpoint, the viewer types (minimal residential/recreational), and the scenic quality rating, the level of visual sensitivity is considered moderate.

Auplund Road and Cook-Underwood Road - Viewpoint 4 – Figure 4.2-9

Scenic Quality

This viewpoint captures the view from the Ausplund, Cook-Underwood Roads where they meet and provide residential, agricultural, and forest management access to the area. These roads are connector and feeder roads that can be accessed from SR 14. This area is elevated from the

Columbia River Gorge National Scenic Area but is within its boundaries. The area has a mix of uses including agriculture, forest management, and some recreation. The foreground from the roadway is an agricultural setting with the middle and background views of forest vegetation and forest management areas. The view is natural appearing with moderate levels of vividness, unity, and intactness. The quality of the view from this viewpoint was rated moderate because of the average or typical views of this type in the project area.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (0.5 to 5 miles), the viewer types (roadway travelers), the portion of the project that is visible from the viewpoint, the viewer types (residential/roadway), and the scenic quality rating, the level of visual sensitivity is considered moderate.

Willard – Viewpoint 5 – Figure 4.2-10

Scenic Quality

This viewpoint captures the view from the small residential community of Willard. This area is accessible by a county road from SR 14 and used by residential and private forest management users. The view looks southeast into the project area and provides a panorama of the longest string of turbines. The foreground is a mixture of mixed conifer second growth stands and the middle ground is of mixed timber harvest openings and a transmission corridor. The background view is similar and the mixture of vertical and horizon lines and formations detracts from the overall vividness and unity of the view. The intactness of the views is moderated by the changes in line and form. The quality of the view from this viewpoint was rated moderately low to moderate.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (0.5 to 5 miles), the duration of the view (foreground screening), the portion of the project that is visible from the viewpoint, the viewer types (minimal residential), and the scenic quality rating, the level of sensitivity is considered moderate.

Mill A – Viewpoint 7 – Figure 4.2-11

Scenic Quality

This viewpoint captures the view from the old mill property west of the project area. This area is accessible from Willard Road and has a mixture of uses. The view is looking northeast into the southern end of the A turbine string. The foreground view is obstructed by the vertical lines of transmission towers. The middle ground view is of transmission corridors and extensive timber harvest openings. Many of the residential views are partially screened from the valley floor. There is a visual discord with the man-made alterations. The vividness, unity, and intactness appear uninviting and of moderate to low visual quality. The scenic quality rating for this viewpoint is moderately low.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (0.5 to 5 miles), the duration of the view (foreground screening), the portion of the project that is visible from the viewpoint, the viewer types (minimal residential), and the scenic quality rating, the level of sensitivity is considered moderate.

Windance – Viewpoint 8 – Figure 4.2-12

Scenic Quality

This viewpoint captures the view from the parking lot of the Windance Sailing Shop in Hood River. This area is across the Columbia River looking south into the project area from within the Scenic Area. Foreground views are of the City of Hood River and the middle ground captures portions of the Columbia River and the northern bank. The background is of Underwood Mountain and the project area. Beyond the foreground elements in the view the levels of vividness, unity, and intactness are considered average or above average in the context of the setting. The scenic quality rating for this viewpoint is moderate.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles), the portion of the project that is visible from the viewpoint, the viewer types (roadway, residential, urban area, and river recreation), and the scenic quality rating, the level of sensitivity is considered low to moderate.

Panorama Point – Viewpoint 10 – Figure 4.2-13

Scenic Quality

This viewpoint captures the view from above Hood River at the Panorama Point within the Columbia River Gorge National Scenic Area looking north across the Columbia River into the project area. Foreground views are a composition of vegetation and residential dwellings. The middle ground encompasses the Hood River and the Columbia River area with the Underwood Mountain in the background. The levels of vividness, unity, and intactness are considered above average with the combinations of man-made structures and natural features in harmony with the view. The scenic quality rating for this viewpoint was rated moderately high.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (8–10 miles), the portion of the project that is visible from the viewpoint, the viewer types (roadway, residential), and the scenic quality rating, the level of sensitivity was rated low.

I-84 Westbound – Viewpoint 11 – Figure 4.2-14

Scenic Quality

This viewpoint captures the view from I-84 traveling westbound towards the project area from the east. I-84 is along the Columbia River Gorge National Scenic Area and views along this portion of the highway are generally directed towards the river and the distant scenery. Beyond the foreground view of the highway and other corresponding structures the view is generally intact with average or above vividness, unity, and intactness. Viewers traveling along this corridor have multiple line of sight transitions and this is considered to be average within those views. The scenic quality rating for this viewpoint was rated moderate.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (8–10 miles), the portion of the project that is visible from the viewpoint, the viewer types (roadway), and the scenic quality rating, the level of sensitivity was rated moderate.

Koberg Park – Viewpoint 12 – Figure 4.2-15

Scenic Quality

This viewpoint captures the view across the Columbia River from Koberg Park. The foreground view of the river is a complete composition indicative of the area and the middle and backgrounds have a high level of vividness, unity, and intactness. The rail-line that bisects the view in the middle ground tends to blend into the scenery without distraction. This view is considered to be above average for the types of views that are throughout the Scenic Area. The scenic quality rating for this viewpoint was rated moderately high.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (8–10 miles), the portion of the project that is visible from the viewpoint, the viewer types (recreational), and the scenic quality rating, the level of sensitivity was rated moderate.

I-84 Eastbound – Viewpoint 13 – Figure 4.2-16

Scenic Quality

This viewpoint captures the view from I-84 traveling eastbound towards the project area from the west. I-84 is along the Scenic Area and views along this portion of the highway are generally directed towards the river and the distant scenery. Beyond the foreground view of transmission structures the view is generally intact with average or above-average vividness, unity, and intactness. Viewers traveling along this corridor have multiple line of sight transitions and this view is considered to be above average within the context of those multiple views. The scenic quality rating for this viewpoint was rated moderately high.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (3 to 5 miles), the portion of the project that is visible from the viewpoint, the viewer types (roadway travelers with fleeting views), and the scenic quality rating, the level of sensitivity was rated as moderately low.

Viewpoint 14 – Viento State Park – Figure 4.2-17

Scenic Quality

This viewpoint captures the view from Viento State Park, a popular recreation and rest area along the Columbia River. Landscape features are diverse and intact and the contrasts of the features have a high level of unity. This view is the open waters of the Columbia River in the foreground with rock features and vegetation in the middle ground and a background of mountains which provides an overall pleasing composition that is inviting to the viewer. This view is one of the less common views along the Gorge and has an above average scenic value. The scenic quality rating for this viewpoint was rated moderately high to high.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles), the portion of the project that is visible from the viewpoint, the viewer types (recreational), and the scenic quality rating, the level of sensitivity was rated as moderate to high.

Viewpoint 15 and 16 – Frankton Road and Fairview Road – Figures 4.2-18 and 4.2-19

Scenic Quality

The viewpoints represent the view from the higher elevation residential areas west of Hood River. These views are across the Columbia River looking into the project area. Both of these roads are local access roads and traffic is considered low. Residential dwellings in these areas have developed based on the topographic and the views both north and south. Many of the views are screened to the north and take advantage of the view south into Oregon. Both of the photos have residential development in the foreground, which is common along these roadways. The middle ground is vegetation, some agriculture, and some forest management. The background is the ridge along the project area. These types of views are relatively common and of average scenic value when compared to the broader area. Vividness, unity, and intactness are moderate to high levels. The scenic quality rating for these viewpoints is moderate.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles), the portion of the project that is visible from the viewpoint, the viewer types (residential), and the scenic quality rating, the level of sensitivity was rated as moderate.

Viewpoints 17 and 18 – Providence Hospital and Rosauers Parking Lot Hood River – Figures 4.2-20 and 4.2-21

Scenic Quality

The viewpoints represent the north and south views of the project from the City of Hood River. The foreground is an urban setting with a middle ground of vegetation that screen the background to some degree, providing a diverse composition of features. The views have a somewhat vivid appeal based mostly on the man-made features; however, the unity and intactness are below average and are visually discordant. This detracts from the background view. Viewers would generally be more focused on the business of the urban environment. The scenic quality of these viewpoints was rated moderately low.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles), the portion of the project that is visible from the viewpoint, the viewer types (urban/residential), and the scenic quality rating, the level of sensitivity was rated as low.

Viewpoint 19 – Columbia River Highway – Figure 4.2-22

Scenic Quality

This viewpoint represents the view of the roadway traveler on the Columbia River Highway (Highway 30) southeast of the project area. This view has a higher scenic quality and is more representative of the high quality views within the Columbia Gorge area. The foreground, middle ground, and background all have an above average arrangement of spaces in the landscape. The view appears intact and has a unity with the road and even the transmission line that is visible in the middle ground. The landscape provides diversity but not to the extent of clutter. This view is rated moderately high for scenic quality.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 5 miles), the portion of the project that is visible from the viewpoint, the viewer types (roadway travelers/sightseers), and the scenic quality rating, the level of sensitivity was rated as moderate.

Viewpoint 20 – State Route 35 – Figure 4.2-23

Scenic Quality

This viewpoint represents the view from SR 35, which is 4.6 miles south of Hood River. The viewpoint position is somewhat inferior with the industrial complex in the foreground. The middle and backgrounds looking into the project area from the southeast have an average scenic quality. The scenic quality rating for this viewpoint is moderately low.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (greater than 10 miles), the portion of the project that is visible from the viewpoint, the viewer types (roadway travelers/sightseers), and the scenic quality rating, the level of sensitivity was rated as low to moderate.

Viewpoint 21 – Kollock-Knapp Road intersection with Scoggins Road – Figure 4.2-24

Scenic Quality

This viewpoint represents the view from local area roadways at specific intersections where local area travelers might converge. These roads are old logging roads that have been upgraded to meet the local residential use. However, they are still used for logging and would be used in the construction portion of this project. This would include upgrading and in some instances widening the roads, which can have an effect on visual quality. The viewpoint position is somewhat inferior with the orchard fence in the foreground. The middle and backgrounds views are lost due to the foreground screening. The scenic quality rating assigned to this view is moderately low.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (1.5 miles), the portion of the project that is visible from the viewpoint, the viewer types (local area workers and minimal residences), and the scenic quality rating, the level of sensitivity was rated as low to moderate.

Viewpoint 22 – Cook-Underwood Road intersection with King Road – Figure 4.2-25

Scenic Quality

This viewpoint represents the view from local area roadways at specific intersections where local area travelers and workers might converge. These roads are old logging roads that have been upgraded to meet the local residential and commercial use. However, they are still used for logging and would be used in the construction portion of this project. This would include upgrading and in some instances widening the roads, which can have an effect on visual quality. The view from this intersection is very pastoral with a feeling of unity and intactness. Beyond the orchard in the middle ground, which adds some diversity to the composition, the view is above average for the area. The scenic quality rating assigned to this view is moderately high.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (1.5 miles), the portion of the project that is visible from the viewpoint, the viewer types (local area workers and minimal residences), and the scenic quality rating, the level of sensitivity was rated as moderate.

Viewpoint 23 – Ausplund Road End – Figure 4.2-26

Scenic Quality

This viewpoint represents the view from local area roadways at specific intersections where local area travelers might converge. These roads are old logging roads that have been upgraded to meet the local residential use. However, they are still used for logging and would be used in the construction portion of this project. This would include upgrading and in some instances widening the roads which can have an affect on visual quality. This view is from the end of the Ausplund Road, which would be used to access the area for construction and maintenance. Very few viewers beyond those associated with the project would see this viewshed. Taking out the vehicles in the foreground, the scenic quality rating assigned to this view is moderate.

Viewer Sensitivity

When considering the distance of the project from this viewpoint (less then 1 mile), the portion of the project that is visible from the viewpoint, the viewer types (local area workers and residence), and the scenic quality rating, the level of sensitivity was rated as low to moderate.

4.2.3.3 Impacts

This analysis examines potential direct aesthetic impacts during the construction, Operations and Maintenance, and decommissioning phases of the proposed project. Indirect impacts are not anticipated because the project is not expected to substantially induce regional growth to the extent that would result in significant changes to the offsite visual landscape.

For the proposed project, the primary concern is the potential aesthetic impacts of the proposed wind turbines. The project would consist of up to 50 wind turbines. Because of the heightened activity in the wind energy industry, pricing and availability of turbines are highly variable. Consequently, the specific turbine type and manufacturer has not been selected. However, it is likely that the turbines would be in the 1.2- to 2.5-MW range, and would measure approximately 426 feet in height (262-foot hub height and 164-foot radius blades). The diameter of the blade would be approximately 230 to 265 feet, depending on which turbine is selected. Each turbine's three rotor blades would be made of laminated fiberglass. Turbine "strings" would include three to 21 turbines placed at approximately 350 to 500 foot intervals.

It is the ability of the landscape in question to accommodate both the size and density of the wind turbines that would determine the resulting visual impacts. Given its dimensions, there are few measures, other than the wind turbine color, that can be implemented to mitigate the visual impact of a wind turbine. Being available to the wind requires the turbines to be in a location that is open and highly visible.

The visual impact assessment was based on evaluating the changes to the existing visual resources that would result from construction and operation of the project. These changes were assessed, in part, by evaluating the "after" views provided by the computer-generated visual simulations and comparing them to the existing visual environment. Consideration was given to the following factors in determining the extent and implications of the visual changes:

- Changes in the affected visual environment's composition, character, and valued qualities
- The affected visual environment's context, including distance
- The extent to which the affected environment contains places or features that have been designated in plans and policies for protection or special consideration
- The number of viewers, their activities, and the extent to which these activities are related to the aesthetic qualities affected by the changes
- The distance factor was considered in the sensitivity rating for establishment of baseline and therefore becomes a factor in the impact assessment

Levels of impact were classified as high, moderate, and low:

- ***High Level of Impact.*** High levels of impact were assigned in situations in which turbines would be highly visible in areas with a high number of sensitive viewers, and would greatly alter levels of vividness, unity, and intactness, decreasing the level of visual quality. This is the largest number of viewers from that key viewpoint. The assessment does account for the number of viewers and would add that into the discussion.
- ***Moderate Level of Impact.*** Moderate levels of impacts were assigned in situations in which turbines would be visible in areas with moderate levels of visual sensitivity and viewers in which the presence of the turbines would moderately alter levels of landscape vividness, unity, and intactness.
- ***Low Level of Impact.*** Low levels of visual impact were found in situations where the project would have relatively small effects on overall landscape level attributes or where existing levels of landscape aesthetic quality are low or where there are low levels of visual sensitivity and a low number of viewers.

Much of the public input and comments received on the proposed project (made in various public forums prior to filing this Application) indicates that for some viewers, the presence of the wind turbines represents a negative impact because it alters the appearance of the rural landscape over a large area. The flashing of FAA aviation lights on the tops of turbines at night would similarly be considered a negative impact. For purposes of this analysis, the term "significant" may be defined as levels of visual impact that are rated "moderately high" to "high" from any given viewpoint. This does not mean that a particular location or the project as a whole poses a "significant" impact for the purposes of SEPA review. Moreover, while a particular viewpoint may be characterized as having a “high” impact, that impact may be experienced by a relatively small number of individuals, or relate to a small portion of the project,[2] and it does not account for the overall benefits of the project. Definition of the term “significant” in this context, however, is subjective and depends on many factors. For example, the degree to which impacts are adverse depends on the viewer’s location, the orientation of structures (such as homes), personal sensitivity, and the impact on view quality. In the final analysis, it is the comparative number of viewers most affected by the project that determines the overall impact. A project that significantly affects a small number of viewers may be offset by the fact that it may have a relatively low impact on a large number of viewers.

Construction

During construction, large earth-moving equipment, trucks, cranes, and other heavy equipment would be highly visible from nearby areas. At times, small, localized clouds of dust created by road building and other grading activities may be visible at the site. Because of construction-related grading activities, areas of exposed soil and fresh gravel that contrast with the colors of the surrounding undisturbed landscape would be visible.

In close-up views, particularly those seen by travelers on the segment of the local highway that passes around the project site and those seen from the closest residences, the visual changes associated with the construction activities would be highly visible and would have a moderate to high visual impact. From more distant locations, the visual effects would be relatively minor and would have little or no impact on the quality of views and are considered short-term.

Operation

Using the visual simulation, the potential levels of visual impacts from key project viewpoints have been evaluated and are summarized on Table 4.2-5. A detailed description for each viewpoint follows the summary table.

The project has the potential to create low to moderate levels of visual impact at key viewpoints. Not every potential view receptor in the project area has been documented. Selected viewpoints are representative of a variety and range of views in the project area. The photos used for the simulations show the worst-case seasonal conditions for visual contrast between the wind turbines and the primarily green and brown landscape backdrop. The period with the least visual contrast is anticipated to occur when there is snow cover and gray skies.

[2] Additionally, for reasons related to commercial viability and engineering feasibility, the project is proposed as an integrated whole, not a series of separate components where parts of the whole may be removed due to subjective, perceived visual effects.

Table 4.2-5
Summary of Existing Scenic Quality Assessment and Project Visual Impacts

Viewpoint	Existing Scenic Quality		Anticipated Level of Visual impact
	Visual Quality	Visual Sensitivity	
Viewpoint 1: State Highway 141/Pucker Huddle (Figure 4.2-6)	Low	Moderate	Low to Moderate
Viewpoint 2: Strawberry Mountain (Figure 4.2-7)	Moderate	Moderate	Low to Moderate
Viewpoint 3: Husum, Highway 141 north (Figure 4.2-8)	Moderate to Moderately High	Moderate	Moderate
Viewpoint 4: Ausplund Road, Cook-Underwood Road (Figure 4.2-9)	Moderate	Moderate	Moderate
Viewpoint 5: Willard (Figure 4.2-10)	Moderately Low to Moderate	Moderate	Moderate
Viewpoint 7: Mill A (Figure 4.2-11)	Moderately Low	Moderate	Low to Moderate
Viewpoint 8: Windance (Figure 4.2-12)	Moderate	Low to Moderate	Low
Viewpoint 10: Panorama Point (Figure 4.2-13)	Moderately High	Low	Low
Viewpoint 11: I-84 Westbound (Figure 4.2-14)	Moderate	Moderate	Moderate to Low
Viewpoint 12: Koberg Park (Figure 4.2-15)	Moderately High	Moderate	Moderate
Viewpoint 13: I-84 Eastbound (Figure 4.2-16)	Moderately High	Moderately Low	Moderate to Low
Viewpoint 14: Viento State Park (Figure 4.2-17)	Moderately High to High	Moderate to High	Moderate
Viewpoint 15: Frankton Road (Figure 4.2-18)	Moderate	Moderate	Moderate
Viewpoint 16: Fairview Road (Figure 4.2-19)	Moderate	Moderate	Moderate
Viewpoint 17: Providence Hospital (Figure 4.2-20)	Moderately Low	Low	Low
Viewpoint 18: Rosauers Parking Lot (Figure 4.2-21)	Moderately Low	Low	Low
Viewpoint 19: Columbia River Highway (Figure 4.2-22)	Moderately High	Moderate	Low
Viewpoint 20: Highway 35 (Figure 4.2-23)	Moderately Low	Low to Moderate	No change
Viewpoint 21: Kollock-Knapp Road intersection with Scoggins Road (Figure 4.2-24)	Moderate to Low	Low to Moderate	Moderate
Viewpoint 22: Cook-Underwood Road intersection with King Road (Figure 4.2-25)	Moderate to High	Moderate	Moderate
Viewpoint 23: Ausplund Road End (Figure 4.2-26)	Moderate	Moderate	Moderate

Atmospheric haze varies by location, season, time of day, and weather patterns. In creating photo composite visual simulations the aim is to match the haze level on the rendered turbines to the observable haze present in the photograph. This is done visually by comparing the haze effects on the photographed terrain near the turbines to the rendered haze effects on the rendered terrain. This is then translated into a worst case (lower than expected) haze visibility setting for the turbine renders. The result is that the turbines would be slightly more visible in the final composites than they would actually be if an observer were standing on the ground viewing them from the exact place, date, and time that the photos were taken.

Viewpoint 1: Pucker Huddle

From Viewpoint 1, approximately 25 turbines would be visible on the ridge tops at distances of 0.8 to 3 or more miles. Figure 4.2-6 illustrates the simulated views from Viewpoint 1 on SR 141 above Pucker Huddle, looking west into Underwood Mountain for the most conservative scenario of a 50-turbine project, with 426-foot high turbines. At the distance depicted in the photo, the visual clutter of more turbines has more impact than the considerable scale of the larger turbines. The composition would be silhouetted against the sky, increasing their visual impact. However, the distance and the line of sight from the residential areas would minimize the contrast. The presence of the turbines would reduce the scene’s degree of intactness by introducing a large number of highly visible engineered vertical elements.

The potential visual impact from Viewpoint 1 would range from low to moderate.

Viewpoint 2: Strawberry Mountain

From Viewpoint 2, approximately 22 turbines would be visible on the ridge tops at distances greater than five or more miles. Figure 4.2-7 illustrates the simulated views from Viewpoint 2 on SR 141 above Pucker Huddle, looking west into Underwood Mountain for the most conservative scenario of a 50-turbine project, with 426-foot high turbines. At the distance depicted in the photo, the background is silhouetted against the sky, increasing the impact of the number of turbines as opposed to the size of the large turbines. The introduction of vertical structures in the background of the view would add to the horizontal and vertical disruptions already within the existing view. The intactness would be compromised minimally with the addition of these features.

The potential visual impact from Viewpoint 2 would range from low to moderate.

Viewpoint 3: Husum

From Viewpoint 3, approximately 27 turbines would be visible on the ridge tips at a distance greater than five miles. Figure 4.2-8 illustrates the simulated views from SR 141 traveling south into the project area. Travelers moving along this highway are generally using the road to access recreation areas or for leisurely drives. Residential viewers would be screened to some degree from the view based on vegetation, landscaping, and the line of sight from the valley floor. Introduction of these vertical structures in the background of this view would decrease the intactness of the landscape, based on the numbers of turbines that would be visible. The composition of the view would be altered with the introduction of these engineered structures and would be apparent on the horizon to the travelers and residence in the area. Due to the low levels of viewers, duration of the views, and viewer awareness, the visual impact from Viewpoint 3 is considered moderate.

Viewpoint 4: Ausplund and Cook-Underwood Roads

From Viewpoint 4 approximately 14 turbines would be visible looking northwest from the roadway. Figure 4.2-9 illustrates the simulated view from the roadway at the intersections of Ausplund and Cook-Underwood Roads. Because of the position of this viewpoint (direct line of sight) and its distance from the turbines, the turbines apparent scale would be visible and apparent. The presence of the turbines would likely have a moderate effect on the vividness of the existing view and a moderate impact on the overall sense of unity and intactness by the roadway and residential viewers.

The potential visual impact from Viewpoint 4 would be moderate.

Viewpoint 5: Willard

From Viewpoint 5, approximately 24 turbines in turbine strings A and B would be visible from screened views from residences in the area of Willard. Figure 4.2-10 shows the simulated view from Viewpoint 5 in the northern portion of the project looking southeast. These turbines would be located in the ridge tops at distances ranging from 1 to 3 miles from this viewpoint. Because the turbines would be seen against the sky at medium range and screened in many residential views, they would still be visible in the background. This would reduce the visual unity and intactness minimally when compared to the existing components in the landscape. The wind turbines would be arrayed uniformly along the ridgeline and would create a moderate change in the setting's existing low to moderate visual quality.

The potential visual impact from Viewpoint 5 would be moderate.

Viewpoint 7: Mill A

From Viewpoint 7, approximately 35 turbines in strings A and B would be visible in the foreground, middle ground, and background of this view. The ridgeline is located 1.5 miles or more from Viewpoint at Mill A. Figure 4.2-11 shows the simulated view. The turbines would be seen against the sky. The presence of the long line of turbines may create a slight increase in the vividness of this view. The unity of the view would be decreased further by the long turbine line and the intactness of the view would be moderately compromised compared to the existing view.

The potential visual impact from Viewpoint 7 is considered to be low to moderate.

Viewpoint 8: Windance

From Viewpoint 8, fewer than seven turbines can be seen in the background of the landscape and more than 5 miles from the viewpoint. Figure 4.2-12 shows the simulated view. The scenic quality with advent of the turbines when seen from this distance is expected to minimally decrease the level of vividness, unity, or intactness of the landscape view. Recreational users in the Gorge area are water related and their line of sight is generally along the river and river banks. Although the turbines would be visible on the far horizon it is not expected to decrease the existing quality of this view.

The potential visual impact from Viewpoint 8 is considered to be low.

Viewpoint 10: Panorama Point

From Viewpoint 10, approximately 11 turbines can be seen in the distant background of the view. Figure 4.2-13 shows the simulated view. Although the turbines would be visible on the far horizon it is not expected to decrease the existing quality of this view. However, because of their relatively small size at this viewing distance, they would not likely detract from views across the Columbia River Gorge National Scenic Area. The visible turbines would have little effect on this view's vividness, unity, and intactness.

The potential visual impact from Viewpoint 10 would be low.

Viewpoint 11: I-84 Westbound

From Viewpoint 11, approximately 19 turbines would be visible in the distance background to roadway travelers looking west into the project area from I-84. Figure 4.2-14 shows the simulated view. Although the turbines would be visible to travelers on the far horizon, their presence is not expected to decrease the existing quality of this view, because of their relatively small size at this viewing distance. The visible turbines would have a minimal effect on this view's vividness, unity, and intactness.

The potential visual impact from Viewpoint 11 was rated as moderate to low.

Viewpoint 12: Koberg Park

From Viewpoint 12, approximately 17 turbines would be visible in the distant background to recreational users of the park and river. The view looks west into the project area. Figure 4.2-15 shows the simulated view. Although the turbines would be visible to the viewers on the far horizon it is not expected to decrease the existing quality of this view to a great degree, because of their relatively small size at this viewing distance. The visible turbines would have a minimal effect on this view's vividness, unity, and intactness.

The potential visual impact from Viewpoint 12 was considered to be moderate.

Viewpoint 13: I-84 Eastbound

From Viewpoint 13 approximately eight turbines would be visible in the background to roadway travelers looking west into the project area from I-84. Figure 4.2-16 shows the simulated view. This view for travelers would be of short duration. Although the turbines would be visible to travelers on the horizon it is not expected to decrease the existing quality of this view because of the number of turbines visible and the partial screening from the middle ground ridgeline. The visible turbines would have a minimal effect on this view's vividness, unity, and intactness for these reasons.

The potential visual impact from Viewpoint 13 was rated as moderate to low.

Viewpoint 14: Viento State Park

From Viewpoint 14, approximately 20 turbines in the background would be visible to the recreational users of the area. Figure 4.2-17 shows the simulated view. Although the water-related recreational activities would have the line of sight more related to the water and river banks, the recreational users moving through this area would be affected by this contrast in the view. The vividness of the scenic quality may be positively or negatively affected, depending on the user perception of turbines in the background. The unity and intactness of the existing view would be moderately compromised and the visible turbines would have a moderate effect on the view's scenic quality compared to existing conditions, due to the distance from the State Park and activities in the foreground and middle ground.

The potential visual impact for Viewpoint 14 was considered to be moderate.

Viewpoints 15 and 16: Frankton and Fairview Roads

From Viewpoints 15 and 16, approximately 10 and eight turbines can be seen, respectively. Figures 4.2-18 and 4.2-19 show the simulated view. At a distance of 5 miles or more this contrast would have a minor effect on the overall visual impact. Consequently, because the prominence of the turbines in the view would be low, the turbines would have a minor effect on the vividness, unity, and intactness from this viewpoint.

The potential visual impact from this viewpoint would be moderate.

Viewpoints 17 and 18: Province Hospital and Rosauers Parking Lots Hood River

From Viewpoints 17 and 18, only two and three turbines can be seen, respectively, and they are diminished by the distance. Figures 4.2-20 and 4.2-21 show the simulated views. At this distance, viewers would have to scan the horizon to find the turbines. Consequently, minor effect or negligible effects to the scenic quality is expected to be low and was rated as low.

Viewpoint 19: Columbia River Highway

From Viewpoint 19, approximately nine turbines are visible in the distant background. Figure 4.2-22 shows the simulated view. Although the turbines would be visible in the background the viewer would have to have a focused orientation to see them in the landscape. The amount of turbines and the limited prominence based on the distance is expected to have a minimal effect on the scenic quality from this viewpoint.

The potential visual impact from this viewpoint would be low.

Viewpoint 20: State Route 35

From Viewpoint 20, approximately 20 turbines could potentially be seen. Figure 4.2-23 shows the simulated view. Given the distance of more than 10 miles from the viewpoint to the wind turbines, it would be difficult to see them out on the horizon unless the conditions and lighting were perfect. Implementation of the project is not expected to change the scenic quality from this viewpoint.

The potential visual impact from this viewpoint would not change from existing.

Viewpoint 21: Kollock-Knapp Road at the intersection with Scoggins Road

From Viewpoint 21, approximately three turbines can be seen. Figure 4.2-24 shows the simulated view. This area would be within 1.5 miles of the project and the turbines would be highly visible at these intersections. However, minimal use of these roads beyond a few residences and workers reduces the viewer types. Regardless, the impacts of the turbines on the landscape would affect the scenic quality of the view.

The potential visual impact from this viewpoint would be moderate.

Viewpoint 22: Cook-Underwood Road at the intersection with King Road

From Viewpoint 22, approximately seven of the 22 turbines can be seen. Figure 4.2-25 shows the simulated view. This area would be within two miles of the project and the turbines would be highly visible at these intersections. However, minimal use of these roads beyond a few area residences and workers reduces the viewer types and the viewer numbers. Regardless, the impacts of the turbines on the landscape would affect the scenic quality of the view for those viewers.

The potential visual impact from this viewpoint would be moderate.

Viewpoint 23: Ausplund Road End

From Viewpoint 23, approximately eight turbines can be seen. Figure 4.2-26 shows the simulated view. This area would be within one mile of the project and the turbines would be highly visible at the end of this project access road. However, very minimal use of these roads beyond workers associated with forest management reduces the viewer types. Regardless, the impacts of the turbines on the landscape would affect the scenic quality of the view.

The potential visual impact from this viewpoint would be moderate.

As noted above, visual impacts relate to the subjective perceptions of viewers. For many viewers, the location of the project, including the limiting effect of topography, tree cover, the relatively significant distance to surrounding residences, and the orientation of the project vis-à-vis viewers, minimizes visual impacts. However, the project is proposed in a location with a robust wind resource and relatively easy and close access to consumers of renewable energy. Consequently, the project would be seen and perceived by many viewers, and it would alter the landscape. Opportunities to minimize and mitigate visual impacts are limited. Simulations have been prepared to compare the impacts of different colors for the turbines. Although a brown turbine color would reduce visual contrast in views where the turbines are seen against a landscape backdrop, it would accentuate the visibility of the turbines in views where they would be seen against the sky. In addition, the brown color would have a greater contrast when snow is on the ground. Because the turbines are most frequently seen against the sky, particularly in close-range views where visual concerns are the greatest, a non-reflective flat neutral gray or light color is recommended as the better choice for minimizing aesthetic impacts.

Decommissioning Impacts

Decommissioning would consist of removing aboveground equipment, such as turbine and meteorological towers and their associated foundations, to a depth of 3 feet bgs. Wind turbine foundations below 3 feet would remain. The ground surface would be regraded to natural contours and revegetated to a natural condition.

For several years after decommissioning, site disturbance would be visible upon close examination. The visual impacts of those aboveground elements that are not removed would remain. During the decommissioning process, similar impacts to those experienced during construction would occur but to a lesser extent because less construction material would be removed than was delivered to the wind turbine sites.

4.2.3.4 Mitigation Measures

Because the turbines are most frequently seen against the sky, particularly in close-range views where visual concerns are the greatest, a non-reflective flat neutral gray or light color is recommended to minimize aesthetic impacts.

4.2.4 RECREATION

4.2.4.1 Inventory of Facilities

The primary recreation activities within Skamania County are camping, hiking and fishing. The USFS maintains numerous campgrounds, hiking trails and wilderness areas. Congress created the Mount St. Helens National Volcanic Monument, located in the northwest corner of Skamania County, following the 1980 eruption of the volcano. The Lewis and Clark Trail Highway follows the Columbia River through Skamania County. The Columbia River Gorge National Scenic Area is located south of the project site area. Informal recreational activities such as hunting, hiking and mountain biking exist subject to landowner approval.

Recreational facilities or activities available closest to the project site are as follows:

- Hiking and horseback riding along Buck Creek Trail
- Husum Hills Golf Course
- BZ Corners Boat Launch
- Underwood Park/Community Center
- Drano Lake Boat Ramp

Summer recreational activities include water sports such as fishing, swimming, boating, river rafting, kayaking, water skiing, and wind surfing; as well as camping, biking, hiking, horseback riding, hunting, picnicking, and other outdoor sports. Some of these activities continue into the winter, weather permitting. Sightseeing is a popular year-round activity in the Columbia River Gorge.

Table 4.2-6 lists recreational facilities and activities available within a 25-mile radius of the project site or beyond; the radius is centered somewhat near the middle of the project site (Figure 4.2-27 Key Recreation Viewing Areas and Recreational Facilities within Approximately 25 Miles). This study area covers forests and wilderness areas, wildlife areas, boat launches, state parks, county parks, city parks, trails, campsites, and museums.

Table 4.2-6
Public Park and Recreation Facilities within 25 Miles

National Scenic Areas and Trails	**Klickitat County Parks**
Columbia River Gorge National Scenic Area	Klickitat County Park
Lewis and Clark National Historic Trail	**Hood River County Parks**
Oregon Trail National Historic Trail	Tucker Park
Washington State Parks	Panorama Point County Park
Columbia Hills State Park	Tollbridge County Park
Doug's Beach State Park	**City of White Salmon**
Oregon State Parks/Campgrounds/Trails	Jewett Creek Park
Lindsey Creek State Park	White Salmon City Park
Starvation Creek State Park	**City of Hood River**
Viento State Park	Eliot Park
Wygant State Park	Waucoma Park
Seneca Fouts State Park	**Golf Courses**
Koberg Beach State Park	Husum Hills Golf Course
Memaloose State Park	Indian Creek Golf Course
Mayer State Park	Hood River Golf and Country Club
Lang Forest State Park	Carson Hot Springs Golf Course and Resort
Wyeth Campground	Skamania Lodge Golf Course
Historic Columbia River Highway State Trail - Twin Tunnels Segment (Mosier Twin Tunnels)	The Dalles Country Club
USFS Parks/Trails/Boat Launches	Northwest Aluminum Golf Club
BZ Corners Boat Launch	**Museums and Sightseeing**
Balfour-Klickitat Park	Hood River County Museum
Dog Mountain Trail	Western Antique Aeroplane & Automobile Museum
Herman Creek Trail	International Museum of Carousel Art
Washington State Department of Natural Resources	Gorge Heritage Museum
Buck Creek Trail	Columbia River Gorge Interpretive Center
Skamania County Parks/Campgrounds/Launches	Bonneville Lock and Dam Visitor Complex
Home Valley Campground	Columbia Gorge Discovery Center
Underwood Park/Underwood Community Center	Wasco County Historical Museum
Big Cedars County Park	Fort Dalles Museum
Wind River Boat Ramp	Sternwheeler Cruises
Drano Lake Boat Launch	
Skamania County Fairgrounds	
Rock Creek Community Center	

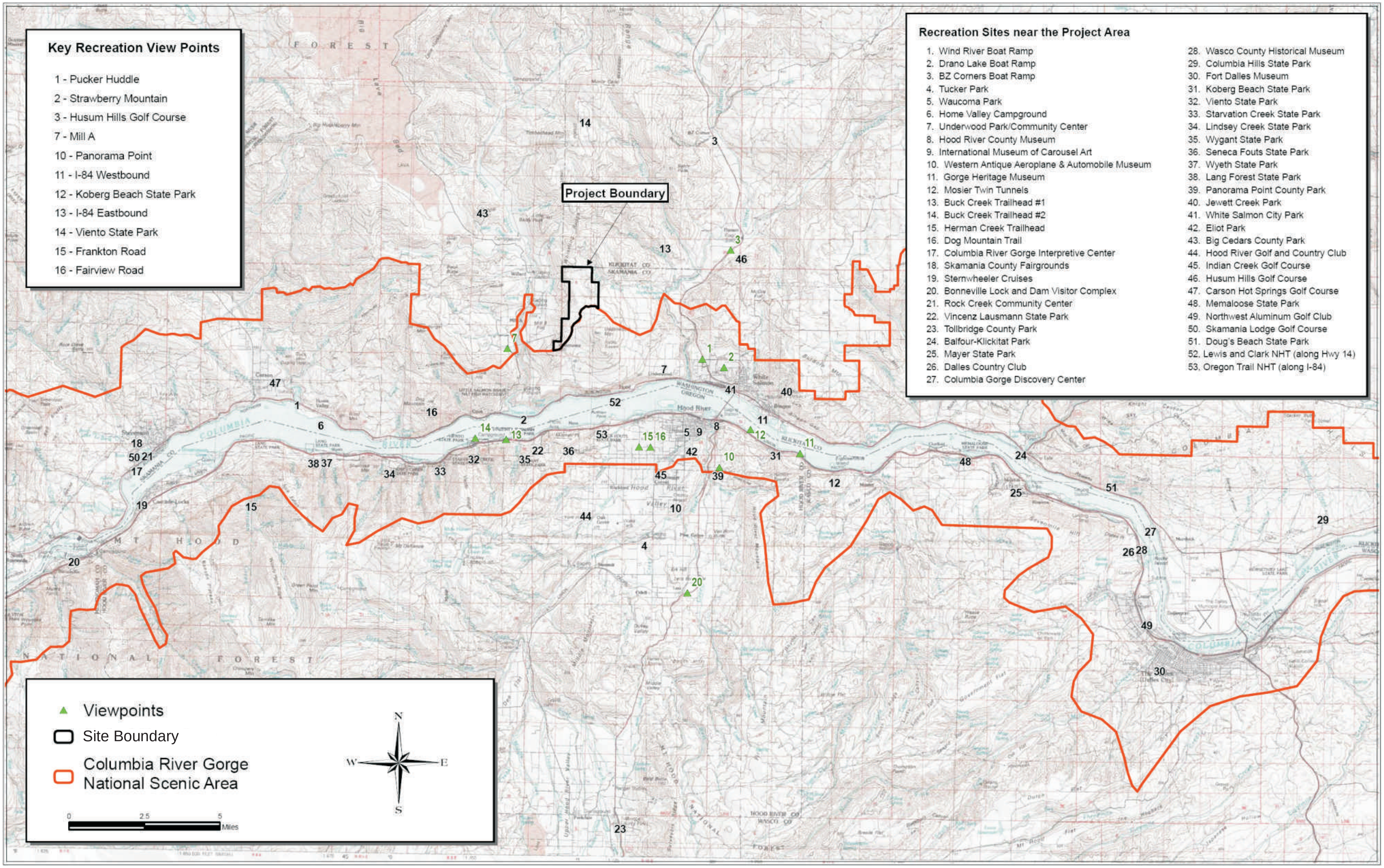


Figure 4.2-27

Recreation Facilities and Key Viewpoints Within Approximately 25 Miles

Source: GeoDataScape.

Job No. 33758687

URS

Whistling Ridge Energy Project
Skamania County, Washington

No Skamania County recreation facilities are within five miles of the proposed project. The closest County facility would be the Underwood Park and Community Center, located near Underwood just off of Cook-Underwood Road (approximately 6 miles south). The community center has a large gymnasium, stage, kitchen, and meeting room; while the park has soccer fields, a pavilion, and a playground.

A notable recreational facility is Doug's Beach State Park, located approximately 20 miles east of the site. Doug's Beach is heavily used by windsurfers in the summer and is considered by many to be the premier expert windsurfing site in the Gorge and perhaps the entire western United States (Columbia River Gorge National Scenic Area 1992).

Two national trails, the Lewis and Clark National Historical Trail and the Oregon Pioneer National Historic Trail, are located within five miles of the proposed facility. These trails roughly follow Highway 14 and Interstate 84, respectively. ~~There are no national trails located within 5 miles of the proposed facility.~~ Within five miles, the White Salmon River is designated as a wild and scenic river, and within 25 miles, the Klickitat River is also designated.

The Gifford Pinchot National Forest, which includes Mount St. Helens National Volcanic Monument, is located approximately 10 miles west and north of the site. The Mount Hood National Forest is located approximately 20 miles south of the site. The Columbia River Gorge National Scenic Area is located immediately south of the site. The Scenic Area is a popular visitor tourist destination. Recreation activities in the Scenic Area include hiking, mountain biking, windsurfing, camping, fishing, boating, wildlife/bird watching, wildflower viewing, photography, picnicking, and rock climbing.

4.2.4.2 Established Plans and Policies

Skamania County completed a Parks and Recreation Master Plan in 2001. This plan outlines goals, policies, objectives, and important background information in order to guide recreational development in the County. There are no County Parks within five miles of the proposed facility.

The Scenic Area encompasses portions of six counties within Oregon and Washington. In 1987, the States of Washington and Oregon entered into the bi-state compact to form the Columbia River Gorge Commission. In 1991, the Columbia River Gorge Commission adopted the National Scenic Area Management Plan, which acts as the comprehensive plan within the Scenic Area.

The goals, objectives, policies, and guidelines for the Scenic Area provide a framework for guiding actions of the various public and private recreation providers in the Scenic Area. Overall goals, objectives, and policies include:

- Protection of the resources
- Scenic appreciation and scenic travel corridors
- River access and protection of the treaty rights

- Interpretation/education
- Trails and pathways
- Transportation
- Coordination

The Recreation Development Proposals List was originally created in 1992 as part of the Recreation Development Plan in the Management Plan for the Columbia River Gorge National Scenic Area. This list highlights selected sites and proposed projects at those sites that, when implemented, would best achieve the recreation goals and objectives of the Management Plan. The proposed projects would be funded by local, state and federal funds; however, it is unknown if any of these projects are funded or have been completed. The following sites identified as proposed improvement projects in the plan are within approximately 25 miles of the site:

- ***Wind River:*** develop river access park on the site emphasizing day-use activities
- ***Drano Lake:*** expand the existing facility and provide an additional launch lane, a dock, and vault toilets
- ***Spring Creek Hatchery:*** create a coordinated and cooperative plan, design, and management program
- ***White Salmon River:*** develop small to moderate-sized day-use facility emphasizing bank fishing opportunities
- ***Klickitat River County Park:*** improve campsites, trail/river access, and signage
- ***Doug's Beach State Park:*** conduct cultural resource investigations at the site
- ***Mayer State Park:*** develop overnight camping, day-use parking, picnicking, and limited interpretive facilities
- ***Hudson Hill:*** acquire property by the USFS and develop a walking path and viewpoint
- ***Mosier Waterfront:*** develop a water-oriented, multipurpose day-use facility with windsurfing rigging/launching area, a swimming beach, picnic area, and a moderate to large parking area
- ***Historic Columbia River Highway State Trail, Twin Tunnels Segment:*** develop overnight camping area, bicycle parking, viewpoints, and picnicking

There are no new parks or recreation facilities planned within a five-mile radius of the site. There are no existing Skamania County ordinances or regulations that would require a dedication of land for recreation facilities, or money in lieu thereof, as a result of the proposed development. Although ordinances of this type could be adopted in the future, it is unlikely that Skamania County would assess such requirements against the development.

No federal recreation regulations apply to the site, nor are there federal or state plans for recreation facilities in the site.

4.2.4.3 Impacts

Construction Impacts

A majority of the construction workers are expected to be within daily commuting distance of the site. At peak construction periods, some workers may seek temporary housing in apartments or motels, or may make private arrangements for recreational vehicles. Existing limits on the length of stay in public camping areas would minimize any potential impacts on park users. Workers would be more likely to use the facilities on weekdays rather than busy weekends, so minimal impacts to park and recreation facilities are expected from construction workers.

Operational Impacts

In addressing the impacts to the Scenic Area and recreation opportunities in proximity to the project area we evaluated how the project would affect the overall goals, objectives, and policies listed above.

- ***Protection of Resources.*** The project would not decrease any resources within the Scenic Area. No recreation resources would be lost in the Scenic Area and only a small portion of an existing road would be affected by this project through upgrading of the road for access.

- ***Scenic Appreciation and Scenic Travel Corridors.*** Impacts to scenic areas and highway are listed in Section 4.2.3. Key viewing areas for recreation and the visual impacts are also found in Section 4.2.3 and disclose the distance of these areas from the project. The assessment for how the recreation visitor would view the project is assessed from these viewpoints. The project would have minor to moderate effects on the visual quality of the area as viewed from these recreation areas.

- ***Resource Based Recreation.*** No resource based recreation within the Scenic Area is expected to be affected by the project. No resources are within or in proximity to the project area.

- ***River Access and Protection of Treaty Rights.*** This project is on private lands outside of the Scenic Area and would have no effect on River Access and Treaty Rights.

- ***Interpretation/Education.*** An opportunity to provide alternative energy interpretation and education could be included in this project and further the goals of the Scenic Area.

- ***Trails and Pathways.*** The project would not affect any trails or pathways in the Scenic Area. There may be some distant views of wind turbines from trails. Key recreation and trails viewpoints are assessed in Section 4.2.4.

- ***Transportation.*** Use of ~~the portion of the~~SR 14 and portions of Cook-Underwood Road ~~road~~ that ~~is~~ are within the Scenic Area to access the project ~~would be upgraded but~~ would have no effect on movement of recreational travel or access. ~~It may increase the ability to access areas outside of the Scenic Area.~~

- ***Coordination***. Coordination with the development of any of the projects set forth above within the Scenic Area would be ongoing throughout the timeframes of the project through construction and maintenance to assist in meeting overall goals, objectives, and policies

Based on these factors, it is expected that the project would not "unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area" (Wild and Scenic Rivers Act, 16 USC 1271-1287), so no impacts to wild and scenic rivers would occur. The project would not have a direct impact on any recreation area in the sense of impairing access, diminishing use, or restricting planned installations and improvements. The project would affect the visual experience of visitors in some locations (Figure 4.2-27 Key Recreation Viewing Areas and Recreational Facilities within Approximately 25 Miles). See Section 4.2.3 Aesthetics for more information about visual and aesthetic qualities and impacts.

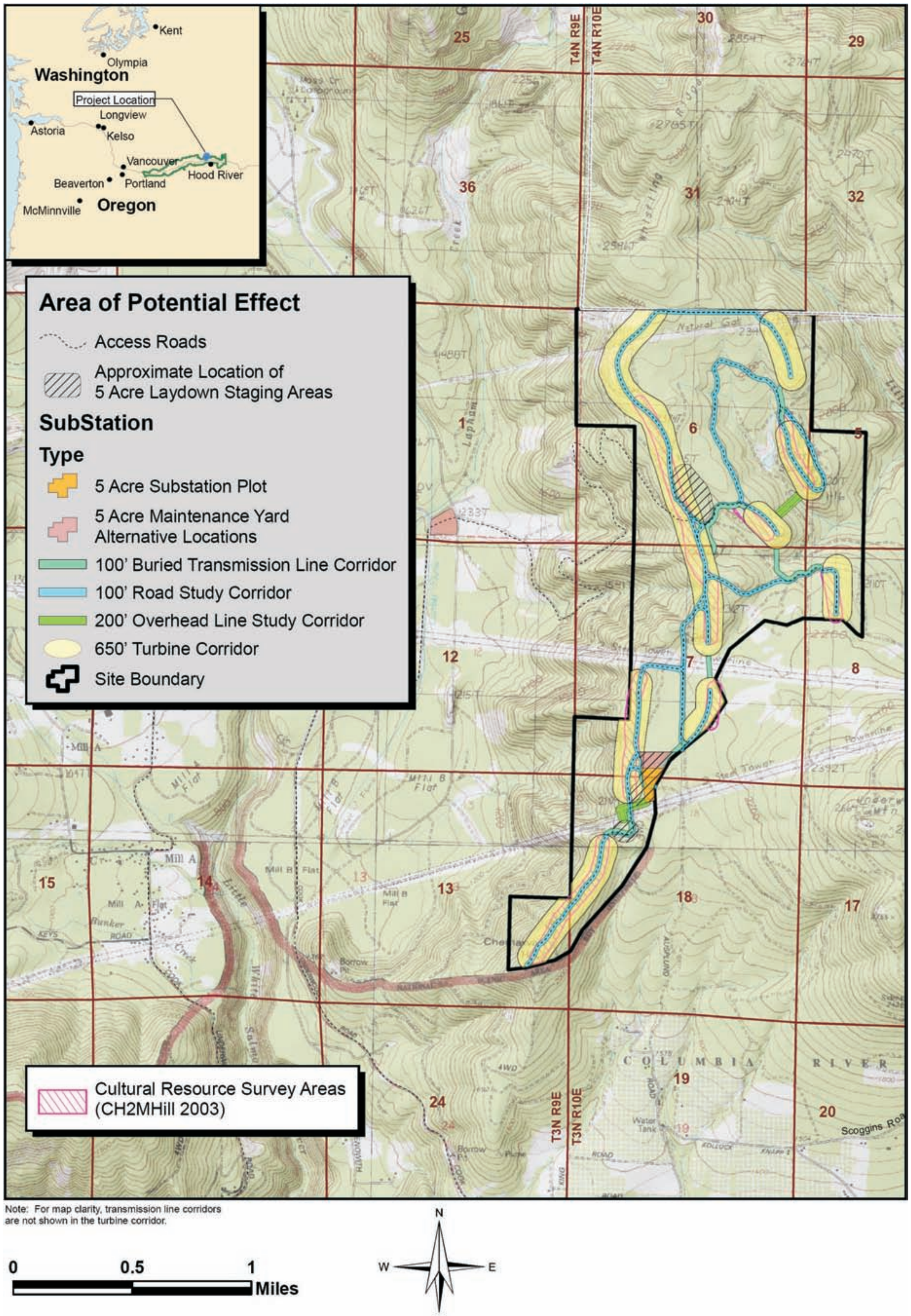
4.2.4.4 Mitigation Measures

Impacts to recreation users during the construction phase would primarily result from dust and noise from construction equipment. While the project would not affect any trails or pathways in the Scenic Area, there may be some distant views of wind turbines from trails during operations. Because they are high on the ridge, no mitigation measures are proposed other than painting the turbines a flat gray. See Section 2.11 Emission Control and 4.1 Environmental Health for mitigation measures proposed for air quality and noise during construction. See Section 4.2.3 Aesthetics for a discussion of visual and aesthetic impacts and mitigation measures.

4.2.5 HISTORIC AND CULTURAL PRESERVATION

4.2.5.1 Introduction

In 2003, CH2M Hill conducted a cultural resources survey at the proposed location for the Whistling Ridge Energy Project and site vicinity in order to assess the potential for such impacts. This survey was designed to identify, evaluate, and record prehistoric and historic cultural resources in accordance with Chapter 36 CFR §800. The survey objectives include identification of archaeological resources and historic properties that might be considered eligible for nomination to the National Register of Historic Places located within the area of potential effect for the development. The area of potential effect is shown on Figure 4.2-28, and includes a cumulative total of approximately 1,152 acres.



Source: GeoDataScape.

Job No. 33758687

Revised Figure 4.2-28

Area of Potential Effects

URS

Whistling Ridge Energy Project
Skamania County, Washington

The results of the survey and its findings have been reviewed by URS and no deficiencies were found. URS expanded the study area to include the new road access, West Pit Road, and completed a file search of this area at the Washington State Department of Archeology and Historic Preservation (DAHP) in July 2009. The file search revealed no archeological or historical sites. An inventory of the new access road survey of portions of the project site wouldand previously recorded resources will be revisited and forms updated, as appropriate, will be conducted in the spring fall 2009 by a URS archeologist to confirm the findings as part of preparation of the Environmental Impact Statement.

Study Methodology

This cultural resource assessment included a file search at the Washington State Department of Archaeology and Historic Preservation. Cultural and environmental background and history of the project vicinity was researched in order to provide an interpretive context for cultural resources potentially present in the project area. An intensive pedestrian inventory (survey) of all wind energy facility areas was conducted, and a windshield survey was conducted of proposed roads and road improvements. Literature was reviewed to examine the location and nature of potential traditional cultural properties (TCPs) in the project area. Potential TCP resources were sought during the field survey. The study methodology employed follows applicable NEPA regulations and is also consistent with US Secretary of Interior Standards for cultural resource survey and documentation under Section 106 of the National Historic Preservation Act (NHPA).

4.2.5.2 Regional Context

The cultural/historical sequence for the project vicinity is fairly well known, and was most recently provided by Griffin and Churchill (2001), but is also discussed by Beckham et al., (1988). Table 4.2-7 summarizes the prehistoric cultural/historical sequence in the project vicinity. The table is based on a synthesis of reports on archaeological sites and material cultural remains in the project vicinity. More information about the prehistoric cultural sequence can be found in Beckham et al. (1988).

Table 4.2-7
Prehistoric Cultural Sequence in the Project Vicinity

Cultural Period	Years Before Present	Site Types	Architecture	Subsistence
Early Period	11,000-	Rock shelters, open air use sites, lithic scatters, early in period	Few, if any, house structures early in period	Reliance primarily on large game hunting early in period
	4,500	Habitation sites, open use and lithic scatter sites, rock shelters, rock art, burials, etc. later in period	Increase in semi-subterranean house structures later in period	Increased reliance on fishing and botanical food resources, reliance on game hunting
Middle Period	4,500-250	Villages, resource processing camps, rock art, burials, open lithic scatters, etc.	Food storage facilities appear, increase in number and permanence of house structures	Further increase in reliance on fish and botanicals, reliance on game hunting secondary
Late Period	250-ethographic present	Permanent and temporary villages, burials, food storage sites, food processing sites, open air lithic scatters	Increased abundance of village sites, food storage facilities	Reliance on riverine, botanical and game resources

Sources: Griffin and Churchill (2001), Beckham et al. (1988)
Sequence defined by archeological sites and material cultural remains

The prehistoric cultural/historical sequence of the project area can be divided into three broad periods (Griffin and Churchill 2001). The **Early Period** began about 11,000 years BP and lasted until about 4,500 years BP. Cultural groups during the start of this period relied primarily on big game for subsistence. Botanical resources also were heavily used, although archaeological evidence for such is not plentiful. Few, if any, permanent dwelling or architectural structures are known from the early part of this period. However, the later part of this period is marked by an increased reliance on fish and botanical resources, and the introduction or increase in the use of semi-subterranean house structures. The appearance of such structures marks a decrease in mobility and a general increase in sedentism, particularly in winter months.

Architectural features, such as semi-subterranean house pits and food storage (cache) facilities marks the **Middle Period** (4,500-250 years BP). Such structures dating to this period are often found grouped in village configurations along streams and river confluence areas. Based on these architectural features, it is evident that cultural groups were sedentary during winter months. During this time, cultural groups continued to rely heavily on riverine and botanical resources, although large game animals were also used.

The **Late Period** (250 years BP [ethnographic present]) coincides with the introduction of the horse, resulting in increased mobility and a greater dispersal in settlement and access to a wider array of economically useful resources. Changes in material culture during this time period reflect the exploitation of a wider array of resources, as well as the increased access to European firearms and metal tools. During this period, cultural groups experienced drastic demographic changes as a result of European disease epidemics, the influx of European settlers and explorers, and related events (Griffin and Churchill 2001, Masten and Galm 1989, Beckham et al. 1988).

It is important to recognize that most evidence for prehistoric cultures is derived from lowland sites located near streams. Archaeological evidence in upland areas, such as the project vicinity, has not been extensively documented or explored. Upland forested areas are considered to be of lower archaeological sensitivity because these areas are often removed from permanent, resource bearing water sources, and are generally thought to lack the wider array of natural resources normally found in lowland and/or riverine settings. Upland forested areas have not yet yielded evidence of prehistoric seasonal, semi-permanent, or permanent settlements.

4.2.5.3 Cultural Background

The project vicinity is ethnographically important to the Yakama Indian Nation. Information about the ethnographic period has been developed by the Yakama through elder testimony (oral history) and is also found in early accounts of European exploration of the Columbia River and the Northwest. Beckham et al. (1988) and Griffin and Churchill (2001) provide detailed descriptions of the ethnographic background of the project site and its surrounding area.

Briefly, the Columbia River Gorge was traditionally used by several cultural groups: the Wishram, White Salmon, and Cascades groups (Eastern Chinookan linguistic group) and the Yakama and Klickitat groups (Echeesh-Keen linguistic group) (Griffin and Churchill 2001). These groups used the Columbia River and its tributaries. Although the groups established territorial boundaries (usually based on geography), these boundaries were loose. The groups subsisted on a seasonal round of resource procurement based on resource seasonality and availability (Griffin and Churchill 2001). While upland and inland resources were seasonally utilized, permanent or semi-permanent villages were located along streams and other permanent water sources.

Euro-American exploration by Lewis and Clark, the Northwest Fur Company, and Hudson's Bay Company describe the indigenous cultural groups that settled along the Columbia River. Accounts of the settlements of the Wishram, White Salmon, Cascades, Yakama and Klickitat by these early explorers confirm the land-use pattern described by ethnographic informants. The implication of this use pattern for cultural resources is that evidence of cultural activity in upland and inland areas may not be evident through material remains, if it exists at all. Rather, most archaeological evidence for ethnographic and ethnohistoric activity is expected to be found in lowland areas along major rivers and streams.

European-American settlement in the northwest directly resulted in the depopulation and displacement of native cultural groups. A temporary Indian Reservation, the White Salmon Reservation, was established at the mouth of the White Salmon River in 1856. After two years, the residents of the reservation were moved to the present-day Yakama Reservation, and Euro-American homesteaders quickly established homesteads in place of the old reservation. In 1855, a treaty was signed in which the Confederated Yakama Tribes ceded their traditionally used lands to the Government but reserved their rights, through the Treaty of 1855, to fish at traditional locations along the Columbia and its tributaries, and to hunt in their traditional lands as long as the lands remained open and unclaimed. Today, the Confederated Tribes and Bands of the Yakama Nation include 14 tribes and bands from at least three different linguistic groups (Griffin and Churchill 2001).

Historic Setting

Relevant themes of historical significance include homesteading, logging, development of dams, railroading, development of fisheries, and recreation. Homesteading in the area did not fully develop until 1857, when the Yakama Tribes were forcibly relocated from the Columbia River area. The Donation Land Act of 1850 enabled settlers to stake claims along the Columbia and its tributaries. The settlers pursued agriculture, established orchards, vineyards, and other crop fields groups (Griffin and Churchill 2001).

The development of the logging industry and dams coincided. Early lumber companies established dams to aid in the transport of timber. Timber harvest began in the White Salmon River area in the late 1800s. Dams were constructed at the mouths of most major tributaries to the Columbia River. Later, hydroelectric dam projects replaced the early logging dams in function. However, some remnants of these early structures remain in the area. The effects of these early logging dam construction activities on local fisheries are not well understood, but were likely harmful. The subsequent hydroelectric dams are known to have affected fisheries negatively. Although evidence of early dams may have been obliterated or inundated due to subsequent dam construction, evidence of early old-growth logging activities can be seen in upland areas, in the form of large stumps, springboard notches, logging roads, etc. (Griffin and Churchill 2001).

Development of the railroad in the Columbia River Gorge reached fruition by 1908. The complex history of local and regional railroad development cannot be reviewed here. However, it is important to note that the rail line paralleled the Columbia River and destroyed native fisheries and sites important to indigenous cultural groups. Evidence of the railroad appears in lowland areas, although the logging activities that took place in upland areas may be related to railroad construction (i.e., timber harvest for railroad ties may have taken place locally). The railroad was an important means of transportation for the area, and aided in the distribution of locally produced crops and goods to areas throughout Washington and Oregon. Other than small local roads, the railroad was the only means of transportation through the Columbia River Gorge until the 1920s (Griffin and Churchill 2001).

4.2.5.4 Cultural Resource Assessment

Pre-Field Research

Preliminary research consisted of a Department of Archaeology and Historic Preservation file search and literature review, a review of previously documented cultural resource in the project vicinity, and a review of previous cultural resource assessments conducted in the project vicinity.

On July 3, 2003, Ms. Raena Ballantyne, a CH2M HILL Cultural Resource Specialist, visited the Department of Archaeology and Historic Preservation in Olympia, Washington to determine whether cultural resources have been previously documented in the project area. In July 2009, Ms. Michelle Stegner, a URS Cultural Resource Specialist, expanded the study area to include the access road located outside of the Columbia River Gorge National Scenic Area. ~~This~~ Both searches provided basic information on the types and frequency distributions of cultural resources present or expected to be present in the project area, and also provided cultural context information.

No previously recorded cultural resources were documented in the area of potential effect for the project or the access road.

A number of cultural resources have been recorded outside of the project area in the project vicinity. Table 4.2-8 lists the known/recorded cultural resources and other pertinent information.

Table 4.2-8
Previously Documented Cultural Resources in the Project Vicinity in Relation to the Project Area of Potential Effect

Site Number	Site Type	National Register of Historic Places Eligibility Status	Location in Relation to Area of Potential Effect
45 SA 108	Prehistoric	Unevaluated	Completely outside
45 SA 408	Multicomponent	Unevaluated	Completely outside
45 SA 457	Historic	Unevaluated	Completely outside
45 SA 458	Historic	Unevaluated	Completely outside
45 KL 443	Prehistoric	Unevaluated	Completely outside
45 KL 444	Prehistoric	Unevaluated	Completely outside
45 KL 781	Prehistoric	Unevaluated	Completely outside
45 KL 782	Prehistoric	Unevaluated	Completely outside
45 KL 783	Prehistoric	Nominated, Eligible	Completely outside
45 KL 784	Prehistoric	Unevaluated	Completely outside
45 KL 789	Historic	Unevaluated	Completely outside
45 KL 790	Historic	Unevaluated	Completely outside
45 KL 841	Historic	SHPO[a] Determined Not Eligible	Completely outside
45 GP 596	Historic	Unevaluated	Completely outside

Site locations and other information obtained from the Department of Archaeology and Historic Preservation in Olympia, WA.
a. State Historic Preservation Officer

Native American Consultation

To initiate Tribal consultation, SDS Lumber Company invited Yakama tribal members to visit the project area in October 2007. Correspondence has been sent to cultural resource representatives of the Confederated Tribes and Bands of the Yakama Indian Reservation by SDS Lumber Company on November 4, 2008, requesting information on archaeological sites, traditional cultural properties, or any other concerns that the Tribe might have with this development. Two letters have been received from Chiefs of Tribes of the Yakama Nation, from Chief Wilbur Slockish of the Klickitat Tribe and from Chief Johnny Jackson of the Cascades Tribe. Neither letter identifies any traditional cultural properties or archeological sites within the project site. Copies of these letters are attached in Appendix F.

Field Survey Results

On August 12–14, 2003, Dr. James C. Bard, Mr. James J. Sharpe, and Ms. Raena Ballantyne, CH2M HILL Cultural Resource Specialists, conducted an intensive cultural resource inventory survey of the proposed area of potential effect. Proposed new roads and proposed upgrades to existing roads were inventoried using windshield survey methodology. Special attention was given to exposed road cut profiles and areas where streams or drainages crossed roadways. Each proposed turbine string and the proposed substation area were inventoried in a pedestrian survey using transects spaced 15 to 25 meters apart. The survey corridor width was 150 feet on each side of the hypothetical turbine centerline, for a total corridor width of 300 feet on each turbine string. The cultural resource specialists examined areas of exposed soils, rodent burrows, backdirt piles, upturned rootwads of trees, etc. Exploratory presence/absence shovel testing in the project area was not conducted. In some areas, surface duff and leaf litter was scraped away from boulder outcroppings and the forest floor to improve ground visibility. The project area lies on upland ridge top areas that are considered low in prehistoric archaeological sensitivity and moderately low in terms of historic archaeological sensitivity. In areas of greater archaeological potential (i.e., on broad terraces or areas near streams and drainages), surface duff and leaf litter accumulation were scraped away to expose soils; such areas were inspected closely for evidence of cultural activity. Two ~~Cultural~~ cultural resources, consisting of a rock alignment and an historic debris scatter ~~(archaeological sites and isolates)~~ were documented using Washington State ~~Site~~ Isolate Forms by CH2M Hill and complied with U.S. Secretary of the Interior Standards.

On October 15, 2003, the proposed staging areas (Figure 2.1-1, Location of Proposed Whistling Ridge energy Project) were surveyed by Dr. James C. Bard and Ms. Carrie Haag of CH2M Hill. A pedestrian survey of these staging areas followed the transect spacing and methodology described above. No cultural resources were observed in the staging areas.

Traditional Cultural Properties

No TCPs were identified during the fieldwork for this project, nor have any been identified to date within the study area.

Griffin and Churchill (2001) conducted a thorough TCP investigation for a project directly east of the proposed project area, and east of the White Salmon River. Several categories of TCPs were identified during their study, and examples of these types of TCPs occurred in their study area. TCPs include power sites, wishing sites, vision quest locales, sweathouse locations, previous longhouse locations, sacred plant habitats, “refrigerator” storage areas, human burial sites, petroglyph and pictograph sites, and oral tradition and legendary sites. Because the proposed project is located nearby in similar terrain, these same TCP types might be expected to exist in the proposed project area. As noted above, two letters have been received from Chiefs of Tribes of the Yakama Nation, from Chief Wilbur Slockish of the Klickitat Tribe and from Chief Johnny Jackson of the Cascades Tribe. Neither letter identifies any traditional cultural properties or archeological sites within the Project site. Copies of these letters are attached in Appendix F.

4.2.5.5 Impacts

Regulatory Framework

Federal and state regulations require consideration of project effects on historic and/or cultural resources. Cultural resources must undergo a Section 106 Review Process for projects with a federal nexus under the NHPA. Section 106 review can be included in an EIS as a part of the NEPA compliance documentation.

Under applicable regulations, cultural resources may include:

Historic Properties. Historic properties are places eligible for inclusion in the National Register of Historic Places. Historic properties can include districts, sites, buildings, structures, objects, and landscapes significant in American history, prehistory, architecture, archaeology, engineering, and culture. Historic properties include TCPs. Historic properties must be given consideration under NEPA and the NHPA.

Native American Cultural Resources. Native American cultural resources may include human skeletal remains, funerary items, sacred items, and objects of cultural patrimony. Native American cultural items must be given consideration under NEPA, the NHPA, the Native American Graves Protection and Repatriation Act, and the American Indian Religious Freedom Act. Native American sacred sites must be considered under the American Indian Religious Freedom Act and Executive Order 13007. Native American traditional resource procurement areas and culturally important regional landscapes are Native American cultural resources often considered to be traditional cultural properties (and thus potential "historic properties").

Archaeological Sites. Archaeological sites and other scientific data must be given consideration under NEPA, the Archaeological Resources Protection Act, the Archaeological Data Protection Act, and to some extent under the NHPA and the Native American Graves Protection and Repatriation Act.

Other Cultural Resources. Cultural institutions, lifeways, culturally valued viewsheds, places of cultural association, and other valued places and social institutions must be considered under NEPA, Executive Order 12898, and sometimes other authorities.

"Historic properties" are protected through NHPA (16 USC 470f) and its implementing regulation, Protection of Historic Properties (36 CFR Part 800), the Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act. Prior to implementing an "undertaking" (issuing a federal permit), Section 106 of the NHPA requires federal agencies (FHWA, Federal Transit Administration, etc.) to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation and the State Historic Preservation Officer a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register of Historic Places. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a tribe (TCPs) to be determined eligible for inclusion in the National Register of Historic Places.

Under the NHPA, cultural resources are considered significant if they meet the National Register of Historic Places listing criteria in 36 CFR 60.4. Cultural resources must be evaluated in terms of their overall quality and integrity of location, design, setting, materials, workmanship, feeling, and association. Cultural institutions, lifeways, culturally valued viewsheds, places of cultural association, and other valued places and social institutions also must be considered under NEPA, Executive Order 12898, and sometimes other authorities. The American Indian Religious Freedom Act allows access to sites of religious importance to Native Americans. The Archaeological Resources Protection Act assigns penalties for vandalism and the unauthorized collection of archaeological resources on federal land and provides for federal agencies to issue permits for scientific excavation by qualified archaeologists. The Native American Graves Protection and Repatriation Act assigns ownership of Native American graves found on federal land to their direct descendants or to a culturally affiliated tribe or organization and provides for repatriation of human remains and funerary items to identified Native American descendants.

Cultural Resource Sites – Washington

On August 12-14, 2003, CH2M HILL Cultural Resource Specialists conducted an intensive cultural resource inventory survey of the proposed area of potential effect. Surveyed areas are shown in Figure 4.2-28 Area of Potential Effects. Ground visibility in the project area varied from 15 percent to nearly 100 percent along turbine string areas, and was consistently 100 percent along proposed roadways and roads proposed for improvement. Soils in the project area are generally thin and characterized by sandy loam with angular and subangular cobble and gravel inclusions. Occasional boulder outcroppings are present in the project area. Such boulders were inspected for rock art, bedrock mortars, and other evidence of cultural use and modification.

The project area is covered by second and third growth commercial timber stands. Evidence of old growth logging is present in the project area in some locations: springboard notched and tall, large-diameter stumps can be observed in several locations throughout the project area.

No evidence of prehistoric activity was observed during the cultural resource survey. No archaeological sites or historic properties were identified, although two historic archaeological isolates were found and documented.

Isolate G2A is a linear stone alignment composed of piled basalt cobbles, all of which could be easily carried without the aid of machinery. No artifacts were found in association with the feature. The function and origin of the alignment are unknown, but the feature is thought to be associated with past logging activities.

Isolate B consists of a scatter of historic debris that has been badly disturbed by power transmission line construction, logging, and other development activities in the area. Artifacts from the area include very tiny fragments of purple, brown, olive green, clear, and white glass, two enamel metal cooking tins, a 1-gallon “Union Oil” can with “Triton SAE 30” stamped on the lid; tiny shards of blue on white ceramic, leather fragments, crushed tin cans and can fragments, and a tobacco tin lid. Most of the artifacts were very small and have been fragmented through past construction activity in the area.

Construction

No archaeological sites or historic properties were identified in the project area during the field inventory. All previously documented archaeological sites in the project vicinity are located well outside of the project area, as indicated in Table 4.2-8. Both of the archaeological isolates identified during the inventory for this project would likely be affected by the project. However, by definition, these isolates lack integrity and the ability to contribute information important to prehistory or history; they cannot be considered significant cultural resources. Construction of the proposed facilities is not anticipated to result in impacts to known/recorded cultural resources.

It is possible, although unlikely, that there are archaeological sites in the project area that were not detected during the archaeological inventory and fieldwork for this project. Such sites may be encountered during construction, installation, maintenance, and/or repair of the proposed wind energy facility. In the event of such an inadvertent discovery, work would be stopped in the area of the discovery and a qualified archaeologist be summoned to the area to identify and document the find and determine it significance.

TCPs are not known to exist in the project area and no impacts are anticipated.

In the unlikely event of a human remains discovery, federal law requires that all work in the area of the discovery be stopped immediately and the area secured. The Skamania County Medical Examiner would be contacted, and the State Historic Preservation Officer would be notified. If the Medical Examiner determines that the area is not a crime scene, and if the remains are determined to be Native American, the State Historic Preservation Officer and the tribes would consult to arrive at an appropriate treatment plan for the respectful re-internment of the remains.

Operations

Operation of the proposed facility would not result in impacts to known cultural resources. However, indirect impacts to cultural resources may result from maintenance activities. For example, maintenance activities for the proposed project facilities may require ground disturbances that could result in inadvertent discovery of cultural resources. If cultural resources are discovered during ground disturbing maintenance activities, assessment of the find would be necessary and appropriate mitigation measures implemented.

Decommissioning

Decommissioning of proposed project facilities is expected to result in impacts similar to construction impacts. There is a remote possibility that as-yet unidentified subsurface cultural resources could be discovered inadvertently during decommissioning activities. In this case, the protocol for such a discovery outlined in the Construction Impacts section above should be followed.

4.2.5.6 Mitigation Measures

Because no cultural resources (archaeological sites or historic properties) were identified in the project area, no mitigation actions are required. If cultural resources are inadvertently discovered during project construction and operations, assessment of the find would be necessary. If such cultural resources are found to be significant, mitigation measures would need to be devised and implemented.

4.2.6 AGRICULTURAL CROPS/ANIMALS

Agricultural activities are those activities conducted on lands defined in RCW 84.34.020(2) Open Space, Agricultural and Timber Lands - Current Use Assessment, and those activities involved in the production of crops and livestock, including but not limited to Operations and Maintenance of existing farm and stock ponds or drainage systems, irrigation systems, changes between agricultural activities, or maintenance or repair of existing serviceable structures and facilities. Activities that significantly impact a previously undisturbed critical area are not part of an on-going activity. An activity ceases to be on-going when the area on which it was conducted has been converted to a non-agricultural use, or has lain fallow for five years.

4.2.6.1 Existing Conditions

The Whistling Ridge Energy Project site would be on lands that have been used historically for commercial forestry. The project site has not been used for agricultural crops or animals.

4.2.6.2 Impacts

There would be no impacts to agricultural crops and animals.

4.2.6.3 Mitigation Measures

There would be no impacts to agricultural crops and animals, therefore mitigation measures are not proposed.

SECTION 4.3 TRANSPORTATION
(WAC 463-60-372)

Construction and operation of the proposed Whistling Ridge Energy Project would affect transportation and traffic in the site area. Transportation issues would include construction traffic on roads (workers, equipment, and material deliveries by truck); transporting large wind energy facility components including tower sections, the nacelle and turbines, and blades either on rail lines or on the Columbia River; and Whistling Ridge Energy operation traffic (employees, visitors, deliveries of materials, and supplies). Types of transportation addressed in this section include roadway, rail, river, and air transport.

4.3.1 EXISTING CONDITIONS

4.3.1.1 Regional and Site Area

The Whistling Ridge Energy Project would be located on private land approximately 7 miles northwest of the city of White Salmon, and approximately 2 miles east of the Little White Salmon River in Skamania County, Washington. The general location is provided on Figure 2.1-1. The project would be located on commercial forest land owned by S.D.S. Co., LLC and Broughton Lumber Company in an unincorporated area of Skamania County, outside of the Columbia River Gorge National Scenic Area. Approximately 2.1 miles of an existing private logging road would traverse the Scenic Area boundary (Figure 4.3-1, Project Site Roadway Network).

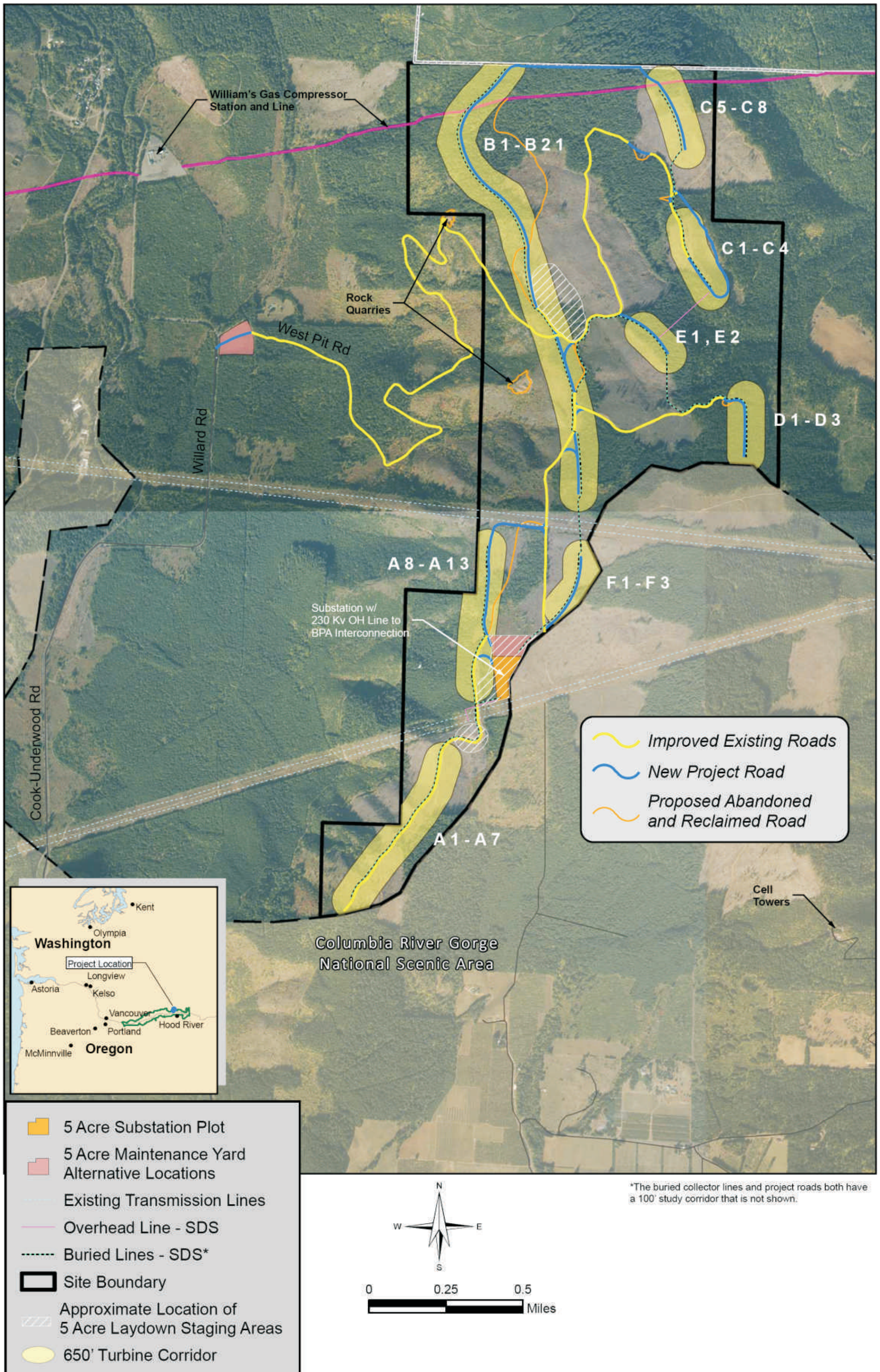
Roadway, rail, river, and air transportation are available in the regional and site areas surrounding the Whistling Ridge Energy Project.

Roadway Transportation

Existing Roadways

Access to the proposed Whistling Ridge Energy Project site would be provided by county roads that extend northward from SR 14, as well as an existing private logging road. From SR 14, access would be provided along Cook-Underwood Road to Willard Road, Kollack-Knapp Road, Scoggins Road, and then via a new direct connection to West Pit Road. West Pit Road is an existing private logging road listed as CG2930. that connects to a network of The existing private logging roads is located on S.D.S. Co., LLC and Broughton Lumber Company property, and. These logging roads would provide access to most areas where project facilities would be located (Figures 4.3-1 Project Site Roadway Network and 4.3-2 4.3-2a and 4.3-2b, Other Roads with Potential Impact).

33758687_97.cdr



Source: GeoDataScape.

Job No. 33758687

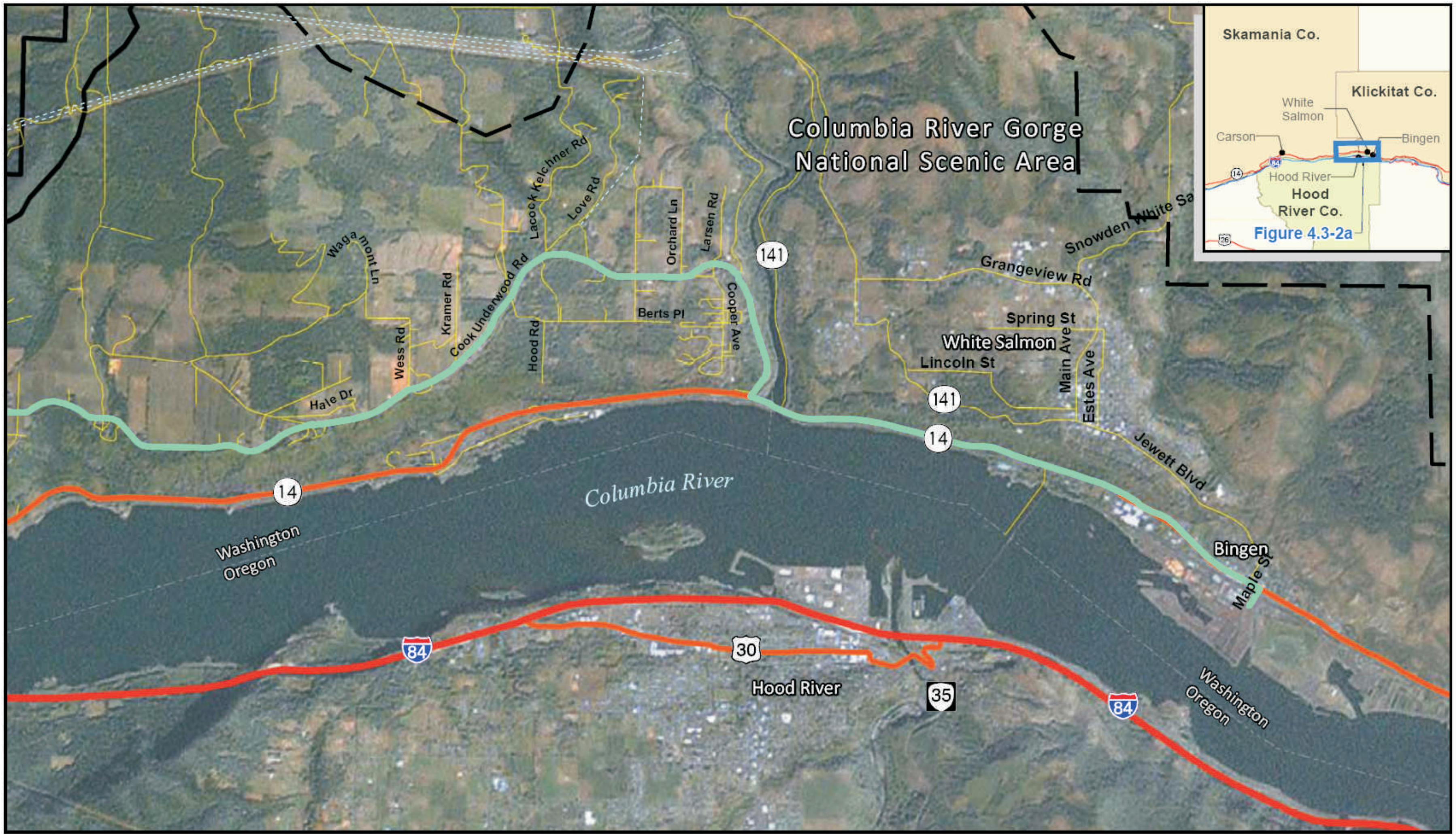
Revised Figure 4.3-1

Project Site Roadway Network

URS

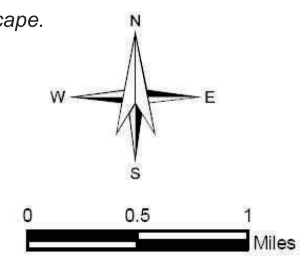
Whistling Ridge Energy Project
Skamania County, Washington

33758687_78.cdr



- Site Boundary
- Columbia River Gorge National Scenic Area
- Other Roads with Potential Project Use
- Local Roads

Source: GeoDataScape.



Revised Figure 4.3-2a

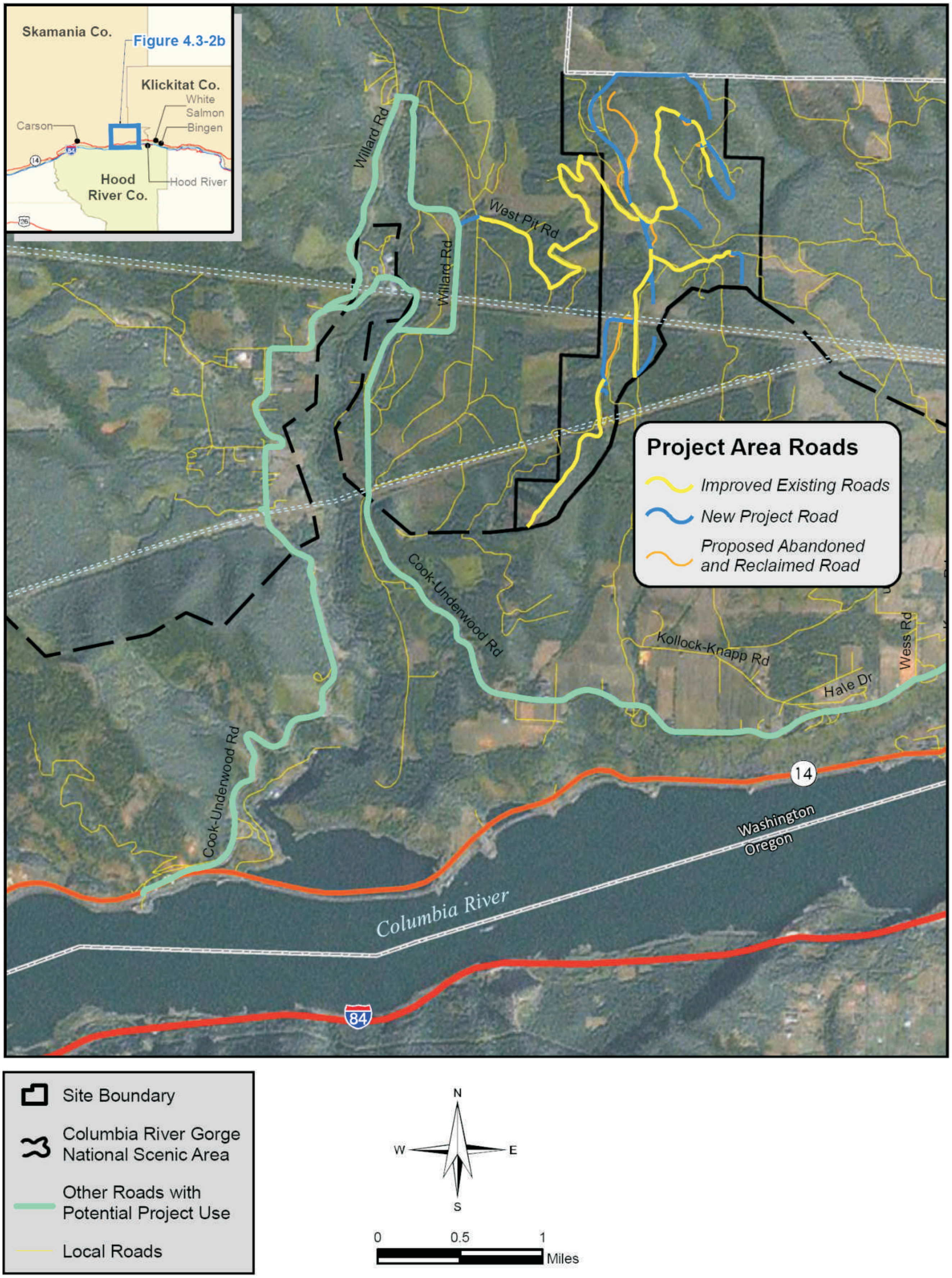
Other Roads with Potential Impact

Job No. 33758687

URS

Whistling Ridge Energy Project
Skamania County, Washington

33758687_105.cdr



Source: GeoDataScape.

Job No. 33758687

Revised Figure 4.3-2b

Other Roads with Potential Impact

URS

Whistling Ridge Energy Project
Skamania County, Washington

Very little as-built information is available regarding existing pavement and base thickness along the proposed haul route. Field observations were conducted in 2007 and in January and July of 2009, and it was determined that the County roads are generally in good condition with certain sections showing signs of distress. West Pit Road was observed The private logging road was determined to be generally in poor condition, however roadway improvements for logging purposes were made during the summer of 2009. Additional improvements (beyond those needed for logging operations) will be needed for project construction and operation.

Pavement thickness was determined through measurement of pavement core samples. Roadway sub-grade testing was conducted along the proposed haul route using a dynamic cone penetrometer. Laboratory testing was conducted and in situ sub-grade strength parameters were determined.

State Route 14. SR 14 between I-5 and the proposed project site is generally very narrow with 12-foot lanes and 2- to 4-foot paved shoulders. It also has many hills, and curves with tight corners in several places. East of the project site on SR 14, there is one low and very narrow tunnel east of the town of Lyle, and also a very narrow bridge east of the city of The Dalles at approximately MP 86. Between Cook-Underwood Road and SR 97 (Goldendale), SR 14 is generally narrow with 12-foot lanes and 2- to 4-foot paved shoulders. It also has some tight low-recommended-speed corners and a number of hills. Between SR 97 and the junction with SR 395/I-82, SR 14 is generally narrow with 12-foot lanes and 2- to 4-foot paved shoulders.

Maple Street. To get from the SDS Lumber Company facility to SR 14, trucks would need to drive on Maple Street for approximately 0.25 mile. This road was recently constructed and is in good condition. Maple Street has two 12-foot lanes, a wide concrete sidewalk on the east side, and a paved shoulder on the west side. This street is under the jurisdiction of the City of Bingen. There are currently no over-size or over-weight load restrictions in force.

Cook-Underwood Road. Cook-Underwood Road has two 12-foot lanes and paved shoulders that are 1 foot or less in width. In general, the side slope begins at the fog line. This road is under the jurisdiction of Skamania County. There are currently no over-size or over-weight load restrictions in force.

Willard Road. Willard Road has two 12-foot lanes and paved shoulders that are 1 foot or less in width. This road is under the jurisdiction of Skamania County. There are currently no over-size or over-weight load restrictions in force.

West Pit Road. West Pit Road varies in width from 20 to 26 feet. It is a dirt road covered in light pit run.

Kollock-Knapp Road. Kollock-Knapp Road has two 12-foot lanes and paved shoulders that are 1 foot or less in width. This road is under the jurisdiction of Skamania County. There are currently no over-size or over-weight load restrictions in force.

~~**Scoggins Road.** Scoggins Road is a narrow road without centerline delineation or useable shoulders. This road is under the jurisdiction of Skamania County. There are currently no over-size or over-weight load restrictions in force.~~

~~**CG2930:** CG2930 is currently very narrow, approximately 10 to 12 feet wide.~~

Existing Traffic Volumes

Average annual daily traffic (AADT) data for SR 14 was obtained from the ~~WSDOT's 2006~~ WSDOT 2008 Annual Traffic Report (WSDOT ~~2006~~ 2008). AADT on SR 14 at the west junction with Cook-Underwood Road during ~~2006~~ 2008 was approximately ~~2,800~~ 3,000 vehicles per day (vpd), and at the east junction with Cook-Underwood Road was approximately 3,300 vpd. A growth rate was developed for the project vicinity using historic data from annual traffic reports between 1996 and ~~2006~~ 2008. During several years between 1996 and ~~2006~~ 2008, there was no recorded historical growth in this area. Using this data, an average weighted growth rate of approximately 1 percent per year was determined. Estimated AADT on SR 14 at the west junction with Cook-Underwood Road during ~~2008~~ 2009 would be approximately ~~3,000~~ 3,100 vpd, and at the east junction with Cook-Underwood Road would be approximately 3,400 vpd.

Peak hour directional volumes were developed based on typical rural highway traffic patterns and proximity of business centers. Typical rural highway traffic patterns conservatively assume AM peak hour volumes to be approximately 7 percent of the total daily volumes, and PM peak hour volumes to be approximately 10 percent of the total daily volumes, with a directional split of 70/30. PM peak hour volumes are traditionally considered to by the highest during a given day. No current traffic data is available for Cook-Underwood Road at either the west or east junctions with SR 14, and traffic volumes were assumed using good engineering judgment and are based on typical patterns for small rural towns. Estimated ~~2008~~ 2009 PM peak hour traffic volumes at ~~the junction of SR 14 and Cook-Underwood Road~~ both the west and the east junctions of Cook-Underwood Road with SR 14 are presented in Table 4.3-1.

Table 4.3-1
Estimated ~~2008~~ 2009 PM Peak Hour Traffic Volumes
at West and East Junctions of SR 14 and Cook-Underwood Road

Location	West Junction PM Peak Hour (4:00 to 5:00)	East Junction PM Peak Hour (4:00 to 5:00)
Eastbound SR 14	90	~~90~~100
Westbound SR 14	220	~~210~~ 240
Southbound Cook-Underwood Road	10	10

Existing Level of Service

Level of service (LOS) is an estimate of operational performance based on travel delay to motor vehicles. The *Highway Capacity Manual* (TRB 2000) published by the Transportation Research Board is generally used when determining LOS. The *Highway Capacity Manual* defines LOS using a letter scale from A to F. LOS A is defined as minimal or no delay to vehicles and LOS F is defined as extreme delays to vehicles. LOS criteria for two-way-stop-control intersections are presented in Table 4.3-2.

Table 4.3-2
Level of Service Criteria for
Two-Way-Stop-Control Intersections

Level of Service	Expected Traffic Delay
A	< 10 seconds
B	> 10 - 15 seconds
C	> 15 - 25 seconds
D	> 25 - 35 seconds
E	> 35 - 50 seconds
F	> 50 seconds

Source: TRB (2000)

LOS analyses were conducted for the junction at SR 14 and Cook-Underwood Road both the west and the east junctions of Cook-Underwood Road with SR 14 using Highway Capacity Software Plus (HCS+). HCS+ algorithms are based on *Highway Capacity Manual* (TRB 2000) methodologies.

Analyses indicate that under 2008 2009 estimated traffic volumes, less than up to approximately 10 seconds of delay would be experienced by all some vehicles at the junction of SR 14 and Cook-Underwood Road the west junction of Cook-Underwood Road with SR 14. Slightly greater than 10 seconds of delay would be experienced by some vehicles at the east junction of Cook-Underwood Road with SR 14.during the PM peak hour These delays of approximately 10 seconds would only be expected to occur during the PM peak hour. with LOS A operations would be maintained at the west junction and LOS B or better operations at the east junction (Table 4.3-3). LOS C or better is typically considered acceptable for rural intersections and is the LOS threshold for Skamania County.

Table 4.3-3
Level of Service Summary
Estimated 2008 2009 Traffic Volumes
at West and East Junctions of SR 14 and Cook-Underwood Road

Roadway and Turning Movement	Peak Hour	West Junction Estimated 2009 Traffic Volumes		East Junction Estimated 2008 2009 Traffic Volumes	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 14 Eastbound Left Turn	PM	7.9	A	7.98.0	A
Cook-Underwood Road Southbound Left/Right Turn	PM	10.0-	A	9.910.2	AB

Delay = Average per vehicle

Estimated Future Traffic Volumes

The Whistling Ridge Energy Project is scheduled to begin construction during the spring of 2010 2011, and be fully operational by the spring of 2011 mid-year 2012. Traffic volumes were estimated for these years based on the previously mentioned average weighted growth rate of approximately 1 percent per year. Estimated future traffic volumes without the Whistling Ridge Energy Project are presented in Table 4.3-4.

Table 4.3-4
Estimated ~~2010~~ 2011 and ~~2011~~ 2012 Traffic Volumes without the Project

Location	West Junction of Cook-Underwood Road with SR 14		East Junction of Cook-Underwood Road with SR 14	
	2011 PM Peak Hour (4:00 to 5:00)	2012 PM Peak Hour (4:00 to 5:00)	~~2010~~ 2011 PM Peak Hour (4:00 to 5:00)	~~2011~~ 2012 PM Peak Hour (4:00 to 5:00)
Eastbound SR 14	110	110	100	100
Westbound SR 14	260	260	~~220~~ 230	~~230~~ 240
Southbound Cook-Underwood Road	10	10	10	10

Estimated Future Level of Service

LOS analyses indicate that ~~the junction of SR 14 and Cook-Underwood Road~~ both the west and the east junctions of Cook-Underwood Road with SR 14 would continue to operate at LOS A along SR 14 during 2011 and 2012. The southbound approach at the west junction of Cook-Underwood Road with SR 14 would degrade to LOS B during 2011 and would remain at LOS B operations during 2012. On the southbound approach at the east junction of Cook-Underwood Road with SR 14, LOS B operations would be maintained during both future years with no change in LOS over year 2009.~~, but would degrade to LOS B at the Cook-Underwood Road approach under both estimated future year scenarios.~~ LOS summaries for estimated future year traffic volumes without the Whistling Ridge Energy Project are presented in Tables 4.3-5.

Table 4.3-5
Level of Service Summary
Estimated ~~2010~~ 2011 and ~~2011~~ 2012 Traffic Volumes without Project at Junctions of Cook-Underwood Road with SR 14

Roadway and Turning Movement	Peak Hour	West Junction				East Junction			
		Estimated 2011 Traffic Volumes		Estimated 2012 Traffic Volumes		Estimated ~~2010~~ 2011 Traffic Volumes		Estimated ~~2011~~ 2012 Traffic Volumes	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 14 Eastbound Left Turn	PM	8.0	A	8.0	A	~~7.9~~ 8.0	A	8.0	A
Cook-Underwood Road Southbound Left/Right Turn	PM	10.1	B	10.2	B	~~10.0~~10.3	B	~~10.1~~10.3	B

Delay = Average per vehicle

Rail Transportation

The BNSF Railway operates a rail mainline that runs parallel to SR 14 to the south of the proposed project site. This line is a major link that ties the important industrial areas of Vancouver, BC; Portland, Oregon; and Seattle/Tacoma, Washington to the north-central states of the US, and eastern railroads via Chicago. SDS Lumber Company currently has two rail spurs from the BNSF mainline to their Bingen site. One spur terminates at the Maple Street crossing and is approximately 800 feet in length. The second spur terminates at the plywood facility and is approximately 2,000 feet in length.

River Transportation

The proposed project site is located north of the Columbia River, which runs predominantly from east to west (and towards the Pacific Ocean) in this part of the state. River transportation in the site area includes barge and boat/shipping transport on the Columbia River. Barges moving upriver from the Ports of Longview or Vancouver are transported to the Bonneville Dam using tug boats. The barges and tugs bypass the Bonneville Dam via the lockage facility, and continue upriver past the SDS Lumber Company facility in Bingen. SDS has a dock and crane suitable for the use of unloading equipment. The Bonneville lockage facility accommodates commercial, government, and recreational vessels. The heaviest lockage traffic on average occurs during the month of August. Vessel traffic is typically heaviest on Thursdays, Fridays, Saturdays, and Sundays.

Air Transportation

Air transportation in the regional area includes the Portland International Airport, approximately 60 miles southwest of the proposed project site, and several other public and private local airports within a 10-mile radius.

4.3.2 IMPACTS

To determine potential transportation impacts, the Skamania County Public Works Department Manager, the County Engineer, and the Maintenance Superintendent were consulted to better understand existing roadway conditions, the proposed haul route, and traffic patterns. A pre and post over-weight haul design strategy for pavement assessment would be developed for the existing roadway network that would be used for the proposed haul route during construction.

4.3.2.1 Construction Access Routes

Construction access to the proposed tower locations would be achieved through travel along SR 14, Cook-Underwood Road,~~ Kollock-Knapp Road, Scoggins Road, and CG2930.~~ Willard Road, and West Pit Road. Historically, ~~CG2930~~ West Pit Road has been used primarily in support of logging activity.~~ and for access to existing BPA transmission lines.~~ Cook-Underwood Road, ~~Kollack-Knapp Road, and Scoggins Road~~ and Willard Road are paved Skamania County roadways that extend northward from SR 14, a Washington State roadway, towards the proposed project site. ~~The private logging road listed as CG2930 connects to Scoggins Road and consists of dirt and rock.~~ West Pit Road consists of dirt and rock and extends eastward towards the proposed project site. A new direct connection will be constructed between Willard Road and West Pit Road.

The Skamania County 2007 Comprehensive Plan, Chapter 4, Transportation Element, lists Cook-Underwood Road as Federal Functional Classification "Major Rural Collector" in County District 3. ~~Kollock-Knapp Road and Scoggins Road~~ Willard Road is~~are~~ listed as "Rural Local Access" also in County District 3. The Comprehensive Plan Transportation Element was developed to address transportation needs in Skamania County. It represents the County's policy plan for the next 20 years and specifically considers the location and condition of the existing traffic circulation system, the projected transportation needs, and plans for addressing future transportation needs while maintaining established level of service standards.

The Southwest Washington Regional Transportation Council is the Regional Transportation Planning Organization for Skamania County, including the cities of Bingen and White Salmon.

All wind energy components including tower sections, the nacelle and turbines, and blades would be shipped to either the Port of Longview or the Port of Vancouver, and then be transported by any or all of the following three modes of travel:

- Specialized trucks along State, County, City, and private roadways
- BNSF rail lines running parallel to SR 14
- Barge and tug boat up the Columbia River and through the lockage facility at the Bonneville Dam

Wind energy components transported on specialized trucks from either of the Ports would be delivered directly to the proposed project site. Components transported either by rail or barge from either of the Ports would be delivered directly to the SDS Lumber Company industrial facility, loaded onto specialized trucks, and then transported to the proposed project site. Fuel would be delivered to the proposed site by truck as needed.

A discussion presenting details for each mode of transport follows.

Specialized Trucks

Specialized trucks may be used to transport wind energy components from either the Port of Longview or the Port of Vancouver to the ~~junction of SR 14 and Cook-Underwood Road.~~ west junction of Cook-Underwood Road with SR 14 at MP 56.28. Trucks transporting wind energy components could have loads as high as 17.5 feet measured from the ground to the highest point of the load, as wide as 14.5 feet or as long as 150 feet. ~~Trucks traveling along SR 14 between Vancouver, Washington and Cook-Underwood Road would be physically constrained by a series of three very narrow tunnels with height restrictions as low as 13 feet 9 inches measured vertically from the edge of the roadway (Figure 4.3-3, Tunnel Locations along SR 14).~~ Over-size loads that would include transport of the tower sections, the nacelles and turbines, and blades would encounter restrictions and/or prohibitions along SR 14 between Vancouver, Washington and the west junction of SR 14 and Cook-Underwood Road at MP ~~63.32~~56.28 due to the length and/or width of the loads. The WSDOT roadway restrictions that apply to this section of SR 14 are summarized in Table 4.3-6, Road and Bridge Restrictions for Oversize Motor Vehicles on SR 14. Cook-Underwood Road near its northern most point at approximate MP 5.5 contains a bridge that crosses the Little White Salmon River. Crossing this bridge with specialized trucks transporting wind energy components would require special provisions agreed upon between S.D.S Co., LLC and Skamania County.

~~Figure 4.3-3, Tunnel Locations along SR 14.~~

Table 4.3-6
Road and Bridge Restrictions for Oversize Motor Vehicles on SR 14
(all restrictions apply in both directions)

Milepost	Height	Width	Length
18.89 to 34.68 (west of project)	Loads over 10' wide require 1 front and 1 rear pilot cars		
19 to 56 (west of project)		Loads over 14' wide require 2 front and 1 rear pilot cars	
19 to 83.53 (west and east of project)			Loads over 125' – trailer/load length prohibited
56.28 to 63.25 (west of project)	All overheight (14')[1] loads must contact WSDOT Goldendale Office Detour via Cook-Underwood Road must be approved by Skamania County	No loads over 12' wide allowed Loads between 8.5 and 10' wide require 2 front and 1 rear pilot cars	
65 to 65 Hood River Bridge Crossing (east of project)		No overwidth loads allowed	
76.77 to 76.91 (east of project)	All overheight (14') loads must contact WSDOT Goldendale Office	Loads over 10' wide require 2 front and 1 rear pilot cars	

An alternate route for transport of wind energy components from either of the Ports to the east junction of SR 14 and Cook-Underwood Road at MP 63.32 would include trucks traveling on I-84 through Oregon to the Boardman junction, then along SR 730 to the junction of I-82 with SR 395, across the Columbia River back into Washington State and then to SR 14. Trucks traveling on SR 14 between the junction of I-82/SR 395 and Cook-Underwood Road would be physically constrained by one very narrow tunnel with a height restriction of 13 feet 3 inches measured vertically from the edge of the roadway.

There are several additional Columbia River crossings west of the I-82/SR 395 crossing, but each has weight restrictions that would prohibit the transport of wind energy components. These crossings include the Bridge of the Gods, the Hood River Bridge, SR 197, and SR 97.

All loads over 10 feet wide traveling from east of the proposed project site between MP 76.77 and 76.91 would require three pilot cars, two in front and one in the rear. The two front pilot cars would be required to maintain a minimum 500-foot separation. The lead pilot car in front of the load would warn oncoming traffic of the over-size load, and the pilot car immediately in front of the over-size load would be responsible to stop all oncoming traffic. All loads over 125 feet in length (including the trailer and load) traveling from east of the proposed project site between MP 83.50 (at the junction of SR 197) and MP 63.32 (at the east junction of SR 14 ~~and~~ with Cook-Underwood Road) are prohibited as of October 11, 2007. Special provisions and/or permitting may be required to transport the wind energy blades to the junction of SR 14 and Cook-Underwood Road at MP 63.32 from the junction of SR 197 (MP 83.50) if this route is selected.

[1] Heights are measured from the ground to the highest point on the load.

This transport option for wind energy components between either of the Ports and the east junction of SR 14 and Cook-Underwood Road at MP 63.32 from ~~both~~ east~~ and west~~ of the proposed project site may not be physically possible. However, specialized trucks would still be required to transport the wind energy components from the SDS Lumber Company industrial facility in Bingen, Washington to the proposed project site should they be transported on rail or barge from~~ the Port of Longview~~ either of the Ports. Transport of wind energy components using specialized trucks from the SDS Lumber Company facility to SR 14 would require the use of Maple Street in the City of Bingen, Washington for approximately 0.25 mile. There are currently no over-size or over-weight restrictions for this roadway. Transport of the wind energy blades from the SDS Lumber Company industrial facility to the east junction of SR 14 and Cook-Underwood Road at MP 63.32 would require the use of SR 14, which has a restriction on loads over 125 feet in length.

Rail

The option of using rail to transport the wind energy components from the Port of Longview to the SDS Lumber Company industrial facility also was analyzed. Wind energy components on rail cars can be up to 14.5 feet in width, up to approximately 15 feet in height, and as long as 150 feet. The BNSF rail line between Vancouver, Washington and the SDS Lumber Company facility in Bingen, Washington may not be able to accommodate loads with widths in excess of 14 feet. This may preclude transport of the bottom tower sections using rail. The wind energy nacelles, turbines, and blades could be transported along the BNSF line to the SDS Lumber Company facility. BNSF could transport the wind energy components on standard or heavy-duty 89-foot long flat rail cars. The wind energy components would be off-loaded at the SDS Lumber Company facility to a staging location to be determined and loaded onto specialized trucks for transport to the proposed project site. Transport of wind energy components using specialized trucks from the SDS Lumber Company industrial facility to SR 14 would require the use of Maple Street in the City of Bingen, Washington for approximately 0.25 mile. There are currently no over-size or over-weight restrictions for this roadway. Transport of the wind energy blades from the SDS Lumber Company facility to the east junction of SR 14 and Cook-Underwood Road at MP 63.32 using specialized trucks would require the use of SR 14, which has a restriction on loads over 125 feet in length.

Barge

The third option analyzed for transporting the wind energy components from either the Port of Longview or Port of Vancouver to the SDS Lumber Company industrial facility was by using barges. The wind energy components would be off-loaded from a ship at either of the Ports, loaded onto barges, and then transported upriver to the Bonneville Dam using tug boats. The barges and tugs would by-pass the Bonneville Dam via the lockage facility, and continue upriver to the SDS Lumber Company industrial facility. There would be no over-size or over-weight restrictions using barges as a transport mode for wind energy components at either of the Ports, on the Columbia River, or at the lockage facility at the Bonneville Dam. Coordination with the Bonneville Dam Project Office would be required to determine optimal times for lockage use. The Bonneville lockage facility accommodates commercial, government, and recreational vessels. The heaviest lockage traffic on average occurs during the month of August. Vessel traffic is typically heaviest on Thursdays, Fridays, Saturdays, and Sundays. The wind energy components would be off-loaded at the SDS Lumber Company industrial facility to a staging location to be determined and loaded onto specialized trucks for transport to the proposed project site. Transport of wind energy components using specialized trucks from the SDS Lumber Company facility to SR 14 would require the use of Maple Street in the City of Bingen, Washington for approximately 0.25 mile. There are currently no over-size or over-weight restrictions for this roadway. Like the use of rail, this option would still require using specialized trucks to transport the wind energy blades from the SDS Lumber Company facility to the east junction of SR 14 and Cook-Underwood Road at MP 63.32, and this section of SR 14 has a length restriction of 125 feet.

4.3.2.2 Roadway Improvements

Improvements to the County roadways and the private logging road would be necessary to support the long and heavy loads that would be required for the delivery of the wind energy components from SR 14 to the proposed project site. Improvements required for support of construction activities would depend primarily upon truck size, load size, and axle loading. Roadway improvements could include:

- Rebuilding large sections of the existing roadway network
- Widening certain sections of the existing roadway network
- Flattening and/or rebuilding existing roadway topography both horizontally and vertically
- Placing asphalt in select areas for hauling equipment access

A detailed discussion of specific roadway improvements for each roadway along the haul route follows. All private roadway improvements required prior to hauling and new private roadway construction at the proposed project site would be designed and constructed in accordance with the standards for the applicable road classifications as set forth in the Skamania County Private Road Guidelines and Development Assistance Manual, 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 Street*s (AASHTO 2004).

State Route 14. All over-size and over-weight loads would require permits. These loads also would require pilot cars both in the front and the rear, and could require additional traffic control measures. SR 14 would require no improvements to accommodate the transport of wind energy components~~, except possibly for the need for minor improvements at the intersection of SR 14 and Cook-Underwood Road.~~.

Maple Street. To get from the SDS Lumber Company facility to SR 14, trucks would need to drive on Maple Street for approximately 0.25 mile. This road was recently constructed and is in good condition. Maple Street has two 12-foot lanes, a wide concrete sidewalk on the east side, and a paved shoulder on the west side. There are currently no over-size or over-weight load restrictions in force and permitting by the City of Bingen would not be required. These loads would require pilot cars both in the front and the rear and could require additional traffic control measures. Maple Street would require no improvements to accommodate the transport of wind energy components.

Cook-Underwood Road. Cook-Underwood Road has two 12-foot lanes and paved shoulders that are 1 foot or less in width. There are currently no over-size or over-weight load restrictions in force but permitting would be required by Skamania County. These loads would require pilot cars both in the front and the rear and could require additional traffic control measures. Cook-Underwood Road would require no improvements to accommodate the transport of wind energy components ~~outside the limits of the junction with SR 14 and the intersection with Kollock-Knapp Road~~.

~~At the junction with SR 14, improvements would be required.~~ Specialized trucks (including a drivable rear axle) transporting wind energy blades (which are the longest single wind energy component) ~~westbound~~ eastbound on SR 14 onto Cook-Underwood Road at MP 56.28 or westbound onto Cook-Underwood Road at MP 63.32 would require a 135-foot inside turning radius, and a 20-foot allowance for "tip swing." Approximately 15 to 20 feet of the wind energy blade would extend beyond the centerline of the drivable rear axle.

~~At the intersection of Cook-Underwood Road and Kollock-Knapp Road (Figure 4.3-8), improvements would be required for transport of wind energy blades to the proposed project site. To accommodate the required truck turning radii, temporary widening at this intersection would be required. Widening would include removal of trees and vegetation and embankment cut sections both on the inside and outside of the turn. The embankment cut sections would not require paving, but would require an all-weather driving surface. Right of way ownership and easement determination would be required.~~

At the intersection of Cook-Underwood Road and Willard Road improvements could be required for transport of wind energy blades to the proposed project site for trucks coming from the west. To accommodate the required truck turning radii, temporary widening at this intersection could be required. Widening could include removal of trees and vegetation, and engineered fill sections and embankment cut sections. The engineered fill and embankment cut sections would not require paving, but would require an all-weather driving surface. Right of way ownership and easement determination would be required.

Willard Road. Willard Road has two 12-foot lanes and paved shoulders that are 1 foot or less in width. In general, the side slope begins at the fog line. There are currently no over-size or over-weight load restrictions in force but permitting would be required by Skamania County. These loads also would require pilot cars both in the front and the rear and could require additional traffic control measures. Willard Road would require no improvements to accommodate the transport of wind energy components outside the limits of the intersection with Cook-Underwood Road.

A new direct connection would be required between Willard Road and West Pit Road for transport of wind energy blades to the proposed project site. The intersection of Willard Road and West Pit Road would be designed to accommodate the required truck turning radii.

West Pit Road. West Pit Road varies in width from 20 to 26 feet. It is a dirt road covered in light pit run. This road would require additional permanent widening to to accommodate transport of wind energy components from Willard Road to the proposed project site. West Pit Road would be improved to provide a minimum drivable section width of 25 feet (width of finished road), with an additional 5 feet of shoulder on either side to provide access to the site by construction vehicles, with allowance for side slope and drainage. Widening could include removal of trees and vegetation, and engineered fill sections and embankment cut sections. The engineered fill and embankment cut sections would not require paving, but would require an all-weather driving surface.

Kollock-Knapp Road. Kollock-Knapp Road has two 12-foot lanes and paved shoulders that are 1 foot or less in width (Figures 4.3-9 through 4.3-12). In general, the side slope begins at the fog line. There are currently no over-size or over-weight load restrictions in force but permitting would be required by Skamania County. These loads also would require pilot cars both in the front and the rear and could require additional traffic control measures. Kollock-Knapp Road would require no improvements to accommodate the transport of wind energy components outside the limits of the intersections with Cook-Underwood Road and Scoggins Road.

At the intersection of Kollock-Knapp Road and Scoggins Road (Figures 4.3-13 and 4.3-14), improvements would be required for transport of wind energy blades to the proposed project site. To accommodate the required truck turning radii, temporary widening at this intersection would be required. Widening would include removal of trees, vegetation, and fencing as well as an engineered fill and embankment cut section on the outside of the turn; and removal of vegetation and shrubs and an embankment cut section on the inside of the turn. The engineered fill and embankment cut sections would not require paving, but would require an all-weather driving surface. Right of way ownership and easement determination would be required.

Scoggins Road. Scoggins Road is a narrow road without centerline delineation or useable shoulders. In general, the side slope begins at the fog line (Figure 4.3-15). Approximately 150 to 200 feet of Scoggins Road would be required for use for construction and operational purposes. There are currently no over-size or over-weight load restrictions in force but permitting would be required by Skamania County. These loads also would require pilot cars both in the front and the rear and could require additional traffic control measures. Scoggins Road would require no improvements to accommodate the transport of wind energy components outside the limits of the intersections with Kollock-Knapp Road and CG2930.

At the intersection of Scoggins Road and CG2930, improvements would be required for transport of wind energy blades to the proposed project site. To accommodate the required truck turning radii, temporary widening at this intersection would be required. Widening would include removal of trees and vegetation and an embankment cut section on the inside of the turn, and removal of trees and vegetation and an engineered fill section on the outside of the turn (Figure 4.3-16). Improvements to the intersections of Scoggins Road with both Kollock-Knapp Road and CG2930 would most likely encroach upon the entire length of Scoggins Road proposed for the haul route to the proposed project site. The engineered fill and embankment cut sections would not require paving, but would require an all-weather driving surface. Right of way ownership and easement determination would be required.

~~**CG2930.** CG2930 is currently very narrow, approximately 10 to 12 feet wide, and would require permanent widening to a minimum drivable section width of 20 feet with allowance for side slope and drainage from Scoggins Road to the proposed project site (Figures 4.3-17 through 4.3-25). Widening would require possible removal of trees, and possible engineered fill and embankment cut sections. The engineered fill and embankment cut sections would not require paving, but would require an all-weather driving surface. There are two sharp left hand turns in the roadway enroute to the proposed project site (Figures 4.3-17, 4.3-23, and 4.3-24) that would require additional special considerations to accommodate the required truck turning radii for transport of the wind energy blades to the site.~~

~~Figure 4.3-4, Junction SR 14 and Cook-Underwood Road - Photo 1.~~
~~Figure 4.3-5, Junction SR 14 and Cook-Underwood Road - Photo 2.~~
~~Figure 4.3-6, Junction SR 14 and Cook-Underwood Road - Photo 3.~~
~~Figure 4.3-7, Junction SR 14 and Cook-Underwood Road - Photo 4.~~
~~Figure 4.3-8, Junction Cook-Underwood Road and Kollock-Knapp Road.~~
~~Figure 4.3-9, Kollock-Knapp Road - Photo 1.~~
~~Figure 4.3-10, Kollock-Knapp Road - Photo 2.~~
~~Figure 4.3-11, Kollock-Knapp Road - Photo 3.~~
~~Figure 4.3-12, Kollock-Knapp Road - Photo 4.~~
~~Figure 4.3-13, Junction Kollock-Knapp Road and Scoggins Road - Photo 1.~~
~~Figure 4.3-14, Junction Kollock-Knapp Road and Scoggins Road - Photo 2.~~
~~Figure 4.3-15, Scoggins Road.~~
~~Figure 4.3-16, Junction Scoggins Road and CG2930.~~
~~Figure 4.3-17, CG2930 - Photo 1.~~
~~Figure 4.3-18, CG2930 - Photo 2.~~
~~Figure 4.3-19, CG2930 - Photo 3.~~
~~Figure 4.3-20, CG2930 - Photo 4.~~
~~Figure 4.3-21, CG2930 - Photo 5.~~
~~Figure 4.3-22, CG2930 - Photo 6.~~
~~Figure 4.3-23, CG2930 - Photo 7.~~
~~Figure 4.3-24, CG2930 - Photo 8.~~
~~Figure 4.3-25, CG2930 - Photo 9.~~

New Roadway Construction at the Proposed Project Site

Access to the proposed project site would be provided through the existing County and private roadway network. Access to all proposed wind tower locations would require some new road construction. In addition to approximately ~~7.2~~7.9 miles of existing private logging roads that would require improvement, approximately 2.4 miles of new private gravel access roads would need to be constructed. The new gravel roadways would extend toward and run along the turbine strings, and would be designed and constructed according to the County private roadway standards. The new private roadways that extend toward the turbine strings would be designed for a minimum drivable section width of 25 feet with allowance for side slope and drainage. The new private roadways that would run along or between the turbine strings would be designed for a minimum drivable section width of 25 feet with an additional 5-foot section on both sides to accommodate drainage and clearance for the project crane that would be on site to assemble the tower sections, the nacelles, and blades. Not all newly constructed roads would need to be paved, but they would require an all-weather driving surface.

Roadway Limitations

Some of the trucks that would transport construction equipment and materials to the proposed project site along State and County roadways could have a gross vehicle weight in excess of 105,500 pounds. These loads would exceed the WSDOT legal load limit. Trucks with loads in excess of the legal load limit could degrade the condition of the existing roadways along the proposed haul route, and may require additional axles in order to distribute the weight of the load. Permits would be required for all over-weight hauls.

Parking

During construction, parking would be located at the construction staging area and along the proposed project site access roads. Parking along turbine string roads would be primarily for those employees working on foundations, electrical infrastructure, and turbines. Vehicles would park in areas that would be already temporarily or permanently disturbed from other construction activities. No additional ground disturbance would occur solely for construction parking requirements.

Hazardous Materials Transport

Diesel fuel and gasoline would be the only potentially dangerous materials that would be used in significant quantities during construction. The estimated total quantity delivered and consumed during construction would be approximately 19,250 gallons. The contractor would use fuel trucks to refill construction vehicles and equipment on site. The fuel trucks would be properly licensed and would incorporate features in equipment and operation such as automatic shut-off devices to prevent accidental spills.

Aviation Hazards

Temporary construction equipment such as cranes and derricks that would be used for the construction of the proposed towers could propose a hazard to aviation safety during the construction period. A "Determination of No Hazard to Air Navigation" would have to be obtained for the proposed project site.

Traffic Hazards

Traffic hazards associated with construction projects are generally related to accident occurrence. Construction of the project would require that many construction vehicles, including trucks with over-size and over-weight loads, share the existing roadway network with the general public. As a result, some accidents could occur that would be directly attributable to construction traffic. An increase in accident occurrence during the construction of the project could take place, but any increase is expected to be minimal.

4.3.2.3 Construction Traffic

The project construction activities would last approximately one year, and would continue from site preparation through full operation. During that time frame, there would be an increase in traffic activity in and around the proposed project vicinity due to the construction workforce, equipment deliveries, and empty trucks returning to SR 14. Traffic delays could occur on the existing roadway network due to the maneuvering of large vehicles carrying heavy and/or long loads.

During the summer months, the cities of Bingen and White Salmon experience a significant increase in traffic volume due to recreational activities in the surrounding area. Prior to construction of the Whistling Ridge Energy Project, coordination would be required between the owner, contractor, the cities of Bingen and White Salmon, Skamania County, and WSDOT to ensure the highest level of safety possible for both the traveling public and the construction vehicles.

During construction, approximately 330 workers total would be employed. During the peak construction period, it is expected that approximately 265 personnel would be on site at the same time, while multiple construction disciplines conduct work concurrently. Estimated traffic volumes include existing local traffic, construction workers and vehicles, and over-size and over-weight trucks. Approximately 65 to 75 percent of the construction labor force would most likely be hired from the cities of Portland and Vancouver. Approximately 25 to 35 percent of the workers would most likely be residents of Skamania, Klickitat, and Hood River counties. The respective percentages are based on the relative populations in the cities of Portland and Vancouver when compared to Skamania, Klickitat, and Hood River counties. All construction workers are expected to commute up to approximately 60 miles each way daily to and from the proposed project site.

Estimated traffic volumes during construction of the Whistling Ridge Energy Project at the west and east junctions of Cook-Underwood Road with SR 14 are presented in Table 4.3-7.

Table 4.3-7
Estimated Traffic Volumes during Construction

	West Junction		East Junction	
	AM Peak (7:00 - 8:00 am)	PM Peak (4:00 - 5:00 pm)	AM Peak (7:00 - 8:00 am)	PM Peak (4:00 - 5:00 pm)
Eastbound SR 14	370	105	~~370~~390	~~105~~115
Westbound SR 14	160	240	~~160~~170	~~230~~ 270
Southbound Cook-Underwood Road	20	285	20	285

During the one-year construction period, there would be over-size and over-weight trucks transporting large wind energy components to the proposed project site throughout the day. Over-size and over-weight trucks are only expected during an approximate two to three month period when the wind energy components are transported to the proposed project site. For traffic analyses purposes, two worst case scenarios were considered. The first assumes that all construction vehicles related to the project during construction would travel through the west junction of Cook-Underwood Road with SR 14. The second assumes that all construction vehicles related to the project during construction would travel through the east junction of

Cook-Underwood Road with SR 14. The respective numbers of construction vehicles related to the project during construction that would travel through either the west or the east junctions of Cook-Underwood Road with SR 14 is not known at this time. It is expected though that during the AM peak hour, approximately 30 construction vehicles would travel through the either junction of SR 14 and Cook-Underwood Road. During the PM peak hour, as many as 10 construction vehicles could travel through this junction. Typical rural highway traffic patterns conservatively assume AM peak hour volumes to be approximately 7 percent of the total daily volumes, and PM peak hour volumes to be approximately 10 percent of the total daily volumes, with a directional split of 70/30. PM peak hour volumes are traditionally considered to be the highest during a given day. A "worst case" traffic analysis scenario is presented for the AM and PM peak hours and includes 7 and 10 percent of the total daily construction vehicles, respectively.

4.3.2.4 Roadway Operations during Construction

Peak-hour LOS analyses were completed for both the west and east junctions of SR 14 and Cook-Underwood Road using estimated 2010 2011 traffic volumes. The results indicate that estimated 2010 2011 traffic volumes including construction vehicles would have a minimal impact on the operations of either the west or east junction of SR 14 and Cook-Underwood Road Delays would increase slightly (up to approximately 4 to 5 6 seconds per vehicle) for vehicles turning left or right from Cook-Underwood Road at either the west or the east junctions of Cook-Underwood Road with SR 14 over estimated 2008 2011 operations. The southbound approach on Cook-Underwood Road at the west junction with SR 14 also would experience degradation in LOS from A to B during the AM hour over estimated 2008 2011 operations. The southbound approach on Cook-Underwood Road at the east junction with SR 14 would experience degradation in LOS from B to C during the AM peak hour over estimated 2011 operations. LOS B operations would be maintained at both the west and east junctions of Cook-Underwood Road with SR 14 during the PM peak hour with no change in LOS over year 2011. Analyses results are presented in Tables 4.3-8 and 4.3-8a.

Table 4.3-8
Level of Service Summary during Construction
West Junction of Cook-Underwood Road with SR 14

Location	Peak Hour	Estimated 2009 Traffic Volumes		Estimated 2011 Traffic Volumes			
				w/o Construction		w/ Construction	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 14 Eastbound Left Turn	AM PM	7.6 7.9	A A	7.6 8.0	A A	8.4 8.0	A A
Cook-Underwood Road Southbound Left/Right Turn	AM PM	9.4 10.0-	A A	9.4 10.1	A B	14.7 14.1	B B

Table 4.3-8a
Level of Service Summary during Construction
East Junction of Cook-Underwood Road with SR 14

Location	Peak Hour	Estimated ~~2008~~ 2009 Traffic Volumes		Estimated ~~2010~~ 2011 Traffic Volumes			
				w/o Construction		w/ Construction	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 14	AM	~~7.5~~ 7.6	A	7.6	A	8.4	A
Eastbound Left Turn	PM	~~7.9~~8.0	A	~~7.9~~ 8.0	A	~~8.0~~8.1	A
Cook-Underwood Road	AM	~~9.3~~ 9.4	A	~~9.4~~9.5	A	~~14.7~~15.1	~~B~~C
Southbound Left/Right Turn	PM	~~9.9~~ 10.2	~~A~~B	~~10.0~~ 10.3	B	~~13.8~~ 14.7	B

Delay = Average per vehicle

It is assumed that construction traffic trips would be distributed as follows:

- 65 to 75 percent traveling to and from west of the proposed project site on SR 14
- 25 to 35 percent traveling to and from east of the proposed project site on SR 14

Many of these trips would occur outside of the peak periods, depending on their origin location and start time.

SR 14 in the vicinity of the proposed project site is a two-lane undivided rural highway with limited access. Access points in the proposed project vicinity do not include roadway channelization for turning movements. Potential moderate impacts to travel safety could occur due to the turning movements of over-size and over-weight trucks onto and off of Cook-Underwood Road during the peak construction period. No significant construction impacts are anticipated.

River and Air Transportation

Anticipated impacts to river transportation would be low. It is not expected that local or regional airports would be used for transporting construction equipment or material and no air transportation impacts would be anticipated.

4.3.2.5 Operational Traffic

The project is being designed to operate continuously (24 hours a day, seven days a week) using an automated system. The project would employ an estimated eight to nine full-time employees. The operations crew would typically work eight-hour days Monday through Friday.

The maximum number of vehicle trips associated with workers commuting to and from the proposed Operations and Maintenance facility on State, County, and private roads would be approximately 30 daily. In addition to the operations crew, there would be occasional service delivery vehicle trips as well. The distribution of operational traffic trips is expected to be the same as for construction trips.

Peak-hour traffic volumes at both the west and east junctions of SR 14 and Cook-Underwood Road include ~~2011~~ 2012 baseline traffic volumes and the project-generated traffic volumes. For traffic analyses purposes, two worst case scenarios were considered. The first assumes that all operational vehicles related to the project during operation would travel through the west junction of Cook-Underwood Road with SR 14. The second assumes that all operational vehicles related to the project during operations would travel through the east junction of Cook-Underwood Road with SR 14. The respective numbers of operational vehicles related to the project during operations that would travel through either the west or the east junctions of Cook-Underwood Road with SR 14 is not known at this time. Estimated traffic volumes during full operation of the project are presented in Table 4.3-9.

Table 4.3-9
Estimated Traffic Volumes during Operation
At Junctions of Cook-Underwood Road and SR 14

Location	West Junction AM Peak (7:00 - 8:00 am)	West Junction PM Peak (4:00 - 5:00 pm)	East Junction AM Peak (7:00 - 8:00 am)	East Junction PM Peak (4:00 - 5:00 pm)
Eastbound SR 14	180	100	~~170~~190	~~100~~110
Westbound SR 14	75	240	~~75~~85	~~230~~260
Southbound Cook-Underwood Road	10	25	10	25

Peak-hour LOS analyses were completed for both the west and east junctions of SR 14 and Cook-Underwood Road-both the west and east junctions of Cook-Underwood Road with SR 14 using estimated ~~2011~~ 2012 traffic volumes. The results indicate that estimated ~~2011~~ 2012 traffic volumes, including operational vehicles, would have a minimal impact on the operations of ~~the junction of SR 14 and Cook-Underwood Road.~~ either the west or the east junctions of Cook-Underwood Road with SR 14. Delays would increase slightly, less than 1 second per vehicle, for vehicles turning left or right from Cook-Underwood Road at either the west or the east junctions of Cook-Underwood Road with SR 14 over estimated ~~2008~~ 2012 operations. ~~The southbound approach on Cook-Underwood Road at SR 14 also would experience degradation in LOS from A to B over estimated 2008 operations, but only during the PM peak hour.~~ LOS A and B operations would be maintained during the AM and PM peak hours respectively at both the west and east junctions of Cook-Underwood Road with SR 14 with no change in LOS over year 2012. Analyses results are presented in Tables 4.3-10 and 4.3-10a.

Table 4.3-10
Level of Service Summary during Operation
West Junction of Cook-Underwood Road with SR 14

Location	Peak Hour	Estimated ~~2008~~ 2009 Traffic Volumes Delay (sec/veh)	Estimated 2009 LOS	Estimated ~~2011~~ 2012 Traffic Volumes w/o Operation Delay (sec/veh)	w/o Operation LOS	w/ Operation Delay (sec/veh)	w/ Operation LOS
SR 14 Eastbound Left Turn	AM PM	~~7.5~~ 7.6 7.9	A A	7.6 8.0	A A	7.6 8.0	A A
Cook-Underwood Road Southbound Left/Right Turn	AM PM	~~9.3~~ 9.4 ~~9.9~~ 10.0-	A A	~~9.4~~ 9.5 ~~10.1~~ 10.2	A B	9.7 ~~10.3~~ 10.4	A B

Delay = Average per vehicle

Table 4.3-10a
Level of Service Summary during Operation
East Junction of Cook-Underwood Road with SR 14

Location	Peak	Estimated ~~2008~~	Estimated ~~2011~~ 2012 Traffic Volumes

	Hour	2009 Traffic Volumes		w/o Operation		w/ Operation	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 14 Eastbound Left Turn	AM PM	7.5 7.6 7.98.0	A A	7.6 8.0	A A	7.6 8.0	A A
Cook-Underwood Road Southbound Left/Right Turn	AM PM	9.3 9.4 9.9 10.2	A AB	9.4 9.5 10.1 10.3	A B	9.79.8 10.3 10.6	A B

Delay = Average per vehicle

Roadway Limitations

Vehicles used during Operations and Maintenance of the proposed project would primarily consist of employees commuting to and from the site. This number is not expected to exceed State or County roadway legal load limits. These vehicles would not contribute to roadway degradation.

Parking

During operations, employees would park at the Operations and Maintenance facility parking lot. There would be a maximum of approximately 10 employee vehicles each day as well as potential visitor and delivery vehicles. No more than approximately 20 vehicles are expected to be parked in the Operations and Maintenance facility parking lot at any one time. A visitor kiosk is also planned at the Operations and Maintenance facility that would provide tourists with a safe place to view and learn about wind turbines. Parking requirements for the visitor kiosk would be accommodated by the Operations and Maintenance facility parking lot.

Hazardous Materials Transport

No significant quantities of hazardous materials would be transported to or from the proposed project site during operations. The only hazardous materials that would be transported to the site would include minimal quantities of lubricating oils, hydraulic fluids, and mineral oil. Hazardous waste materials would require infrequent disposal and would not result in safety risks associated with hazardous materials transport.

Aviation Hazards

It is expected that the proposed wind turbines would not be in conflict with arriving or departing aircraft under instrument flight rule or visual flight rule from either the public or private airports within the proposed project vicinity. The FAA would need to be notified of any alterations to the wind towers that could affect the national air space. All towers would meet FAA regulations regarding lighting. A "Determination of No Hazard to Air Navigation" would be obtained for the proposed project site.

Traffic Hazards

Operation of the project is not expected to increase traffic hazards related to accident occurrences.

4.3.3 MITIGATION MEASURES

Construction Traffic Control

The following mitigation measures are proposed to reduce impacts from project construction on roadway traffic in the region:

- A Transportation Management Plan (TMP) would be prepared in consultation with both WSDOT and Skamania County and submitted to EFSEC for approval that would direct and obligate the contractor to implement procedures to minimize traffic impacts
- The TMP would include requirements for coordination of project-related construction traffic and WSDOT planned construction projects
- The TMP would include requirements for coordination of project-related construction traffic and Skamania County, City of Bingen, and City of White Salmon summer recreational traffic
- Whistling Ridge Energy LLC and its contractors would be required to comply with State and County permitting requirements for over-size and over-weight vehicles
- Whistling Ridge Energy LLC would be required to notify land owners in the project vicinity prior to construction of transportation routes that would be used for construction equipment and labor
- Approved State and/or County advanced warning construction signs would be placed prior to and during construction
- Certified flaggers would be used when necessary to direct traffic when over-size and over-weight trucks either enter or exit public roads, to minimize risk of accidents
- Pilot cars would be used both in front of and behind all trucks transporting over-size or over-weight loads on all public roadways
- Traffic flow would not be restricted for more than 20 minutes during the construction phase

Access Roadway Construction

All sections of the access roadway system that would require improvements or new construction would be designed and built according to WSDOT and Washington State access management standards.

Hazardous Materials Transport

Transport of hazardous materials would be conducted in a manner that would protect both human health and the environment and would be in accordance with applicable Federal and WSDOT requirements.

Roadway Maintenance

- Pre- and post-haul construction visual assessments of roadway surface conditions would be conducted identifying weak or deteriorated areas along the haul route that may require mitigation

- Should mitigation be required, a mitigation design program would be developed to repair all pavement sections to pre-construction conditions or better

- Whistling Ridge Energy LLC would be responsible for maintaining turbine string access roads, access ways, and other roads built to construct and operate the proposed project

- All snow removal would be performed in a safe manner that would not degrade roadway conditions

SECTION 4.4 SOCIOECONOMIC IMPACT
(WAC 463-60-535)

This section presents an analysis of the impact of the Whistling Ridge Energy Project on local socioeconomic resources. The section analyzes impacts to local population, work force, property values, housing, the local economy, government fiscal conditions, health and safety facilities and services, and education facilities and services. An analysis of the impacts the project would have on traffic is contained in Section 4.3, Transportation.

4.4.1. EXISTING CONDITIONS

The project site is located in unincorporated Skamania County in southwestern Washington, approximately 7 miles northwest of White Salmon, Washington and Hood River, Oregon. The area for which information is presented includes Skamania, Klickitat, and Hood River counties, and the cities of White Salmon and Hood River, depending on the resource and the available data for that resource. Data for the State of Washington are presented for comparison.

4.4.1.1 Population and Housing

Demographic Characteristics

The population of Skamania County in 2008 was 10,700 and represented less than one percent of the statewide population of 6.6 million. Table 4.4-1 presents the geographic distribution of the population within Skamania County, compared to the State of Washington. As shown, a greater percentage of Skamania County residents live in unincorporated areas (78 percent) than in incorporated cities. Within the incorporated area, 62 percent of the population lives in Stevenson and the remaining 38 percent lives in North Bonneville. The populations of the cities of Stevenson and North Bonneville represent 13 percent and 8 percent of the total County population, respectively. The counties of Klickitat, Washington, and Hood River, Oregon, have slightly fewer residents living in unincorporated areas relative to Skamania County.

Incorporated cities closest to the project site are the City of White Salmon (7 miles southwest of the site) in Washington and the City of Hood River (approximately 8 miles southwest of the site) in Oregon. The City of Hood River is home to 6,865 residents, while the City of White Salmon is home to 2,205 residents. The metropolitan area closest to the project site is the Portland-Vancouver-Beaverton metropolitan area, with a population of 2.2 million people (PSU Research Center 2008a), located approximately 61 miles west of the project site.

Table 4.4-2 shows the age distributions of the residents of the cities of White Salmon and Hood River; the counties of Skamania, Klickitat, and Hood River; and the states of Washington and Oregon for 2008. Age distribution illustrates the ratio of working-age persons to younger and older residents, which affects both the supply of labor and the level and distribution of income. In White Salmon, 36 percent of the population is of non-working age (i.e., either 14 or under, or 65 and over). In Skamania County and Klickitat County, 22 percent and 24 percent of the populations (respectively) are of non-working age. In comparison, the same measures for the Washington and Oregon are 22 percent and 21 percent.

Table 4.4-1
Population Distribution in the Project Vicinity

Jurisdiction	Population, April 1, 2000	Population, April 1, 2008 (July 1, 2008 for Oregon Statistics)
Skamania County	9,872	10,700
Unincorporated	8,079	8,383
Incorporated	1,793	2,317
North Bonneville	593	877
Stevenson	1,200	1,440
Klickitat County	19,161	20,100
Unincorporated	12,536	13,490
Incorporated	6,625	6,610
Bingen	672	680
Goldendale	3,760	3,725
White Salmon	2,193	2,205
Hood River County (Oregon)	20,411	21,625
Unincorporated	13,465	13,710
Incorporated	6,946	7,915
Cascade Locks	1,115	1,050
Hood River	5,831	6,865
Washington State	5,894,143	6,587,600
Unincorporated	2,374,593	2,527,130
Incorporated	3,519,550	4,060,470
Oregon State	3,421,399	3,791,075
Unincorporated	1,141,038	1,149,668
Incorporated	2,280,361	2,641,407

Source: WOFM (2008a), PSU Research Center (2008a).

Table 4.4-2
Population Age Distribution in the Project Vicinity, 2008

Jurisdiction	Age 14 and Under		Age 15 to 64		Age 65 and Over	
	Number	Percent	Number	Percent	Number	Percent
White Salmon	458	20%	1,476	64%	367	16%
Hood River	1,525	23%	4,365	66%	753	11%
Skamania County	2,103	20	7,362	69	1,235	12
Klickitat County	3,992	20	13,215	66	2,894	14
Hood River County	4,661	22	14,211	66	2,599	12
Washington State	1,295,245	20	4,521,044	69	771,311	12
Oregon State	724,681	19	2,554,333	68	466,441	12

Source: WOFM (2008b), PSU Research Center (2008b), Claritas (2009).

Table 4.4-3 shows that the cities of White Salmon and Hood River have slightly more women than men, and are predominantly white and non-Hispanic racially, although minority residents represent 23 percent of the White Salmon population and 31 percent of the Hood River population. The three-county area including Skamania, Klickitat, and Hood River counties is also predominantly white, non-Hispanic. Hood River County has the highest minority percentage (31 percent) of population, followed by Klickitat County (16 percent) and Skamania County (11 percent). The State of Washington population includes 24 percent minority residents. Oregon's population is 20 percent minority.

Table 4.4-3
Race and Sex Composition in the Project Vicinity, 2008

Jurisdiction	Population	Sex (%)		Race (%)										
					Hispanic/Latino					Not Hispanic/Latino				
		M	F	Minority[a]	White	Black	AIAN	API	SOR	White	Black	AIAN	API	SOR
Combined CBGs Within Approx. 3 Miles of Project Site	3,347	52	48	12	3	0	0	0	5	88	0	1	0	2
CT 9503 CBG 2	678	52	48	14	4	0	0	0	8	86	0	0	1	2
CT 9503 CBG 3	1,068	51	49	9	1	0	0	0	4	91	0	1	0	2
CT 9504 CBG 2	1,601	52	48	12	3	0	0	0	6	88	0	2	0	1
City of White Salmon	2,301	49	51	23	4	0	0	0	15	77	0	1	1	2
City of Hood River	6,643	48	52	31	11	0	0	0	15	69	1	1	1	2
Skamania County	10,962	50	50	11	2	0	0	0	3	89	0	2	1	3
Klickitat County	20,399	50	50	16	3	0	0	0	6	84	0	3	1	3
Hood River County	21,770	50	50	31	9	0	0	0	17	69	0	1	2	2
Washington State	6,523,733	50	50	24	4	0	0	0	5	76	3	1	7	3
Oregon State	3,772,854	50	50	20	4	0	0	0	6	80	2	1	4	3

Source: Claritas (2009).

a. For the purpose of this analysis, minority includes those residents identified as Black or African American, American Indian or Alaskan Native, Asian Pacific Islander, Some Other Race, Two or More Races, or Hispanic/Latino.

Notes:

Percentages may not total 100 percent due to decimal places not expressed in this table.

AIAN = American Indian or Alaskan Native

API = Asian Pacific Islander

SOR = Some Other Race or Two or More Races

CBG = Census Block Group

CT = Census Tract

The race and ethnicity composition of the project area is estimated by analyzing the three census block groups that most closely match an area defined by a three-mile radius around the project site. When combined, the population in these three census blocks is approximately 12 percent minority. The second most common race and ethnicity category for residents in this area is (1) Hispanic/Latino, and (2) Some Other Race or Two or More Races.

The population living within three miles of the project site has a lower minority percentage than the two nearest cities (White Salmon and Hood River), Klickitat County, Hood River County, Washington State, and Oregon State. The population within three miles of the project site has a higher minority percentage (12 percent) compared to the same measure for Skamania County as a whole (11 percent). Although minority residents do exist near the project site, the area near the project does not have a substantially higher minority population when compared to larger reference populations.

Poverty status in 2000 is available for all areas studied. More current poverty statistics (for the period 2005 to 2007 as an annual average) are only available for the areas with relatively larger populations (Klickitat County, Hood River County, Washington, and Oregon). Table 4.4-4 shows 2000 poverty statistics for all areas (for comparison purposes), and also shows more current poverty statistics where available. Poverty estimates for 2008 were not available.

Table 4.4-4
Population Living Below the Poverty Level

Jurisdiction[a]	Population For Whom Poverty Status is Determined[b]	Number of Persons Living Below Poverty Level	Percentage of Persons Living Below Poverty Level
Combined Census Block Groups Within Approx. 3 Miles of Project Site (2000)	3,191	299	9
Individual Census Tract 9503 Block Group 2 (2000)	1,467	193	13
Individual Census Tract 9503 Block Group 3 (2000)	685	69	10
Individual Census Tract 9504 Block Group 2 (2000)	1,039	37	4
City of White Salmon (2000)	2,144	357	17
City of Hood River (2000)	5,801	1,004	17
Skamania County (2000)	9,763	1,281	13
Klickitat County (2000/annual 2005-2007)	18,983/19,540	3,236/3,779	17/19
Hood River County (2000/annual 2005-2007)	19,986/21,061	2,845/3,044	14/14
Washington State (2000/annual 2005-2007)	5,765,201/ 6,237,571	612,370/ 737,254	11/12
Oregon State (2000/annual 2005-2007)	3,347,667/ 3,611,297	388,740/ 488,896	12/14

Source: US Census (2008a and 2008b).

a. Estimates of this type of data for the areas with smaller populations (census block groups, cities, and Skamania County) were not available for more recent years from the US Census or from Claritas.

b. Poverty status was determined by dividing the population living below poverty by the population for whom poverty status is determined, which excludes those living in institutional housing.

In 2000, 17 percent of the populations of the cities of White Salmon and Hood River were living below the poverty level. This same measure was 13 percent for Skamania County, 17 percent for Klickitat County, and 14 percent for Hood River County the same year. The cities and counties near the project site had relatively more residents living below the poverty level compared to Washington as a whole, and Oregon as a whole in 2000.

Approximately nine percent of the population living within approximately three miles of the project site lived below the poverty level in 2000, indicating fewer people living in poverty compared to the cities and counties near the project site. The geographic areas for which more recent (2005–2007 annual average) poverty statistics are available have all increased in percentage of persons living below the poverty level, as shown in Table 4.4-4.

Population Growth Trends

Most of the population in Skamania County lies in the southern quarter of the county, along the Columbia River and in the Wind River Valley. Population growth in Skamania County was 0.4 percentage points less than the State of Washington during the period 2000 to 2008, but is expected to approach the state rate during the period 2008 to 2015. Skamania County's population is expected to grow from 10,700 in 2008 to 11,720 in 2015. Both Skamania County and Washington State growth rates are expected to slow by 0.3 percentages points during the period 2015 to 2025. Skamania County is expected to have 12,915 residents by 2025 (Table 4.4-5).

Table 4.4-5
Population Growth Trends and Projections for the Project Vicinity

Jurisdiction	2000 Census	2008	2000-2008		2015 Fore-cast	2008-2015		2025 Fore-cast	2015-2025	
			Number Change	Annual Average Rate of Growth		Number Change	Annual Average Rate of Growth		Number Change	Annual Average Rate of Growth
City of Hood River	5,831	6,865	1,034	2.1%	NA[a]	NA[a]	NA[a]	NA[a]	(b)	(b)
City of White Salmon	2,193	2,005	-188	-1.1%	NA[a]	NA[a]	NA[a]	NA[a]	(b)	(b)
Skamania Co.	9,872	10,700	828	1.0%	11,720	1,020	1.3%	12,915	1,195	1.0%
Klickitat Co.	19,161	20,100	939	0.6%	23,049	2,949	2.0%	25,831	2,782	1.1%
Hood River Co.	20,411	21,625	1,214	0.7%	23,485	1,860	1.2%	26,667	3,182	1.3%
Washington St.	5.9 million	6.6 million	0.7 million	1.4%	7.3 million	0.7 million	1.4%	8.1 million	0.9 million	1.1%
Oregon State	3.4 million	3.8 million	0.4 million	1.3%	4.1 million	0.3 million	1.1%	4.6 million	0.5 million	1.2%

Sources: WOFM (2008c), OOEA (2008).

a. Population forecasts by city are not available from the Washington State Office of Financial Management.

The City of White Salmon, near the project but in Klickitat County, has decreased in population 1.1 percent per year, on average, between 2000 and 2008, from 2,193 in 2000 to 2,005 in 2008. The City of Hood River has grown 2.1 percent per year between 2000 and 2008, from 5,831 in 2000 to 6,865 in 2008. During the same period, Hood River County grew 0.7 percent annually, from 20,411 in 2000 to 21,625 in 2008. Hood River County is expected to grow 1.2 percent and 1.3 percent, respectively, during the periods 2008–2015 and 2015–2025. Although Hood River County's growth rate for the period 2000–2008 was over one-half of one percent less than the same measure for Oregon State, in future periods 2008–2015 and 2015–2025, the growth rate for Hood River County is expected to be 0.1 percentage point higher than the same measure for Oregon (Table 4.4-5).

Housing Characteristics

Table 4.4-6 presents housing characteristics in Skamania County, Klickitat County, Hood River County, the cities of White Salmon and Hood River, and the states of Washington and Oregon. The number of housing units that existed in Skamania County in 2000 (4,576) increased to 5,409 by 2008, representing an annual average rate of growth of 2.1 percent, a rate that is slightly higher than the same rates for Klickitat County (1.8 percent) and the state (1.7 percent).

Table 4.4-6
Housing Characteristics in the Project Vicinity, 2000 and 2008

	Total Housing Units	Occupancy Rate (%)	Percent of Occupied Housing Units That Were Owner-Occupied (%)	Average Household Size
City of White Salmon				
2000	948	93.6	57.2	2.5
2008	985	93.8[a]	57.3[a]	2.4[a]
City of Hood River				
2000	2,645	91.8	47.6	2.4
2008	3,050[a]	88.2[a]	46.8[a]	2.5[a]
Skamania County				
2000	4,576	82.1	73.8	2.6
2008	5,409	83.2[a]	74.2[a]	2.6[a]
Klickitat County				
2000	8,633	86.6	68.8	2.5
2008	9,985	89.2	66.7	2.4
Hood River County				
2000	7,818	92.7	64.9	2.7
2008	8,493[a]	89.5[a]	64.4[a]	2.8[a]
State of Washington				
2000	2,451,075	92.7	64.6	2.5
2008	2,805,340	91.6	65.6	2.5
State of Oregon				
2000	1,452,709	91.8	64.3	2.5
2008	1,613,136[a]	91.8[a]	64.5[a]	2.5[a]

Sources include 2005-2007 estimates for geographic areas with over 20,000 population (US Census 2008a), 2000 estimates (US Census 2008b), and 2008 information from Washington Office of Financial Management (WOFM 2008d), except where footnoted.
a. Claritas (2009).

The rate of increase in number of housing units for Hood River County and Oregon State are 1.0 percent and 1.3 percent, respectively, for the period 2000 to 2008. Occupancy rates increased in Skamania County and Klickitat County during the period 2000 to 2008, and decreased for Washington State and Hood River County. Occupancy rates in Oregon stayed constant during the period 2000 to 2008. During that same period, the share of occupied units that were owner-occupied increased in Skamania County, Washington State, and Oregon State, and decreased in Klickitat County and Hood River County.

Between 2000 and 2008, the population of Skamania County grew by approximately 1.0 percent per year, while the number of housing units in the county was expected to grow by 2.1 percent.

These measures suggest that vacancy rates have increased during this period, indicating decreasing demand for housing. Average household size in Skamania County was 2.6 people, slightly higher than the same measure for Washington State during the period 2000 to 2008 (Table 4.4-6).

The number of housing units in the cities of White Salmon and Hood River increased during the period 2000 to 2008 by 0.5 percent (White Salmon) and 1.8 percent (Hood River). Occupancy rates in 2008 were 93.8 percent (White Salmon) and 88.2 percent (Hood River). Household sizes for these cities were similar to the same measures for the counties in which they are located. Over half of occupied housing units were owner-occupied in White Salmon in 2008, while slightly less than half of occupied housing units were owner-occupied in Hood River in 2008 (Table 4.4-6).

In 2000, median gross rent was 13 percent lower in Skamania County when compared to the state. In Klickitat County the same year, median gross rent was 25 percent lower when compared to the same statistic for Washington State. Median gross rent in White Salmon in 2000 was slightly higher when compared to the same measure for Klickitat County. During the period 2000 to 2007, median gross rents grew approximately 2.5 percent in Klickitat County and 3.2 percent in Washington State.

The City of Hood River, the largest city in the project vicinity, is located across the Columbia River from the project site. The City of Hood River had median gross rent of $544 in 2000. That year, rents were higher when compared to Hood River County. Median gross rent in Hood River County was 13 percent lower than in Oregon as a whole in 2000. More currently, during the period 2005–2007, rents in Hood River County were lower compared to Oregon.

Housing values in Skamania and Klickitat counties were lower in 2008 when compared to some other areas in Washington State (Table 4.4-7). The median housing value in the City of White Salmon ($192,750) was higher than in Klickitat County as a whole. The median housing value for the City of Hood River in 2008 ($199,215) was less than the same measures for Hood River County ($213,173) and Oregon ($236,157) (Table 4.4-7).

The residences closest to the project site are located approximately 0.48 mile and 0.8 mile from proposed turbine locations. A new homesite location has been applied for, and would be located approximately 2,000 feet (0.38 mile) from the south property line. The unincorporated community of Willard is located approximately 2.25 miles northwest of the project site. The unincorporated community of Mill also A is located near the project site, approximately 1.5 miles west of the site. The homes near the project site are rural, primarily single family, between 30 and 50 years old, and low- to medium-density.

Table 4.4-7
Housing Values

Jurisdiction	2000		Current Year	
	Median Gross Rent	Median Value for Owner-Occupied Housing Units	Median Gross Rent	Median Value for Owner-Occupied Housing Units (2008)
City of Hood River	$544	$143,100	NA[a]	$199,215
City of White Salmon	$499	$132,300	NA[a]	$192,750
Skamania Co.	$579	$150,200	NA[a]	$255,257
Klickitat Co.	$498	$110,400	$578[b]	$173,451
Hood River Co.	$538	$152,400	$660[b]	$213,173
Washington St.	$663	$168,300	$799[b]	$262,036
Oregon State	$620	$152,100	$735[b]	$236,157

Sources: US Census (2008a and 2008b), Claritas (2009).
a. Not available.
b. This estimate is for the annual average for the period 2005-2007. The same measure for more recent years was not available.

Temporary Lodging

Over 1,000 hotel rooms and 39 recreational vehicle (RV) or tent campsites exist within 25 miles of the project site (Table 4.4-8). Assuming average occupancy rates of 70 percent, a minimum of 325 hotels rooms or RV/tent campsites are available at any one time.

Table 4.4-8
Temporary Lodging Units

Type of Lodging	Units within 25 Miles of Project Site
Hotel or Motel	1,043
RV Camping	21
Tent Camping	16
Cabin or RV	2
Total Units	1,082
Units Available Assuming 70% Occupancy	325

Source: Woodall (2008), TravelWashington (2008).

4.4.1.2 Employment and Income

The sources of income and types of employment in an area often provide the most comprehensive indicators of the health and direction of the local economy. To a large extent, these factors also play a part in determining the overall welfare and quality of life of the individuals inhabiting the area. Tables 4.4-9 through 4.4-11 present 2006 income and employment levels for Skamania County, Klickitat County, and Hood River County.

In 2006, employment in Skamania County averaged 3,116 jobs, of which 2,284 (73 percent) were held by wage and salary workers and 832 (27 percent) by proprietors. Place of work earnings (wages, salaries and proprietors' earnings) accounted for approximately one-quarter of total personal income in the county, with income from property (dividends, interest and rent) and transfer payments (mainly Social Security) making up the balance. The principal sources of employment were local government, accommodation and food services, federal government, and manufacturing (Table 4.4-9).

Table 4.4-9
Employment and Income Data for Skamania County, 2006

Category	Employment		Earnings	
	Jobs	%	$	%
Total	3,116	100%	$297,460	100%
Wage and salary employment	2,284	73%	$66,142	22%
Proprietor employment	832	27%	$6,976	2%
Farm employment	101	3%	$195	0%
Nonfarm employment	3,015	97%	$91,792	31%
Forestry, fishing, related activities, other	(D)	NA	(D)	NA
Mining	(D)	NA	(D)	NA
Utilities	-	0%	$-	0%
Construction	179	6%	$4,341	5%
Manufacturing	226	7%	$10,641	12%
Wholesale trade	38	1%	$1,182	1%
Retail trade	197	7%	$3,498	4%
Transportation and warehousing	61	2%	$2,169	2%
Information	20	1%	$355	0%
Finance and insurance	61	2%	$1,259	1%
Real estate and rental and leasing	(D)	NA	(D)	NA
Professional and technical services	141	5%	$4,902	5%
Management of companies/enterprises	(D)	NA	(D)	NA
Administrative and waste services	(D)	NA	(D)	NA
Educational services	(D)	NA	(D)	NA
Health care and social assistance	(D)	NA	(D)	NA
Arts, entertainment, and recreation	62	2%	$417	0%
Accommodation and food services	626	21%	$14,992	16%
Other services, except public admin.	205	7%	$3,538	4%
Federal government, civilian	159	5%	$12,231	13%
Military (government)	34	1%	$1,202	1%
State government	39	1%	$1,815	2%
Local government	589	20%	$23,404	25%

Source: BEA 2008.
This type of industry breakdown is not available for years beyond 2006.
(D) Not shown to avoid disclosure of confidential information; estimates for this item are included in the totals.
NA = Not available

The annual unemployment rate in Skamania County was 6.6 percent in 2007, and rose to 8.4 percent in 2008. In comparison, the same measure in 2000 was 6.0 percent. Relative to the state as a whole, Washington unemployment rates in 2007 and 2008 were 4.5 percent and 5.5 percent, respectively, having risen from 5.0 percent in 2000 (Table 4.4-12) (WESD 2008). Per capita personal income in 2006 in Skamania County was $28,265, which was 74 of per capita personal income for the State of Washington as a whole (BEA 2008). Median household income the same year (2006) was $39,476, or70 percent of the same measure for Washington State as a whole ($56,184) (WOFM 2008e). These statistics indicate relatively lower income near the project when compared to some other areas in Washington.

These current unemployment rates and trends and income levels not only reflect that the economy in Skamania County is more depressed when compared to some other areas in Washington, but also that the current national economic slowdown that began in 2008 is affecting areas near the project. The 2008 annual unemployment rate in Skamania County was almost three percentage points higher than the state average, indicating a slow economy.

Table 4.4-10
Employment and Income Data for Klickitat County, 2006

Category	Employment		Earnings	
	Jobs	%	$	%
Total	9,880	100%	$551,401	100%
Wage and salary employment	6,573	67%	$209,347	38%
Proprietor employment	3,307	33%	$46,405	8%
Farm employment	1,269	13%	$18,671	3%
Nonfarm employment	8,611	87%	$285,137	52%
Forestry, fishing, related activities, other	(D)	NA	(D)	NA
Mining	(D)	NA	(D)	NA
Utilities	51	1%	$4,636	2%
Construction	772	9%	$20,421	7%
Manufacturing	615	7%	$18,200	6%
Wholesale trade	185	2%	$6,110	2%
Retail trade	671	8%	$32,152	11%
Transportation and warehousing	249	3%	$11,061	4%
Information	63	1%	$1,715	1%
Finance and insurance	185	2%	$4,664	2%
Real estate and rental and leasing	500	6%	$2,590	1%
Professional and technical services	624	7%	$29,681	10%
Management of companies/enterprises	(D)	NA	(D)	NA
Administrative and waste services	(D)	NA	(D)	NA
Educational services	49	1%	$639	0%
Health care and social assistance	405	5%	$9,309	3%
Arts, entertainment, and recreation	194	2%	$1,924	1%
Accommodation and food services	382	4%	$4,639	2%
Other services, except public admin.	678	8%	$13,694	5%
Federal government, civilian	103	1%	$7,216	3%
Military (government)	64	1%	$2,256	1%
State government	176	2%	$8,823	3%
Local government	1,422	17%	$62,131	22%

Source: BEA 2008.
This type of industry breakdown is not available for years beyond 2006.
(D) Not shown to avoid disclosure of confidential information; estimates for this item are included in the totals.
NA = Not available

To the east of the project, 6,573 jobs (67 percent) of the total 9,880 jobs in Klickitat County in 2006 were held by wage and salary workers. Approximately 33 percent of jobs (3,307 jobs) were held by proprietors. Place of work earnings (wages, salaries and proprietors' earnings) accounted for about 46 percent of total personal income in the county, with income from property (dividends, interest and rent) and transfer payments (mainly Social Security) making up the balance. The principal sources of employment were local government, retail trade, and professional and technical services (Table 4.4-10).

The annual unemployment rate in Klickitat County was 6.7 percent in 2007, and rose two percentage points to 8.2 percent in 2008. In comparison, the annual unemployment rate in Klickitat County in 2000 was 7.5 percent. Washington unemployment rates in 2007 and 2008 were 4.5 percent and 5.5 percent, respectively, and 5.0 percent in 2000 (Table 4.4-12) (WESD 2008). Per capita personal income in 2006 in Klickitat County was $27,827, which was 73 percent of the same measure for the State of Washington as a whole and similar to the income levels for Skamania County (BEA 2008). Median household income the same year (2006) was $44,843, or 80 percent of the same measure for Washington State as a whole ($56,184) (WOFM

2008e). Similar to in Skamania County, these rates reflect (1) a relatively depressed local economy, and (2) the current nationwide economic slowdown.

Table 4.4-11
Employment and Income Data for Hood River County, 2006

Category	Employment		Earnings	
	Jobs	%	$	%
Total	15,578	100%	$621,528	100%
Wage and salary employment	12,179	78%	$328,095	53%
Proprietor employment	3,399	22%	$36,246	6%
Farm employment	1,743	11%	$36,809	6%
Nonfarm employment	13,835	89%	$400,990	65%
Forestry, fishing, related activities, other	638	5%	$18,093	5%
Mining	(L)	NA	(L)	NA
Utilities	45	0%	$3,585	1%
Construction	859	6%	$25,707	6%
Manufacturing	1,395	10%	$57,434	14%
Wholesale trade	579	4%	$18,005	4%
Retail trade	1,743	13%	$38,593	10%
Transportation and warehousing	152	1%	$4,758	1%
Information	181	1%	$8,208	2%
Finance and insurance	201	1%	$5,947	1%
Real estate and rental and leasing	422	3%	$4,666	1%
Professional and technical services	809	6%	$26,401	7%
Management of companies/enterprises	(D)	NA	(D)	NA
Administrative and waste services	(D)	NA	(D)	NA
Educational services	173	1%	$2,118	1%
Health care and social assistance	1,926	14%	$57,117	14%
Arts, entertainment, and recreation	742	5%	$15,547	4%
Accommodation and food services	1,438	10%	$23,906	6%
Other services, except public admin.	664	5%	$11,703	3%
Federal government, civilian	118	1%	$9,472	2%
Military (government)	63	0%	$2,221	1%
State government	108	1%	$6,277	2%
Local government	1,091	8%	$48,236	12%

Source: BEA 2008.
(D) Not shown to avoid disclosure of confidential information; estimates for this item are included in the totals.
(L) Less than 10 jobs, but the estimates for this item are included in the totals.Note: This type of industry breakdown is not available for years beyond 2006.
NA = Not available

Of the three counties that surround the project site, Hood River County has the highest number of employed workers. In 2006, employment in Hood River County averaged 15,578 jobs, of which 12,179 (78 percent) were held by wage and salary workers and 3,399 (22 percent) by proprietors. Place of work earnings (wages, salaries and proprietors' earnings) accounted for 59 percent of total personal income in the County, with income from property (dividends, interest and rent) and transfer payments (mainly Social Security) making up the balance. The principal sources of employment were manufacturing, health care and social assistance, local government, and retail trade (Table 4.4-11).

The annual unemployment rate in Hood River County was 4.6 percent in 2007, having fallen from 6.6 percent in 2000. The December 2008 unemployment rate in Hood River County was 5.7 percent. In comparison, the annual unemployment rate for Oregon as a whole was 5.1 percent in 2000 and 5.2 percent in 2007. The December, 2008 unemployment rate for Oregon was 5.7 percent (Table 4.4-12) (OED 2009). Hood River County has the lowest unemployment of the three counties near the project site. The most recent available annual unemployment rate in Hood River County (2007) is roughly two percentage points lower than the same measures for Klickitat and Skamania counties and 0.6 percentage point lower than the same measure for Oregon as a whole.

Table 4.4-12
Unemployment Trends

Geographic Area	Unemployed					
	2000 Annual		2007 Annual		Most Recent Annual or Monthly Estimates[a]	
	No.	Percent	No.	Percent	No.	Percent
Skamania County	290	6.0	340	6.6	450	8.4
Klickitat County	700	7.5	650	6.7	820	8.2
Hood River County	757	6.6	592	4.6	712	5.7
Washington State	151,340	5.0	154,720	4.5	192,000	5.5
Oregon State	93,196	5.1	100,517	5.2	158,369	8.0

Sources: WESD (2008), OED (2009).

a. The most recent annual statistics for Washington are for 2008 and are shown in this column. The most recent annual statistics for Oregon are for 2007. This column shows (for the Oregon areas) the most recent unemployment rate available for both Oregon and Hood River County, which is the December 2008 monthly unemployment rate.

Of the three counties that surround the project site, Hood River County has the highest per capita and median household income, although these measures remain below the state average. Per capita personal income in 2006 in Hood River County was $29,333, which was 88 percent of the same measure for the State of Oregon (BEA 2008). Median household income in 2007 was $47,159, or 97 percent of the same measure for Oregon State as a whole ($48,735) (USDA 2007).

These unemployment rates and income levels indicate that all three counties near the project have been affected by the national economic slowdown. The economic slowdown together with (1) the relatively high unemployment and low income levels in Skamania and Klickitat Counties, and (2) the decreasing federal payments for the Counties, translate to economic challenges for these three Counties in the near future.

Major employers in the region surrounding the Whistling Ridge Energy Project site include those listed in Table 4.4-13.

Skamania County is about 40 miles in length from west to east, and extends northward from the Columbia River into the Cascade Mountains and the Gifford Pinchot National Forest. The county covers 1,672 square miles and is part of an area recognized for scenic beauty and as a major water, highway, and railroad transportation corridor. Skamania County has historically been highly dependent on logging and the forest products industry. Recently, due in part to government restrictions on timber harvesting, economic activity has shifted away from logging and forest products to tourism and recreation.

Table 4.4-13
Major Employers in Skamania County

County	Company
Skamania	Skamania Lodge
	Skamania County Government
	Stevenson-Carson School District
	Wilkins, Kaiser, Olsen
	Carson Hot Springs Resort
	Bonneville Hot Springs Resort
	A & J Select
	Big River Grill/El Rio
	Molded Fiberglass Company
	High Cascade Veneer
	Skamania County P.U.D. No. 1
Klickitat	TLC Modular Homes
	Custom Interface, Inc.
	Innovative Composite Engineering (ICE)
	Insitu/Boeing
	Klickitat County Government
	SDS Lumber Company
	Underwood Fruit
Hood River	Mt. Hood Meadows
	Hood River County School District
	Diamond Fruit Growers
	Providence Hood River Hospital
	Duckwall-Pooley Fruit Company
	Embarq
	Hood River County Government
	Cardinal Glass IG
	Columbia Gorge Hotel
	Hood River Care Center
	Maritime Services
	Columbia Gorge Center
	City of Hood River Government

Source: SCCC (2008), Real Estate.com (2008), Klickitat County PEDA (2008).

Approximately 85 percent of land in Skamania County is currently owned by the federal government (Mill A Community Action Committee 2008), resulting in relatively low property tax revenues for the County and for local school districts. Federal programs have been in place for over 100 years to relieve the economic burden placed on the County and local schools by the relatively low property tax revenue. Most of these programs operated with or related to funds generated by the sale of timber on federal lands. Historically, approximately one-quarter of US Forest Service revenues, such as those from timber sales, have been returned to States and Counties in which national forest lands are located.

The Secure Rural Schools Act was enacted in 2000 to provide assistance to rural counties, such as Skamania County, affected by the decline in revenue from timber harvests in federal lands. Public Law 110-343, enacted on October 3, 2008, reauthorized and amended the Secure Rural Schools and Community Self-Determination Act of 2000 (Public Law 106-393). The new Secure Rural Schools Act authorizes distribution of funds only through 2011, and the distributions will decrease each year beginning in 2008 (USFS 2008). Consequently, Skamania County will need to find alternate funding for governmental services.

Economic uses on the project site include timber harvesting. The project site is on land managed for commercial forestry by S.D.S. Co., LLC and Broughton Lumber Company. The Applicant, Whistling Ridge Energy LLC, is wholly-owned by S.D.S. Co., LLC. All of the parcels on which the project would be constructed 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 stands of trees on the sections of land that would have turbines on them are near maturity. S.D.S. Co., LLC and Broughton Lumber Company have recently implemented timber harvest plans on portions of the land. Additional harvests are planned, subject to requirements of a Forest Practice Application.

Mill A and Willard consist entirely of housing. The lumber mill closed in 1988, and the school in Mill A has a declining population.

4.4.1.3 Fiscal Conditions

Washington State and Skamania County collect several types of taxes:

- Payroll taxes are paid in Washington by employers for compensation to unemployed or injured workers. Skamania County does not benefit from collection of payroll taxes.

- Washington's Business and Occupation (B&O) tax is levied on the gross receipts of business operations. This revenue would not represent a benefit to Skamania County because all B&O tax revenues remain in the State budget. The amount paid in B&O tax could be less if the project qualifies for a credit under the Rural County B&O Tax Credit for New Employees program. Skamania County does not levy a business tax.

- Washington State collects retail sales and use tax. The sales and use tax rate for the unincorporated area of Skamania County is 7.0 percent, meaning that after the State government's share of 6.5 percent, a remaining 0.5 percent goes to the County. Sales and use tax collected in Skamania County during calendar year 2007 was $630,515. Total taxable (sales and use) retail sales in 2007 was $39.8 million. Since 1995, taxable sales have decreased annually by as much as 34 percent (2001–2002) and increased annually by as much as 52 percent (2002–2003). Cumulatively, taxable sales increased over 50 percent between 1995 and 2007 (WDOR 2008).

- Skamania County collects property taxes for taxing districts within the County. Skamania County's tax base, i.e., assessed value of real and personal property, was $1.134 billion in 2007 (WDOR 2009a). Skamania County collected (current and delinquent) property tax of $9.6 million in calendar year 2007 (WDOR 2008). The average property tax rate for Skamania County in 2008 was $8.36/$1,000 assessed value (WDOR 2009b).

In 2008, the Skamania County Budget was $55,262,498, including $15.8 million for the Current Expense Fund and $39.5 million for all other County funds. The top four categories make up over half of the Current Expense Fund, and include General Services (21 percent), the Sheriff's Department (16 percent), facilities and recreation (13 percent), and the jail (6 percent). Skamania County's General Fund was categorized in 2007 as shown in Table 4.4-14.

Table 4.4-14
Skamania County General Fund, 2007

Category	**Amount**
General Property Taxes	1,474,406
Sales & Use Taxes	333,956
Other Local Taxes	172,114
Licenses & Permits	230,151
Charges & Fees for Services	459,560
Interest & Investment Earnings	1,739,209
Fines & Forfeits	526,162
Rents, Insurance Premium, Internal Contributions, Miscellaneous	656,295
Intergovernmental Revenues	7,461,639
Debt Proceeds	--
Operating Transfers-In	0
Total Revenues	**13,053,492**
Law & Justice Services	4,724,993
Fire & Emergency Services	353,558
Health & Human Services	406,551
Natural Resources	1,370,187
General Government	2,954,717
Capital	204,931
Debt Service-Interest	40,589
Operating Transfers-Out	792,030
Total Expenditures	**10,847,556**

Source: Washington State Auditor (2009).

The project site is within Taxing District 109, for which the total millage rate[1] is $8.026839/$1,000 assessed value. The millage rate is broken down as shown in Table 4.4-15.

[1]The millage rate is the amount per $1,000 of property assessed value that is used to calculate taxes on property.

Table 4.4-15
Breakdown of Taxing District No. 109 Millage Rate

Category	Amount
Current Expense	1.218965
Mental Health	0.012500
Developmental	0.012500
Veteran's Relief	0.011250
County Road	1.262288
Hospital and EMS District	0.643625
State Treasurer (State School Fund)	2.033112
Cemetery District	0.074757
Library District	0.338660
Excess Levy: School District 405 (Klickitat County), Maintenance and Operations	1.640058
Excess Levy: School District 405 (Klickitat County), Capital Projects	0.163270
Excess Levy: School District 405 (Klickitat County), Bond	0.281641
Public Utility District	0.334213
Total	8.026839

Source: L. Moore (personal communication).

4.4.1.4 Public Services and Utilities

Fire Protection

Two city fire departments (North Bonneville and Stevenson) and seven Skamania County fire districts provide fire protection to Skamania County residents. WDNR also provides fire suppression services to forested areas in Skamania County, and would be the first responder to a fire emergency at the project site (J. Weeks, personal communication). Skamania County Fire District No. 3 (SCFD3) provides fire protection and emergency response to a 20-square mile service area immediately south of the project site (Cox 2008). Although the project site is not formally within SCFD3's service area (T. Skinner, personal communication), SCFD3 would likely respond to a fire at the project site, along with and in coordination with WDNR (R. Hovey, personal communication). The Mill A Fire Department is also near the project site, and has a staff that includes less than six volunteer firefighters and no paid personnel (Carlson, 2008).

The project site is located in WDNR's West Klickitat Area. The WDNR work center closest to the project site is the Husum work center, which is staffed by one fire manager officer and one assistant fire manager (J. Weeks, personal communication). Other staff and equipment at the Husum work center includes six firefighters and two Type 6 wildfire engines (Fullerton and Helgerson 2008). The WDNR response time to the project site would vary depending on the location of the engines and the type of fire emergency at the project site, but would range from 45 minutes to one hour (R. Hovey and J. Weeks, personal communications). The engines are usually assigned to work projects in the field.

Skamania County Fire District No. 3 is located in the unincorporated community of Underwood and is staffed by 17 volunteer firefighters. The SCFD3 service area is 20 square miles. Equipment at District No. 3 includes one of each of the following: Type 1 engine, Type 2 engine, Type 3 engine, Type 7 engine, Type 2 tender, and Type 3 tender (Fullerton and

Helgerson 2008). The Washington State Ratings Bureau rating for SCFD3 at the project site is "Unprotected – 10," because the site is not located within the SCFD3 boundaries (T. Skinner, personal communication).

The project site is located outside of the Columbia River Gorge National Scenic Area. If an incident at or near the site, i.e., a wildland fire, threatens the area, the Columbia River Gorge National Scenic Area fire agency could respond. The fire agency is equipped with three Type 6 wildfire engines, one fire prevention module, two command vehicles, two cooperative engines (with the WDNR), and one cooperative engine (with the Oregon Department of Forestry). The Columbia River Gorge National Scenic Area fire agency has nine employees and is staffed seven days per week, July through September (Fullerton and Helgerson 2008).

Skamania County has prepared a Community Wildfire Protection Plan through a Title III grant from the Secure Rural Schools and Self Determination Act. This is a plan developed by a community in an area at risk from wildfire, with the goal of reducing the risk of catastrophic wildfire within the region. Topics addressed in a typical Community Wildfire Protection Plan include wildfire response, hazard mitigation, structure and water source protection, education, and community preparedness (Fullerton and Helgerson 2008).

Table 4.4-16 lists the fire departments that serve the site and surrounding area, along with the departments' staff and equipment. These fire districts have mutual aid agreements with each other (J. Carlson, personal communication).

Law Enforcement

The Skamania County Sheriff's Office would provide law enforcement services to the project site. Sheriff's Office headquarters are located at 200 Vancouver Avenue in Stevenson, approximately 15 miles southwest of the project site. The Sheriff's Office also operates a substation in Cougar that serves the northern portion of Skamania County. Cougar is located more than 50 miles northwest of the project site (Cox 2008). The Sheriff's Office staff includes 23 commissioned officers, two reserve officers, four civil staff, and 14 jail staff. At any one time, at least two officers patrol the County. Response times to the project site depend on the location of patrol vehicles when the call for service is received. The response time from Sheriff's Office headquarters to the project site is approximately 20 minutes (Cox 2008).

Other law enforcement agencies providing service near the project site include the Washington State Patrol, which patrols SR 14 south of the site. Construction and equipment delivery vehicles would travel on SR 14. Roads extending north of SR 14 are county roads, and are patrolled by the Sheriff's Office (Cox 2008). All 39 Washington State county sheriffs sign a mutual aid agreement annually.

Table 4.4-16
Fire Departments in the Whistling Ridge Energy Project Vicinity

Fire Department	Paid Full-Time Personnel	Volunteer Personnel	Equipment	Protection Class[a]
Skamania County Fire District No. 3	0	17	1 – Type 1 engine 1 – Type 2 engine 1 – Type 3 engine 1 – Type 7 engine 1 – Type 2 tender 1 – Type 3 tender	10
Mill A Fire Department	0	<6	(c)	
Washington Department of Natural Resources	6	NA[b]	2 – Type 6 wildfire engines	-
Columbia River Gorge National Scenic Area Fire Agency	9	NA[b]	3 – Type 6 wildfire engines 1 – fire prevention module 2 – command vehicles 2 – cooperative engines (with WDNR) 1 – cooperative engine (with Oregon Department of Forestry).	-

Sources: Fullerton and Helgerson (2008), Washington State Patrol (personal communication), MSRC (2008), J. Carlson (personal communication).

a. T. Skinner (personal communication): As rated by the Washington Surveying and Rating Bureau. The Bureau rates the level of fire protection provided by fire departments against four main elements: available water supply; logistical characteristics and makeup of the district fire department; available communications systems; and finally fire control and safety measures taken and ordinances in effect in the particular fire district. Ratings are used to evaluate fire protection availability for insurance purposes. Ratings range from 1 to 10, with class 1 representing the highest level of fire protection and class 10 the lowest level. Ratings were not available for the Washington Department of Natural Resources or the Columbia River Gorge National Scenic Area Fire Agency.

b. Not available.

The Vancouver District (No. 5) of the Washington State Patrol would provide law enforcement services to SR 14 near the proposed Whistling Ridge Energy Project site, but would not respond to calls for service at the project site. The Washington State Patrol Vancouver District has approximately 60 commissioned officers, and serves the population living in Cowlitz, Lewis, Clark, Klickitat, and Skamania counties. In addition to the Vancouver District, four detachment offices are located in Chehalis, Morton, Kelso, and Goldendale. The detachment office closest to the project site is the Goldendale Detachment, which covers Klickitat and Skamania counties, and more than 230 miles of state routes. In addition to SR 14, the Goldendale Detachment is also responsible for SR 97, SR 141, SR 142, and SR 197 (Washington State Patrol, personal communication).

The Goldendale detachment has nine commissioned officers (Washington State Patrol, personal communication). Table 4.4-17 shows that the staffing level per capita for the Skamania County Sheriff's Office is higher than the average for Washington State.

Table 4.4-17
Police Department Staffing Levels
in the Whistling Ridge Energy Project Vicinity

Department	2008 Population of Service Area	Number of Commissioned Officers	Ratio of Officers to 1,000 Population
Skamania County Sheriff's Office	10,700	23	2.1[a]
Washington State Patrol District 5 Goldendale Detachment	30,800[b]	9	0.3
Washington State Patrol Vancouver District 5	608,600[c]	60	0.01
Average for Washington State	6,489,490	10,541	1.6[d]

a. Cox (2008), WASPC (2008), Washington State Patrol (personal communication).
b. Includes population of Klickitat and Skamania Counties.
c. Includes population of Clark, Cowlitz, Lewis, and Skamania Counties.
d. WASPC (2008), statistics are for 2007.

Emergency Medical Services

Two ambulance companies would respond to an emergency at the Whistling Ridge Energy Project site: Skamania County Emergency Medical Service and Skyline Ambulance. Skamania County Emergency Medical Services is the functioning entity of Skamania County Hospital District No. 1, which provides ambulance service to the residents of Skamania County. Skamania County Emergency Medical Services is located in Stevenson and is equipped with three medic vehicles, one rescue vehicle, and two squad vehicles. Skyline Ambulance is based at Skyline Hospital in White Salmon, and is equipped with three ambulance vehicles (Skyline Hospital 2008). Table 4.4-18 lists characteristics of the first response ambulance service providers for the Whistling Ridge Energy Project site.

Table 4.4-18
Ambulance Service Providers in the Whistling Ridge Energy Project Vicinity

Name	Ownership	Level of Care
Skyline Ambulance	Public	Advanced Life Support
Skamania County Emergency Medical Services	Public	Advanced Life Support

Sources: Cox (2008), Skyline Hospital (2008), Skamania County EMS (2008).

The two hospitals closest to the project are Skyline Hospital in White Salmon (7 miles southeast of the project) and Providence Hood River Memorial Hospital in the City of Hood River (8 miles southeast of the project). Skyline Hospital is a 32-bed acute care hospital with a Trauma Level IV designation, serving western Klickitat County and eastern Skamania County. Services at Skyline Hospital include acute care, obstetrics, surgery, cardio-pulmonary care, radiology and laboratory services, physical therapy, a pharmacy, and emergency services. Skyline Hospital owns and operates a three-vehicle ambulance service (Skyline Hospital 2008).

Providence Hood River Memorial Hospital is a 25-bed facility that provides Cardio conditioning, counseling, diabetes treatment, a dialysis center, emergency services, obstetrics, radiology, laboratory services, nutrition, occupational medicine, a sleep center, and surgery.

Schools

In October, 2007, the total student enrollment in Skamania County public schools was 1,213 students, representing approximately one-tenth of one percent of total enrollment in Washington that year (Washington State OSPI 2008). Five school districts provide public education services to Skamania County residents. The service areas for four of the five districts are completely within Skamania County boundaries. These four districts are Mill A School District No. 31, Stevenson-Carson School District No. 303, Skamania School District No. 2, and Mount Pleasant School District No. 029-93. The fifth district, Washougal School District No. 112-6, is under Clark County jurisdiction, but has a service area that extends into the western portion of Skamania County. Table 4.4-19 shows that over the last few years, enrollment in these five districts has not changed more than five percentage points, on average (Washington State OSPI, 2008).

Table 4.4-19
Enrollment Trends
in the Whistling Ridge Energy Project Vicinity

	Mill A School District	Mount Pleasant School District	Skamania School District	Stevenson-Carson School District	Washougal School District
Fall 2004	79	65	64	1,049	2,870
Fall 2005	76	63	72	1,069	3,015
Fall 2006	66	56	70	1,058	3,057
Fall 2007	69	56	68	1,020	3,054
Annual Average Rate of Growth, 2004-2007	-4.4%	-4.8%	2.0%	-0.9%	2.1%

Source: Washington State OSPI (2008).

Mill A School District No. 31 provides public educational services to the population in the southeastern corner of Skamania County, a service area adjacent to the project site (ESD 2008). Mill A School currently enrolls 81 students in grades K through 8. High school students living within the boundaries of the Mill A School District attend Stevenson High School in the Stevenson-Carson School District No. 303, which borders Mill A School District No. 31 on the west. Mill A School and district offices are located at 1142 Jessup Road in the community of Cook, which is located approximately 5 miles south of the project site (Mill A School District 2008).

The public school closest to the project site is the Mill A School, which is approximately 2 miles southwest of the site. The next closest public schools are in the community of Carson, approximately 10 miles west of the site. School buses may drive through neighborhoods near the project site, including the communities of Willard and Mill A, which are located approximately 2.25 and 1.5 miles respectively from the site.

The higher education facilities closest to the site include Clark College, a community college in Vancouver, and Washington State University's Vancouver campus (SCCC 2008).

Parks and Recreational Facilities

Parks and other recreational facilities are discussed in Section 4.2.4, Recreation.

Utilities

Embarq provides telephone service to the area surrounding the site (Cox 2008). The Skamania County Public Utility District (PUD) is a customer-owned utility that provides electricity service to Skamania County. The homes and businesses in Mill A and Willard do not have sewer service or water service. They are on wells and have septic systems. Skamania County provides solid waste pick-up service to residences and businesses in the County, including those near the project site (Skamania County PUD office staff, personal communication).

Discussions of water supply systems and stormwater control systems at the Whistling Ridge Energy Project site and in the site vicinity, as well as project-related impacts on these facilities, can be found Section 2.5 Water Supply System, Section 2.10 Surface Water Runoff, and Section 3.3 Water.

4.4.2. IMPACTS

This section describes the expected impacts of the project on local socioeconomic resources. The project would generate new local employment, additional business for local service and materials providers, and additional tax revenues to Skamania County and the state. The overall permanent socioeconomic impact of the project would be positive. Impacts were estimated through a detailed review of the proposed action against existing conditions.

4.4.2.1 Construction

Business and Economic Impacts

Section 2.12, Construction and Operation Activities provides information on the construction costs and schedule and projected manpower loading for the project. Assuming the Governor approves the Site Certification agreement in April 2010, the Applicant anticipates beginning design and construction in 2010 and operation by 2011. During the estimated one-year construction period (excluding engineering, design, specifications, and survey), approximately 330 full-time and part-time workers would be employed at some point during construction. Some of these jobs would not last the entire construction period. The on-site construction work force would peak at approximately 265 workers over the construction period and average 143 workers over the 12 months.

Table 4.4-20 presents the expected average composition of the construction work force. Construction trades would be broken down as shown in Table 4.4-21.

An estimated 65 to 75 percent of the construction labor force would likely be hired from the Portland-Vancouver metropolitan area. An estimated 25 to 30 percent of the workers would be residents of the three-county area including Skamania, Klickitat, and Hood River counties (A. Barkley, personal communication). This estimate is based on the relative size of the labor force in the three-county area compared to larger labor forces in metropolitan areas that are further away. Most construction workers hired from the Portland-Vancouver metropolitan area (65 to 75 percent) are expected to commute on a daily basis due to the 61-mile distance to the site.

Table 4.4-20
Estimated Quarterly Construction Personnel

Month Before Commercial Operation	Estimated Number of Construction Personnel On Site
14	15
13	15
12	90
11	90
10	190
9	190
8	265
7	215
6	165
5	190
4	100
3	100
2	100
1	25
0	25
Cleanup	25
Average (months 1 – 12)	143
Peak (months 1 – 12)	265

Table 4.4-21
Average Power Plant Construction Workforce Composition, by Occupation

Occupation	Composition (%)
Engineering/Design/Specifications/Surveys	4.5
Road Construction	15.2
Foundations Construction	15.2
Electrical Collection System Construction	15.2
Substation Construction	12.1
Wind Turbine Assembly and Erection	22.7
Plant Energization and Commissioning	7.6
Construction Punchlist Clean-Up	7.6
Total	100.0

To ensure that the applicant uses the local labor pool to the greatest extent possible, construction contractors would be required to advertise positions locally and to employ local workers to the greatest extent possible. Top hiring priority for construction would be given to qualified in-county and in-state construction workers. Some of the more specialized skills required for certain plant construction activities may not be available in the local or state labor pools; therefore, a small percentage of the work force may have to be brought in from outside of both Washington and Oregon states. These workers (up to 15 percent of the workforce [A. Barkley, personal communication]) would likely be employed for a short period of time, and would reside in motels in the project area for the duration of their assignments.

The average of up to 21 specialized out-of-state workers (40 at peak), and an estimated average 31 (57 peak) weekly-commuting construction workers[2] (would generate additional business for

[2] These weekly-commuting construction workers represent one-third of the workers originating from the Portland-Vancouver metropolitan area, as a worst-case scenario.

the operators of transient accommodations, such as motels, recreational vehicle parks, and campgrounds, as well as for other businesses near the project area. Also, a portion of the construction materials and services needed for the project would be procured from local vendors, thus generating additional income for local suppliers.

Whistling Ridge Energy Project non-salary local procurements[3] for construction materials, services and equipment leasing associated with construction are projected to total approximately $13.2 million. These procurements would augment the revenues of many construction-related businesses in Skamania County and the three-county area in general. In addition, the consumption spending of local project workers and their households out of their wages and salaries would stimulate the retail trade and services sector of the local and regional economies. Total payroll costs for project construction, including fringe benefits and other labor overhead costs, are projected to be approximately $18 million, of which approximately $4.5 million is expected to be earned in the three-county area including Skamania, Klickitat, and Hood River Counties.

An analysis of the primary and secondary effects of these construction spending streams within the three-county area reveals that indirect and induced value added from construction would be $3.9 million, and that 71 indirect and induced jobs would be attributable to construction. The total economic impact (direct, indirect, and induced) is expected to be $8.5 million in value added and 107 jobs (IMPLAN 2008). Project construction would create a total of 107 jobs in the three-county area, which would continue throughout the construction period.

Table 4.4-22 shows the direct, indirect, and induced economic effects of construction of the project in terms of its contribution to gross regional product (value added) and creation of employment (number of jobs) in the local area, including Skamania, Klickitat, and Hood River counties. Table 4.4-22 shows the breakdown of these effects by industry.

The estimates in Table 4.4-22 were calculated using an IMPLAN economic input-output model specific for the three-county area and the Whistling Ridge Energy Project. Local expenditures related to project construction would affect the three-county area economy *directly* through the purchases of goods and services in the region, and *indirectly* as those purchases, in turn, generate other purchases of intermediate goods and services from related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance the overall purchasing power of residents, thereby *inducing* further consumption and investment. Number of jobs is the full-time equivalent of person-years of construction employment.

---

[3]Local procurements are procurements that would occur with the three-county area including Skamania, Klickitat, and Hood River Counties.

Table 4.4-22
Economic Impacts of Construction

Sector	Direct Effects		Indirect Effects		Induced Effects		Total Effects	
	Total Value Added[a]	Number of Jobs	Total Value Added[a]	Number of Jobs	Total Value Added[a]	Number of Jobs	Total Value Added[a]	Number of Jobs
Agriculture, Forestry, Fish & Hunting	-	0	0.1	1	-	0	0.1	2
Mining	-	0	-	0	-	0	-	0
Utilities	-	0	-	0	-	0	0.1	0
Construction	4.6	35	-	1	-	0	4.6	36
Manufacturing	-	0	2.0	35	0.8	11	2.8	46
Wholesale Trade	-	0	-	0	-	0	-	0
Transportation & Warehousing	-	0	-	0	0.2	6	0.2	6
Retail trade	-	0	-	1	0.1	2	0.1	3
Information	-	0	0.2	5	0.1	5	0.4	10
Finance & insurance	-	0	0.1	1	0.1	2	0.1	3
Real estate & rental	-	0	0.1	1	0.1	0	0.1	1
Total (b)	4.6	35	2.5	45	1.4	26	8.5	107

Source: IMPLAN (2008).
a. In millions of 2008 dollars
Totals may not add due to rounding.
North American Industry Classification System categories that are 0 are not shown.

Construction activities such as earth movement and vehicle traffic would generate noise and dust, which would represent a temporary nuisance to nearby businesses. In addition, traffic delays could occur on the existing roadway network due to the maneuvering of large vehicles carrying heavy or long loads. Nuisances and traffic delays related to construction would be temporary and are not expected to affect employers' ability to conduct business.

Population and Housing Impacts

The approximately 15 percent of the construction work force that would be specialized craftsmen originating outside of Washington and Oregon would likely have relatively short assignments, so few are expected to bring their families with them when they arrive to work on the project. The population increase in the project area and elsewhere in the three-county area would therefore be limited mainly to these workers for a temporary period of time, plus, during the work week, the non-local workers who would temporarily commute on a weekly basis from the Portland-Vancouver area.

The total estimated number of workers requiring transient housing would be 52 (average) and 97 (peak) over the 12-month construction period, assuming that one-third of the workers from the Portland-Vancouver metropolitan area would commute on a weekly basis and the specialized, temporary staff also would require lodging. These construction workers are expected to seek temporary accommodation in the general vicinity of the project site, and to use motels, trailers, campers, and other forms of transient housing. Table 4.4-8 shows that approximately 1,082 hotel rooms or RV campsites exist within 25 miles of the project site. Assuming 70 percent occupancy, approximately 325 of these units (313 hotel rooms) would be available at any one time. Assuming a worst-case scenario that workers would want hotel or motel lodging, the peak demand of 97 rooms (assuming, again a worst-case scenario that no workers would share rooms) would represent approximately 31 percent of the available rooms and would therefore not stress the lodging facilities within 25 miles. Construction of the proposed project is not expected to result in a significant impact on transient accommodation availability in the project vicinity, nor is the project expected to affect median housing values, median gross rents, or new housing construction. The applicant has no plans to provide on-site temporary housing for workers or shuttle to or from hotels or other temporary lodging facilities.

Access to the proposed project site would be via Skamania County roads that extend northward from SR 14 and an existing private logging road. From SR 14, vehicles would travel along Cook-Underwood Road, Kollack-Knapp Road, Scoggins Road, and a private logging road listed as CG2930. The private logging road is located on the Applicant's (S.D.S. Co., LLC and Broughton Lumber Company) property, and would provide access to most areas where project facilities would be located.

Fiscal Impacts

Sales Tax Revenue

The total cost of construction is estimated to be approximately $150 million. In addition to the local area procurements mentioned above, the Applicant would be purchasing large amounts of wind power generation equipment from various domestic and foreign suppliers. Depending on legislation currently under consideration in the state legislature, state sales and use tax may be levied only on procurements that are not directly related to electricity generation. Should the state sales tax exemption for wind power be extended, capital equipment such as turbines, transformers, transmission cables, and substation equipment would not be taxable.

The local procurements are estimated to be 10 percent of total procurements (approximately $13.2 million). The majority (estimated at 90 percent) of local procurements would be directly related to electricity generation. Taxable sales due to project construction would therefore be approximately $1.32 million, resulting in $92,400 in sales and use tax revenue for Washington State and Skamania County taxing districts.

The Skamania County sales and use tax rate for the unincorporated area is 7.0 percent, meaning that after the state government's share of 6.5 percent, a remaining 0.5 percent goes to the County. Due to the project's location within the unincorporated area of Skamania County, Skamania County would receive $6,600 of the $92,400 in sales and use tax revenues related to project construction. This one-time influx of revenue ($6,600) would represent an increase of one percent when compared to the sales and use tax collected in Skamania County during calendar year 2007 ($630,515) (WDOR 2008). These positive fiscal impacts to the County and the state would be a one-time occurrence resulting from project construction activities.

Modest increases in sales of goods and services would occur during construction, such as local purchases by construction workers. Sales tax revenues resulting from these types of purchases would be beneficial although small within the context of the Skamania County economy.

Property Values and Property Tax Revenue

The project site is located on undeveloped land in a forest land zone. The nearest residences are approximately 0.5 mile northwest of the site, and approximately 0.4 mile (2,000 – 2,500 feet) southeast of the site. Construction traffic would go through Underwood, which would experience additional truck traffic for a period of up to nine months. Construction activities are not likely to adversely affect property values in residential and commercial areas near the project site because the construction period would be relatively short. Construction of the project would not affect property tax revenues.

County Expenditures

Skamania County could experience a small increase in traffic-related costs due to the need for permitting and control measures related to over-size or over-weight loads carrying equipment such as tower sections, nacelle, turbines, and blades. Construction of the project would require that many construction vehicles, including trucks with over-size and over-weight loads, share the existing roadway network with the general public. As a result, some accidents could occur that would be directly attributable to construction traffic. An increase in accident occurrence during the construction of the project could take place, but any increase is expected to be minimal.

The County could experience a small increase in cost of public services such as fire suppression, law enforcement, governmental services, parks and recreation, and hospital costs during construction due to the additional traffic and the temporary population. These potential additional costs would be temporary and negligible within the context of the total costs for services in Skamania County.

The benefits of the project, including additional jobs, income, spending, and tax revenue, would outweigh the small amount of costs Skamania County could potentially incur. Both the benefits and costs associated with construction would be temporary and would occur concurrent with the one-year construction period.

Public Services and Utilities

The influx of construction workers into project area communities on a daily and weekly basis could result in a minor and temporary increase in the demand placed on public service providers. This increase in demand could have a minor and temporary effect on local police departments, providers of emergency medical services, and local fire departments. The contractor would develop emergency plans for project construction.

The impact of project construction on local schools would be at most minor and temporary, as few out-of-state construction workers are likely to be accompanied by families. Construction-related impacts to local utilities are also expected to be minor and temporary.

Response times in the project vicinity are not expected to change due to project construction. Construction trucks would represent additional volume on area roads, but would not deter any emergency vehicles from travel. The project would be constructed entirely within land managed for commercial forestry by the Applicant.

Anticipated water uses during construction include spraying roads for dust control, construction support (such as concrete curing and hydrostatic testing of equipment), and restroom facilities for the estimated average of 143 and peak of 265 construction and support workers. Water needed for construction would be purchased by the contractor from an off-site vendor with a valid water right and transported to the project site in water-tanker trucks.

The project would require the improvement of approximately 7.2 miles of existing private logging roads. In areas near proposed wind turbine strings where no logging roads currently exist, approximately 2.4 miles of new gravel access roads would be constructed. Some of these construction roads would continue to be used during the project's operational phase.

The needs of public service providers are considered in Section 4.3, Transportation. Section 4.2.4, Recreation addresses the potential for impacts on parks and other recreational facilities.

4.4.2.2 Operation

Business and Economic Impacts

Operation of the project would result in a positive economic impact to Skamania County, the three-county area, and the State of Washington due to increased tax revenues, employment, and local expenditures. Operation of the project would likely require eight to nine full-time or part-time Operations and Maintenance employees. Efforts would be made to hire local individuals to staff the project as much as practicable.

The estimated gross payroll (including fringe benefits and other payroll overheads) for the operational workforce is $1.5 million, or an average annual labor cost of $167,000 to $188,000 per employee. This is approximately 25 percent higher than the standard industrial wage for this industry in Skamania County (IMPLAN 2008). In addition to the regular operational workforce, a temporary workforce with appropriate skills would be utilized during major maintenance or other non-routine operational work.

Using IMPLAN regional economic modeling software for the power generation and supply industry in the three-county area including Skamania, Klickitat, and Hood River Counties, a wind power facility employing nine full-time workers would have a gross annual operating cost valued at approximately $3.75 million, which would include direct purchases from suppliers (including fuels, maintenance supplies and services, retail goods and professional services). Sales, use and other indirect business taxes on that level of spending are estimated at $200,000 (IMPLAN 2008) per year, which would accrue to state and local government jurisdictions. Employee spending from wages and salaries is estimated at around $900,000 per year, assuming an average local expenditure rate of 70 percent of compensation.

Table 4.4-23 shows the direct, indirect, and induced economic effects of operation of the project in terms of its contribution to gross regional product (value added) and creation of employment (number of jobs). The estimates in the table were calculated using an IMPLAN economic input-output model for the three-county area including Skamania County, Klickitat County, and Hood River County.

Table 4.4-23
Economic Impacts of Operation

Sector	Direct Effects		Indirect Effects		Induced Effects		Total Effects	
	Total Value Added[a]	Number of Jobs	Total Value Added[a]	Number of Jobs	Total Value Added[a]	Number of Jobs	Total Value Added[a]	Number of Jobs
Ag, Forestry, Fish & Hunting	-	0	-	0	-	0	-	0
Mining	-	0	-	0	-	0	-	0
Utilities	1.2	7	-	0	-	0	1.2	7
Construction	-	0	-	0	-	0	-	0
Manufacturing	-	0	-	0	0.2	2	0.2	2
Wholesale Trade	-	0	-	0	-	0	-	0
Transportation & Warehousing	-	0	-	0	-	1	-	1
Retail trade	-	0	-	0	-	0	-	0
Information	-	0	-	0	-	1	-	1
Finance & insurance	-	0	-	0	-	0	-	0
Real estate & rental	-	0	-	0	-	0	-	0
Total[b]	1.2	7	-	1	0.2	5	1.5	12

Source: IMPLAN (2008).
a. in millions of 2008 dollars
b. totals may not add due to rounding
North American Industry Classification System categories that are 0 are not shown.

Operation of the project would result in a total of 12 permanent jobs, including direct, indirect, and induced effects. For comparison, the Renewable Energy Policy Project estimates that every megawatt of installed wind capacity creates about 4.8 job-years of employment, both direct (manufacturing, construction, operations) and indirect (advertising, office support, etc.) (REPP 2009). Using this standard, the Whistling Ridge Energy Project, which would produce approximately 75 MW of electricity, would result in 600 job-years (60 jobs each year over 10 years, for example). In comparison, this analysis finds that the project would result in 78 jobs for the construction period, and 12 jobs each year for the estimated 30 year life of the project.

Expenditures related to project operation would affect the three-county area economy *directly* through the purchases of goods and services in the region, and *indirectly* as those purchases, in turn, generate other purchases of intermediate goods and services from related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance the overall purchasing power of residents, thereby *inducing* further consumption and investment. Number of jobs is the full-time equivalent of person-years of employment.

Project operations would not affect local businesses' ability to conduct operations.

Lease Payments and Royalties

Whistling Ridge Energy LLC would lease land for the project from S.D.S. Co., LLC and Broughton Lumber Company.

Population and Housing Effects

Operation would require up to nine permanent employees. For the IMPLAN model, an estimated seven employees were assumed to originate from the three-county area. The remaining two employees could migrate to the area from other locations outside the three-county area. Assuming an average household size of 2.6 persons, the population in the area could increase by approximately five people, and two households. Assuming the most recent average housing vacancy rate available (2008) for Skamania County (16.8 percent), more than 900 housing units would be available in Skamania County along, not including the additional nearby housing in Klickitat and Hood River counties. Even if both of these new project-related households choose to locate in Skamania County, the population increase would not represent an adverse impact on population or housing demand in the area.

The project would not displace any minority or low-income populations. The project would be constructed on private land not occupied by residents or businesses owned by anyone other than the Applicant. As discussed in Section 4.4.1.1, the area near the project does not have a substantially higher minority or low-income population when compared to larger reference populations. Section 4.1, Environmental Health, states that infrasound (noise) potential impacts are considered to be either non-existent or less than significant during operation. Permanent visual changes due to project operation would be low to moderate. Therefore, this analysis finds that high and disproportionate impacts upon minority and low-income populations would not occur.

Fiscal Impacts

Property Values

Local communities near proposed wind turbine locations have expressed concern that constructing wind turbines would detract from views, which would in turn decrease their property values. In order to address this concern and potential socioeconomic impact of the Whistling Ridge Energy Project, two studies were found that (1) review literature related to property values and wind projects, and (2) analyze property value impacts of wind projects.

The first study is entitled "Economic Impacts of the Kittitas Valley Wind Project" (the Kittitas Study) (ECONorthwest 2006). The Kittitas Study was prepared in 2006 by ECONorthwest for the Economic Development Group of Kittitas County, Washington. The Kittitas Study is an update to the "Economic Impacts of Wind Power in Kittitas County" study (ECONorthwest 2002). The Kittitas Study finds that "views of wind turbines will not negatively impact property values…based on a nationwide survey conducted of tax assessors in other areas with wind power projects, [the authors] found no evidence supporting the claim that wind farms decrease property values" (ECONorthwest 2006). The authors also conducted a literature review, and testified that "information from tax assessors and related literature indicate that views of wind turbines do not negatively affect property values" (EFSEC 2006).

The second study, is entitled "The Effect of Wind Development on Local Properties," and was prepared by the Renewable Energy Policy Project, a government agency in Washington, D.C. (REPP 2003). The REPP Study states that because installed wind power capacity in the US grew 26 percent annually (on average) between 1998 and 2002, any impacts on property values would likely have been evident in 2003, when this study was conducted. The REPP Study reviewed data on property sales near wind projects and used statistical analysis to estimate whether and to what extent wind projects affected prices at which properties were sold.

The authors of the REPP Study chose 10 projects that were (1) 10 ms or greater installed wind capacity, and (2) built during the period 1998 to 2001. They chose five-mile radius study areas around each wind project because they found that wind turbines are not highly noticeable beyond five miles. The authors collected property sales data over a period of six years, straddling the on-line date of the projects. The goal was to collect data for three years preceding and three years following the on-line date of the project. The authors gathered data for the view shed, and for a community comparable to the view shed, but without the presence of the wind turbines. The database for the study held over 25,000 records of property sales in the view shed communities and the comparable communities. The REPP Study found that:

- In eight of ten cases, property values increased faster in the view shed than in the comparable community
- In a study of the view shed only (not the comparable community), in nine of ten cases, property values increased faster after the project came on line than before
- In nine of ten cases, property values increased faster in the view shed than they did for the comparable community during the period after the projects came on line

The results of the REPP Study statistical analysis provides no evidence that wind development has harmed property values within the view shed (REPP 2003).

The Whistling Ridge Energy Project would be located in an undeveloped area, away from large population or industry centers and primarily zoned as Unmapped by Skamania County (wind energy facilities are an outright permitted use in the Unmapped area). Approximately 400 homes or businesses exist within three miles of the project site—approximately one-third of these 400 are located in Willard. The closest home would be located to the southeast of the Project Site, approximately 2,000 – 2,500 feet away. Homes and businesses near the project, as well as those further away, such as across the Columbia River, could have views of the turbines. Section 4.2.3 discusses the potential impacts to views attributable to the project. Based on the findings of the two studies discussed above, the project would not likely result in decreasing property values for properties with views of the wind turbines. The Applicant is not aware of any other studies or information (of a non-anecdotal nature) that would indicate a likelihood of negative impacts on property values for a setting such as that near the project.

Sales Tax Revenues

The permanent operation employees and the local procurement of supplies and equipment for operations and maintenance would generate modest additional economic activity due to their local spending. This activity would result in a small and beneficial increase in sales tax revenue for Skamania County.

Property Tax Revenue

An increase in the tax base equal to the numbers of turbines multiplied by an estimated value of $1.75 million per turbine ($87.5 million) would represent an increase of 6.5 percent in assessed value in the County. Using the average property tax rate for Skamania County of $8.36/$1,000 assessed value (WDOR 2009b), the increase in property tax revenue to the County would be $731,500 and would represent a permanent, annual increase of 7.6 percent compared to the amount of property tax collected (current and delinquent) in calendar year 2007 ($9.6 million) (WDOR 2008). Property tax revenues would be higher to the extent that increased wages and economic activity in the County results in higher valued properties.

Using a standard for wind projects given by the National Wind Coordinating Committee of $10 to $14 in property taxes for each $1,000 investment (NWCC 2009), the $17.7 million dollars spent locally (labor and non-labor cost) due to this project would result in approximately $177,000 to $250,000 in property taxes, which is lower than the estimate above. To the extent the wind turbines depreciate over time, the assessed value of the turbines and therefore the property tax revenue would decrease.

These additional and permanent annual revenues could help satisfy the need for alternate funds to replace decreasing federal funding. Assuming that the annual tax revenue of $731,500 would be distributed among funds as shown in Table 4.4-15, funds receiving the most revenue would be the State School Fund ($185,281), School District 405 Maintenance and Operations ($149,461), the County Road fund ($115,035), and the Current Expense fund ($111,086). A portion of the

State School Fund would be returned to Skamania County for Skamania County schools (L. Moore, personal communication).

County Expenditures

Skamania County could experience a negligible increase in demand for and cost of public services (fire service, law enforcement, governmental services, parks and recreation, and hospital services) due to project operation. Changes due to the project would include additional roads and five residents living in the three-county area. An estimated two workers and their families would permanently relocate to the area. These additional costs would be negligible within the context of the Skamania County budget and the permanent economic and fiscal benefits attributable to project operation.

The benefits of the project, including permanent jobs, income, spending, and tax revenue, would outweigh the costs Skamania County could potentially incur, even as depreciation of project equipment causes a decrease in property tax revenues in the project's later years. The increase in property tax revenue would begin one year after construction is complete, and continue for the life of the project.

Public Services and Utilities

No new BPA infrastructure would be needed for the electrical transmission interconnection system. The project substation would occupy a portion of a fenced 5- to 6-acre area in the southwest part of the project site, immediately adjacent to the BPA 230-kV transmission line. The collector system would collect energy generated at 575 volts (depending on model) from each wind turbine, and transform the voltage to 34.5 kV using a pad-mounted transformer. Then, the collector would deliver the energy via underground cables to the project substation, which would further transform the energy from 34.5 kV to 230 kV and deliver it to the adjacent BPA transmission line and into the regional transmission system. The project would require approximately 8.5 miles of underground collector cable trenches.

A permanent Operations and Maintenance facility would be constructed on a 2-acre area adjacent to the substation. 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.

Upon completion, the project would be connected to the following established utility systems:

- Electric service: Skamania County PUD/BPA connection
- Sewer Services: on-site
- Drinking Water: on-site
- Telephone: Embarq and Sprint
- Non-hazardous waste pick-up: Allied Waste

The Applicant would develop fire, emergency, and illness plans for project operation (see Section 2.16, Security Concerns). Water and sewer facilities for the project would be developed on site by the Applicant. Water for the bathroom and kitchen would come from a new on-site well. Project operations would require less than 5,000 gallons of water per day. The bathroom and kitchen would drain into an on-site septic system. A graveled parking area for employees, visitors, and equipment would be located adjacent to the Operations and Maintenance facility. The entire project site (including Operations and Maintenance facility, parking area, utilities, and turbines) would be fenced and have a locked gate.

Considering the small number of on-site employees (eight to nine) and the use of on-site services and emergency response plans and devices, the project is not expected to place an unacceptable additional demand on local public services.

The Sheriff's Office resources are generally adequate to serve the project during construction and operation, given that onsite security is provided by a separate party (Cox 2008). The Applicant would likely contract locally for private security.

WDNR resources for fire protection and suppression services are adequate to serve the project during construction and operation (J. Weeks, personal communication).

The project would not result in a decrease in response times for area service providers during operation. The project's eight to nine permanent employees would not represent a substantial increase in traffic volumes on area roads, nor would project facilities result in additional traffic controls.

The addition of potentially two new households could mean increased demand at Mill A School District or other nearby school districts. Assuming every two households represent the addition of one school-age child, enrollment at any of these districts could increase by 1.5 percent at most, representing a less-than-significant impact.

There would be a potential positive impact on public services and utilities due to project operation. The project's assessed value could be $87.5 million, and would generate approximately $800,000 per year in generation, property and sales tax distribution to municipal, county and other local jurisdictions. A portion of these funds could be used to upgrade existing public services and utilities in the County.

4.4.3. MITIGATION

Socioeconomic impacts are expected to be beneficial in the form of additional jobs, increased sales, and increased tax revenues. Temporary increases in population due to worker relocation during construction are likely to be less than significant in view of the availability of housing, transient accommodations, and other public services in the region. Specific mitigation measures to lessen the impacts of the construction phase on public service providers in the Whistling Ridge Energy Project vicinity include:

- Construction activities would be coordinated with local police and fire departments, as well as emergency medical service providers, to ensure access to all locations in the project site vicinity in the case of an emergency.

- To help mitigate loss of access and other traffic-related impacts, adequate traffic control and signage, indicating closures and alternate routes, would be provided where needed.

- Construction vehicle trips in and out of the immediate construction zone would be coordinated and scheduled away from peak travel periods as much as possible, to minimize general traffic disruption.

- Noise and dust problems generated by construction would be mitigated through the use of properly muffled construction equipment, and by the use of approved dust control methods.

For related discussions of impacts and mitigation, see Section 3.2 Air, Section 4.1 Environmental Health, and Section 4.3 Transportation.

SECTION 5.1 AIR EMISSIONS PERMITS AND AUTHORIZATIONS (WAC 463-60-536)

Pursuant to WAC 463-60-115, Whistling Ridge Energy LLC requests a waiver of the information required by WAC 463-60-536, which calls for a PSD permit application and a Notice of Construction Application.

The fuel source for the Whistling Ridge Energy Project is wind transformed from kinetic energy into electrical energy by wind turbine generators. The project would not be subject to PSD regulations since it would not emit more than 100 tons per year of a regulated pollutant. As no air emissions would be generated from operation of the wind turbine generators, a PSD Permit and Notice of Construction Application would not be required.

SECTION 5.2 WASTEWATER/STORMWATER DISCHARGE PERMIT APPLICATION (WAC 463-60-537)

5.2.1 WASTEWATER DISCHARGE

EFSEC has jurisdiction regarding the NPDES Permit over the project pursuant to WAC Chapter 463-38. Construction of the facility would disturb more than five acres of land, and EFSEC may determine that the Whistling Ridge Energy Project obtain coverage under Ecology's Stormwater General Permit for construction activities.

If coverage is deemed necessary by EFSEC, at least 30 days prior to beginning construction, Whistling Ridge Energy LLC would develop and submit to EFSEC a notice of intent to be covered by Ecology's 2005 Construction Stormwater General Permit for discharges associated with construction. Pursuant to the general permit, Whistling Ridge Energy LLC would prepare SWPPPs that identify appropriate BMPs to reduce the pollution loadings resulting from construction activities and industrial operations. These BMPs would be incorporated into project design, and Whistling Ridge Energy LLC would ensure that they are observed during construction of the project. Monitoring and reporting would be carried out in accordance with permit requirements.

Appendix B

Geotechnical Report
November 2007

URS

Preliminary Geotechnical Report
Saddleback Wind Energy Project
White Salmon, Washington

Prepared for

SDS Lumber Company

November 2007

Prepared by

URS Corporation
URS Job #33758687

URS

URS

November 5, 2007

SDS Lumber Company
PO Box 266
Bingen, WA 98605

Attn: Jason S. Spadaro, President

Re: Preliminary Geotechnical Report
Saddleback Wind Energy Project
SDS Lumber Company
White Salmon, Washington
URS Job No: 33758687

Dear Mr. Spadaro:

We are pleased to submit herewith our report entitled "Preliminary Geotechnical Report – Saddleback Wind Energy Project, White Salmon, Washington." This report presents our findings, conclusions, and recommendations regarding the proposed project.

It has been our pleasure to assist you with this project. Should you have any questions regarding the contents of this report, please call us at your convenience.

Yours very truly,

URS CORPORATION

Dan B. Meier, LEG
Senior Engineering Geologist

State of Washington
Engineering Geologist
2382
Licensed Geologist
DANIEL B. MEIER
Exp 2/27/08

Brian M. Willman, PhD, PE
Principal Engineer

Registered Professional Engineer
60468P
Oregon
May 17, 1999
Brian M. Willman
EXPIRES: 6/30/08

URS Corporation
111 SW Columbia, Suite 1500
Portland, OR 97201-5850
Tel: 503.222.7200
Fax: 503.222.4292

TABLE OF CONTENTS

URS

Preliminary Geotechnical Report
Saddleback Wind Energy Project
White Salmon, Washington

Prepared for

SDS Lumber Company

November 2007

Prepared by

URS Corporation
URS Job #33758687

URS

URS

November 5, 2007

SDS Lumber Company
PO Box 266
Bingen, WA 98605

Attn: Jason S. Spadaro, President

Re: Preliminary Geotechnical Report
Saddleback Wind Energy Project
SDS Lumber Company
White Salmon, Washington
URS Job No: 33758687

Dear Mr. Spadaro:

We are pleased to submit herewith our report entitled "Preliminary Geotechnical Report – Saddleback Wind Energy Project, White Salmon, Washington." This report presents our findings, conclusions, and recommendations regarding the proposed project.

It has been our pleasure to assist you with this project. Should you have any questions regarding the contents of this report, please call us at your convenience.

Yours very truly,

URS CORPORATION

Dan B. Meier, LEG
Senior Engineering Geologist

State of Washington Licensed Geologist
ENGINEERING GEOLOGIST 2382
DANIEL B. MEIER
Exp 2/27/08

Brian M. Willman, PhD, PE
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
60468P
OREGON
MAY 17, 1999
BRIAN M. WILLMAN
EXPIRES: 6/30/08

URS Corporation
111 SW Columbia, Suite 1500
Portland, OR 97201-5850
Tel: 503.222.7200
Fax: 503.222.4292

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

1.1 GENERAL

The purpose of this report is to provide preliminary geotechnical feasibility and recommendations regarding design of wind turbine tower-foundations and approach roads for the Saddleback Wind Energy Project (SWEP). This is at site located approximately 7 miles west of the town of White Salmon, Washington, and approximately 2 miles east of the Little White Salmon River. The location of the site is shown on Figure 1, Vicinity Map.

The project area is located on private land immediately north of the Columbia River Gorge National Scenic Area boundary. The area of the proposed project is approximately 3.2 square miles (2000 acres). The Project site is located on a series of north trending ridges that range in elevation from approximately 2100 to 2300 feet above mean sea level (msl). The land west of the proposed Project site drops sharply to a narrow river terrace and then to an elevation of less than 800 feet above msl in the Little White Salmon River valley. The topography to the northeast of the site drops gradually toward the White Salmon River or climbs gently up the northeast flank of Underwood Mountain (2,728 ft above msl). To the south, the topography drops to the Columbia River.

1.2 PROPOSED CONSTRUCTION

The SWEP project involves the installation of approximately forty eight wind energy turbines at its White Salmon, Washington site. As of the date of this report, the tower designer and tower locations have not been finalized. Because of this, the exact bearing capacity of the foundations required to support the Wind Turbine Generators (WTG) is not known. URS received information from a proposed turbine construction contractor, D.H. Blattner & Sons, Inc. which preliminarily assumed installation of 80-meter high GE 1.5 WTG which will be supported by 30 foot-deep concrete foundations. Each turbine tower will be coupled to the foundation with 128 rock anchor (consistent with GE towers). Final foundation design will be developed after detailed investigation and when designs are finalized.

Construction and Maintenance access to the proposed tower locations will be achieved by improving existing roadways that have historically been used primarily in support of logging activity and for access to existing BPA transmission lines. Modification of the roadways will be necessary to support the long and heavy loads that will be required for delivery of the wind turbine systems.

1.3 SCOPE OF WORK

To complete this preliminary report, URS has completed the following scope of work.

County Roads - Pavement Engineering – Upon speaking with the County personnel URS recommends that best pavement approach at this time would be to develop a "pavement assessment and design" strategy rather than a comprehensive field effort – as the field conditions will likely change over the next couple of years. The plan entails the following and is located in Appendix C:

- Anticipated routes for the project
- Existing pavement sections along the route – as they are best known (field verification of the actual sections later)
- Estimate axle weights and number of trips for trucks
- Strategy and design parameters for the haul roads on SDS property
- Strategy for pavement assessment just prior to heavy hauls, and strategy for pavement assessment upon completion of the heavy hauls

Landslide Hazards – URS completed a landslide assessment which should be repeated just prior to site development so that we would be able to note changed conditions. This work is presented in a Appendix D of this report and entails the following:

- Review of existing published geologic and geologic hazards literature for the site.
- Review of Sections of the County Code that address Geologically Hazardous Areas;
- Review of aerial photographs if they are available. URS will also review public groundwater records for the immediate area, as available.
- Conduct a site visit to evaluate site conditions. This will include evaluating the geologic conditions and existing slopes as well as geologic activities (slides, faulting, rupture, etc.) that may have influenced geologic hazards at the site. URS anticipates this will take approximately one day of field work.

Preliminary Geotechnical Engineering – URS has developed a preliminary foundation design based on the encountered foundation conditions. To complete this, URS did the following:

- Reviewed of the URS / Dames & Moore project files for information pertaining to this project. URS will review geologic maps of the area to further understand the soils prior to investigation.

- URS personnel met with the Owner's site representative just prior to investigation. **The tower designer has not been identified for the project site, and the exact locations of the towers have not been identified. Therefore, URS will not perform any deep subsurface explorations at the site.** We will, however, perform up to twelve 15-foot deep test pits that will be excavated by a SDS Employee. The test pits will be backfilled with the excavated soils.

- Along the roadway areas, URS assessed the near surface capacity and modulus of the onsite soils by performing a total of 30 dynamic cone penetrometer tests (DCP) located selectively across the existing roads. Each DCP probe was advanced to approximately 3 feet, or refusal, whichever is greater, below existing grade or the pavement surface to accurately determine the *insitu* subgrade characteristics. The DCP will furthermore clearly delineate between layers of weak and strong subgrade soils. The DCP is an inexpensive, manually driven exploration device designed for pavement assessments with limited subgrade exposure.
- Five field resistivity tests to assess the electrical resistivity of the near surface soils. We will use the 4 point "Wenner" method with electrodes spaced at 5, 10, 20 and 30 feet. The design engineers, to assess cathodic protection and grounding grid requirements, will use this data.
- URS will be doing limited laboratory testing for the project. We anticipate moisture contests, visual manual identification and atterberg limits. All will be done to applicable ASTM standards.

- ***Preliminary Recommendations for Spread Footings, Mat Foundations,*** - Allowable soil bearing pressure, stated as net or gross pressure at the underside of foundation level. State how allowable pressure changes with depth.
  - Vertical Subgrade Reaction Modulus "k" for slab on grade design.
  - Lateral sliding friction coefficients between soil and concrete.
  - Active and at-rest equivalent fluid pressures for the design of earth retaining structures.
  - Passive equivalent fluid pressures used to resist horizontal forces.
  - Soil unit weights dry and saturated.
  - Backfill material specifications and installation specifications for subgrade and base material, including Preliminary Recommendations for preparation, placement, and compaction. Comment on the use of native materials for backfill material.
  - Settlement values (total and differential, including long term settlements over period of several years for the reciprocating machinery).
  - Minimum depth to bottom of footing based on frost depth and bearing values.
  - Comment on the appropriateness of increased allowable soil bearing and lateral resistance for short duration loads.
  - Anchorage requirements for the shallow foundations.

- ***Preliminary Seismic Considerations***
  - Discuss past seismic activity, including known faults, and potential for a future event.
  - Discuss potential for liquefaction during a seismic event.
  - Define the Site Class and Soil Profile per 2006 edition of the IBC.

2 FIELD AND LABORATORY INVESTIGATIONS

2.1 SUBSURFACE INVESTIGATIONS

The field exploration program was conducted between September 18 and September 25, 2007. The subsurface investigation included the completion of twelve test pits to assess near surface soil and rock characteristics, and thirty dynamic cone penetration (DCP) tests along the roadway alignments to evaluate the near surface bearing capacity and moduli of onsite soils.

2.1.1 Test Pits

The test pit exploration program was conducted between September 18 and September 19, 2007. The program consisted of 12 test pits excavated to depths of 7 to 16 feet below ground surface (bgs). Approximate test pit locations are shown on the Figure 2. Test pit logs are presented in Appendix A.

A representative from URS maintained a log of conditions observed in the test pits, visually classified the soils encountered according to the Unified Soil Classification System and obtained representative bulk samples at selected intervals. The test pits were backfilled with excavated materials and compacted using the bucket of the backhoe. The stratigraphic contacts indicated within the test pit logs represent the approximate boundaries between soil and rock types; actual transitions may be more gradual and indistinct. The subsurface conditions depicted are only for the specific locations reported, and therefore, are not necessarily representative of other locations. The sample intervals are shown on the test pit logs attached in Appendix A.

2.1.2 Dynamic Cone Penetration Test

Roadway subgrade testing was conducted using the Dynamic Cone Penetrometer (DCP). A total of 30 DCP tests were performed for the proposed site access roads to depths of between 1 and 3 feet bgs. The DCP is a widely used device to determine *in situ* strength properties of base materials and subgrade soils. The four main components of the DCP include the cone, rod, anvil, and hammer. The cone is attached to one end of the DCP rod while the anvil and hammer are attached to the other end. Energy is applied to the cone tip through the rod by dropping the 17.64-lb hammer a distance of 22.6-inches against the anvil. The diameter of the cone is 0.1575-inch larger that the rod to ensure that only tip resistance is measured. The number of blows required to advance the cone into the subsurface materials is recorded. The DCP index is the ratio of the depth of penetration to the number of blows of the hammer. This can then be correlated to a variety of material properties, including California Bearing Ratio (CBR) and

Resilient Modulus, both of which are used in pavement design. Logs of the DCP test results are included in Appendix C to this report. Approximate DCP test locations are shown on Figure 2.

2.1.3 Field Soil Electrical Resistivity Testing

Resistivity tests for the proposed Wind Energy Project site were performed on September 24, 2007 to assess the electrical resistivity of the near surface soil. The locations of the tests are noted on Figure 2, Site Plan. Test locations were selected to correspond with the sites of the proposed Wind Turbine Generators. A Strata-Scout Model R-40CY resistivity meter was used to measure the resistance by the 4-point (Wenner) configuration at equal spacing of 5, 10, and 20 feet for tests R-1 through R-5. A Nilsson Model 400 meter was used in the same configuration at equal spacing of 5, 15, and 20 feet for tests R-1 through R-5. The resistance and spacing were used to calculate the resistivity at each location. Results of the resistivity tests are presented in Appendix B. These indicators can be used for determinations regarding corrosion potential and grounding grid design.

2.2 LABORATORY TESTING

Upon completion of the field investigation, samples obtained from test pits were transported to our Portland, Oregon laboratory for further examination and testing. The laboratory tests included the following:

- Visual soil classification performed in general accordance with ASTM D 2487;
- Moisture content performed in general accordance with D 2216;
- Grain size analysis performed in general accordance with ASTM D 422 and D 1140;
- Atterberg Limits in general accordance with ASTM D4318..

Complete individual laboratory test results are shown in Appendix B of this report.

3 SITE DESCRIPTION

3.1 REGIONAL GEOLOGY

The White Salmon, Washington area is located within the Cascade Range and the Columbia Intermontane Physiographic Province. The project area is located just within the western boundary of the Columbia Plateau, which is located at the western edge of the Columbia Intermontane Physiographic Province (Freeman et al, 1945). This lowland province is surrounded on all sides by mountain ranges and highlands, and covers a vast area of eastern Washington and parts of northeastern Oregon and western Idaho. The Columbia Plateau is underlain by a series of layered basalt flows extruded from vents (located mainly in southeastern Washington and northeastern Oregon) during the Miocene epoch (between 5.3 and 23.8 million years before present [B.P.]). Collectively, these basalt flows are known as the Columbia River Basalt Group (CRBG). Individual basalt flows range in thickness from a few millimeters to as much as 300 feet. Where significant time elapsed between successive flows, interflow zones developed. The interflow zones are characterized by the presence of highly weathered basalt and paleosols. These interflow zones are generally significantly weaker than the surrounding basalt and sometimes form basal failure surfaces for large landslide complexes within the CRBG.

A variety of younger volcanic rocks and sedimentary materials that range from Pliocene (1.8 to 5.3 million years B.P.) to Holocene (less than 10,000 years B.P. in age) overlie the CRBG in the project area. Sedimentary rocks are generally thought to underlie the basalts in the Project area.

3.2 SITE GEOLOGY

The proposed Project site is located within the northern boundary of the structural Hood River Valley, which extends a few miles into southern Washington. In general, the geology of the area consists of basalt flows extruded from local vents, layered with conglomerate, tuff, tuff breccias, and other volcanoclastic deposits. These formations are typically overlain by silt and clay soil of varying thickness in the Project vicinity.

The bedrock underlying the proposed Project site consists of Grande Ronde Basalt of the CRBG and Quaternary basalt of Underwood Mountain - a shield volcano that lies approximately midway between the lower reaches of the Little White Salmon and White Salmon Rivers. Its southern slopes drain to the Columbia River. Site geology is presented on Figure 3.

Underwood Mountain Basalt Unit: The Pleistocene-epoch (1.8 million years to 10,000 years B.P.) basalts and cinders erupted from the Underwood Mountain vents and overlie the Tertiary

CRBG Grande Ronde and Wanapum basalts. Public records of wells located within the Underwood volcanic field indicate a 310-foot thick repetitive sequence of thin lava flows (2 to 8 feet thick), cinders and silty-clays overlying a productive confined aquifer consisting of intensely fractured Grande Ronde basalt (Yinger, 2000 and 2001). The Miocene-epoch Grand Ronde Basalt consists of multiple basalt flows that are a subgroup of the CRBG, and has been described to have a thickness of up to 1000 feet, although the thickness in the Project vicinity is not known.

Field observations of rock outcrop and test pits excavated during a geotechnical investigation at the proposed site indicate that the near-surface rock consists of yellow-gray volcanoclastic rocks, medium to dark gray, fine-grained to medium-grained basalt and andesite, which is fractured into angular gravels, cobbles, and boulders. The basalt observed in the test pits was most commonly vesicular, very soft to moderately hard, and decomposed to slightly weathered. Some zones displayed non-vesicular characteristics and were generally harder. In most exposures the basalt was moderately to highly weathered, with fractures and vesicles filled by clayey residual soil. In most of the test pits excavated in this basalt, the rock is weathered into varying layers of residual (clay) soil, and clayey gravelly cobble-sized basalt. The residual soil layers often exhibit remnant rock structure.

Unconsolidated Deposits: Unconsolidated deposits are thin to absent in the Project vicinity. Based on observations made during field reconnaissance, the surficial materials consisted primarily of a thin veneer of brown, silty topsoil that is likely derived from forest duff and wind-blown deposits. The thickness of this material varied across the site from a few inches to three feet, based on test pit observations. In several areas bedrock and talus were observed at the ground surface.

Landslide Deposits: Regional Geologic maps indicate the presence of Quaternary-age mass wasting landslide deposits located to the north of Underwood Mountain (Korosec, 1987, excerpted in Figure 3, this report). These deposits are mapped as a large landslide, estimated to be approximately 1/3 square mile in area and almost a mile long. A URS Engineering Geologist reviewed stereo aerial photographs that were flown specifically for this project in 2007 and performed a one day site reconnaissance. There is no obvious evidence, based on the review, to suggest the presence of a landslide as mapped on the 1:100,000 scale geologic map. If landslide deposits are present, they are so old that most or all of the geomorphic evidence has been removed by erosion. A separate Landslide Hazard Report for the project is presented as Appendix C to this report.

Faults: No faults are mapped within the footprint of the proposed Project area. However, faults are mapped approximately 1.5 miles southwest and northeast of the proposed Project area. Many of these faults are inferred and shown as dotted lines buried by younger surficial deposits. The activity of the area faults is unknown. However, a review of aerial photography shows no indication of recent movement along the trace of the inferred faults.

3.3 SUBSURFACE CONDITIONS

The following is a general summary of the soil conditions encountered in the explorations conducted at the site to date. More detailed description of the soils encountered in the test pits are provided on the logs included in Appendix A.

Based on the current test pits and field observations, we anticipate that unconsolidated soils extend up to 3 feet below ground surface (bgs). The surficial soils are primarily characterized as soft, moist sandy SILT [ML] to CLAY with sand [CL], and clayey SAND [SC]. Immediately beneath the unconsolidated soils, rock with variable strength and weathering properties is present. The test pit data is limited to depths no greater than 16 feet bgs. It is anticipated that rock quality of the basalts will improve with depth but that weaker interflow zones consisting of volcaniclastic material and paleosols are possible at any depth. Prior to final design of the tower foundations, additional subsurface investigations (boreholes) will be required to provide geotechnical data at foundation and anchor depths.

The United States Department of Agriculture National Resources Conservation Service (NRCS) describes the soils in the project vicinity as follows (USDA, 2003):

- **Chemawa Series**: The Chemawa series consists of very deep soils (up to 5 feet) formed in alluvium from volcanic ash and basalt. The soils exist on terraces, footslopes and backslopes at elevations between 800 and 2500 feet in southeast Skamania County and southwest Klickitat County. Chemawa Soils are well drained with slow to medium runoff and moderate permeability.

- **McElroy Series**: The McElroy series consists of very deep soils (up to 5 feet) formed in colluvium and residuum from basalt with a mantle of volcanic ash that influences soils in the top 9 to 13 inches. The soils exist on the footslopes and backslopes of mountains on slopes from 5 to 90 percent at elevations from 400 to 2600 feet in eastern Skamania County and western Klickitat County. McElroy Soils are well drained with medium to rapid runoff and moderate permeability. The series was established in 1981 following the introduction of volcanic ash from the eruption of Mt. St. Helens.

- **Timberhead Series**: The Timberhead series consists of very deep soils (up to 5 feet) formed in residuum and colluvium from basalt mixed with volcanic ash. The soils exist on mountain slopes between 5 and 65 percent at elevations from 2000 to 3600 feet in Skamania County and western Klickitat County. McElroy Soils are well drained with medium to rapid runoff and moderate permeability. The series was established in 1981 following the introduction of volcanic ash from the eruption of Mt. St. Helens.

- **Underwood Series**: The Underwood series consists of very deep soils (5 feet or more) formed in residuum and colluvium from basalt and andesite with a thin mantle of volcanic ash. The soils exist on benches, backslopes, and footslopes of mountains with slopes between 2 and 50 percent at elevations between 500 and 2700 feet in southeast Skamania County and west Klickitat County. Chemawa Soils are well drained with slow to medium runoff and moderately slow permeability.

- **Undusk Series**: The Undusk series consists of very deep soils (5 feet or more) formed in residuum and colluvium from basalt and andesite with a thin mantle of volcanic ash. The soils exist on benches, backslopes, and footslopes of mountains with slopes between 2 and 50 percent at elevations between 500 and 2700 feet in southeast Skamania County and west Klickitat County. Chemawa Soils are well drained with slow to medium runoff and moderately slow permeability.

3.4 GEOLOGIC HAZARDS

3.4.1 Description of Geologic Hazards

In general, geologic hazards are geologic processes or geological conditions that constitute a threat to human safety, improved property, and the natural environment. For the purposes of this report, the focus is on geologic hazards associated with the construction and operation of the proposed wind energy project. The primary geologic hazards present in the project area can be divided into three categories; landslides, seismic, and volcanic. Landslide hazards include rotational-translational slides, earthflows, debris slides, and debris flows. Seismic hazards can include ground shaking, fault surface rupture, settlement, liquefaction, and lateral spreading. Volcanic hazards at the project site are generally limited to ash fall from any of three nearby Cascade volcanoes. By identifying areas prone to specific geologic hazards, design and construction details can be modified to avoid dangers to human safety, improved property, and environmentally sensitive areas from such hazards as a result of project construction and operation.

3.4.2 Landslide Hazards

The most common types of landslides in the Pacific Northwest include rock falls, topples, rotational-translational slides, earthflows, debris slides, and debris flows. Most slope failures are complex combinations of these distinct types, but the generalized groupings enable the investigator to communicate the types of hazards anticipated and observed.

Landslides can be initiated in marginally stable slopes by a number of natural and human disturbances. Processes and conditions that can trigger slope failure include earthquake shaking, volcanic eruption, deforestation, intense rainfall, and rapid snowmelt. Two of the most common triggering events in southern Washington are intense precipitation and human alterations.

The Pacific Northwest is subject to severe rainfall storm events, particularly in the wet winter and spring months of November through April. These relatively high-precipitation storm events can trigger slope failures through a number of mechanisms. Water infiltration into zones of weakness can trigger failures by reducing the frictional resistance to sliding, increasing pore pressures within slope masses and adding weight acting downslope. Typically, all three mechanisms combine during longer duration, heavy precipitation or rain on snow events to trigger slope stability problems.

Landslide hazards were assessed as part of the public document review, aerial photograph investigation, and field reconnaissance. Results of the landslide hazard review are presented as a separate technical report in Appendix D to this report.

3.4.3 Seismic Hazards

Liquefaction is a phenomenon whereby soils undergo significant loss of strength and stiffness when they are subjected to vibration or large cyclic ground motions produced by earthquakes. Typically, cyclic loading of saturated soils leads to the build up of excess pore-water pressure as a result of soil particles being rearranged with a tendency toward denser packing. Under undrained conditions (such as during earthquake shaking), loads are transferred from the soil skeleton to the pore-water with consequent reduction in the soils' shear strength.

Saturated granular soils without cohesive fines (i.e. gravels, sands and silts) are most susceptible to liquefaction. Other factors affecting the potential for liquefaction in soils are density, amplitude of loading, confining pressure, past stress history, age of soil deposit, the size, shape and gradation of particles, and the soil fabric structure. Liquefaction-induced ground settlement and lateral spreading have been the primary cause for extensive damage to aboveground structures, foundations and pipelines during many earthquakes.

Test pits excavated at the project site encountered shallow bedrock covered with a combination of cohesive and cohesionless soil. No groundwater was observed in any of the test pits. Based on the soils encountered during the field explorations, it is URS' opinion that the potential for liquefaction is very low at this site.

The risk of seismically inducted settlement and lateral spreading is low due to the low liquefaction potential. It is URS' opinion settlements and lateral spread induced by a seismic event will be minimal.

Coseismic surface rupture occurs when a fault breaks to the land surface during an earthquake. Surface rupture is usually associated with moderate to large earthquakes (magnitude 6.5 or greater) or, rarely during smaller, very shallow events. There are no mapped faults crossing the site. Therefore, the potential for coseismic primary surface rupture at the proposed project site is small.

3.4.4 Volcanic Hazards

Within the region of the site, the USGS recognizes three volcanoes as either active or potentially active: Mount Hood, Mount Adams, and Mount St. Helens. In the last 200 years, only Mount St. Helens has erupted more than once (USGS, 2002b). Impacts in the geographic region surrounding the Project site from volcanic activity can be either direct or indirect. Direct impacts include the effects of lava flows, blast, ash fall, and avalanches of volcanic products. Indirect effects include mudflows, flooding, and sedimentation. Data accumulated as a result of the 1980 Mount St. Helens eruption indicate that there could be ash fallout in the geographic region surrounding the Project site if one of the three regional volcanoes were to erupt.

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

3.5 GROUNDWATER CONDITIONS

During the current subsurface exploration ground water was not encountered in the site up to a depth of 16 feet bgs. It should be noted that these observations reflect groundwater levels at the time of the field investigation and actual groundwater levels may fluctuate significantly in response to seasonal effects, regional rainfall, and other factors not observed during this investigation. There may be regional or perched water tables at greater depth. Prior to final design of the tower foundations, additional subsurface investigations (boreholes) will be required to provide geotechnical data at foundation and anchor depths. Future deep foundation investigations will include observation of groundwater, if encountered.

4 SEISMIC DESIGN

4.1 REGIONAL SEISMICITY

The Pacific Northwest has four types of seismic sources due to the presence of the Cascadia subduction zone. These sources include (1) the subduction zone megathrust, which represents the boundary (interface) between the subducting Juan de Fuca plate and the overriding North American plate; (2) faults located within the Juan de Fuca plate (referred to as the intraplate or intraslab region); (3) crustal faults principally in the North American plate; and (4) volcanic sources beneath the Cascade Range (Wong and Silva, 1998). Each of these events has different causes, and therefore produces earthquakes with different characteristics (that is, peak ground accelerations, response spectra, and duration of strong shaking).

Because of their proximity, crustal faults are possibly the most significant seismic sources to inland sites. Studies by Pezzopane (1993) and Geomatrix Consultants (1995) show that at least 70 crustal faults having earthquake potential exist in southwest Washington and northwest Oregon. Many of these faults were unknown or not recognized as being seismogenic a decade ago. Although the largest known crustal earthquake in south-west Washington and western Oregon is only about M_W 6 (Wong and Bott, 1995), potential exists for events of M_W 6½ or greater along several recognized faults.

4.2 2006 IBC SEISMIC DESIGN

We recommend that all structures on the site be built in accordance with the seismic design provisions presented in the 2006 version of the IBC, and ASCE/SEI 07-05. At this time, and without unconfined compressive strengths of the bedrock, URS best describes these soils as Soft Rock (Soil Site Class B) Based on the site location and site conditions described above, we recommend that the values listed in Table 4-1 be used for seismic design of the project in accordance with Section 1613.5.3 of the 2006 IBC. The occupancy category of the proposed structure is assumed III as per Section 1613.5.6 of the 2006 IBC.

Table 4-1: 2006 IBC Seismic Design Values

Parameter	Value	2006 IBC/ASCE 7-05 Reference
Soil Profile Site Class	B	Table 1613.5.2
0.2 Second Spectral Acceleration S_s	0.513 g	Figure 1613.5 (1)
1.0 Second Spectral Acceleration S_1	0.193 g	Figure 1613.5 (2)
Peak Ground Acceleration ($0.4S_{Ds}$)	0.136 g	ASCE 7-05 equation 11.4-5
Site Coefficient F_a	1	Table 1613.5.3 (1)
Site Coefficient F_v	1	Table 1613.5.3 (2)
Seismic Design Category[1]	B	Tables 1613.5.6 (1) & (2)

1. Assumes Seismic Use Group III

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

In support of this report, URS has conducted a limited site investigation, including several test pits, to determine the near-surface properties of the soil and rock. Rock, with varying strength and weathering characteristics, was encountered at shallow depths (ranging between 3 to 12 feet bgs). Because of the presence of relatively shallow rock, and the high potential overturning loads anticipated for the turbine towers, URS recommends rock anchored mat-slab foundations to support the turbines for this preliminary assessment (see Figure 4). However, a drilled shaft foundation concept may prove to be more beneficial in the future, as the design advances. The viability of this foundation concept will be determined with the final geotechnical engineering report for this site.

5.2 WIND TURBINE GENERATOR FOUNDATIONS

As of the date of this report, the tower designer and tower locations have not been finalized. Because of this, the exact loads on the foundations required to support the turbines is not known. One proposed turbine construction contractor, D.H. Blattner & Sons, Inc. has preliminarily assumed installation of 80-meter high GE 1.5 Wind Turbine Generators (WTG) which will be supported by 30 foot-deep concrete foundations. Each turbine tower will be coupled to the foundation with 128 anchor bolts (consistent with GE towers). Based on the soil conditions present at the site, URS preliminarily recommends that mat-slab foundations be used to support the proposed wind turbine tower structures. Once the final exploration is completed, URS may also recommend that the foundation system be drilled shafts.

Due to the anticipated high axial and lateral loads exerted by the towers, URS recommends that the base of the foundation excavation be established in competent rock and be properly leveled to provide uniformity of support. Following excavation, the bearing surfaces should be thoroughly cleaned of loosened or disturbed rock, by hand if necessary. This removed rock should be A URS inspector should manually probe the area within the excavation bottom for confirmation of the bearing surface and to identify any soft areas. Any soft or unsuitable rock encountered at the base of foundation excavations should be removed. URS anticipates that the excavation base would irregular, but if completed properly, the allowable bearing capacity on the excavated base would be on the order of 30,000 psf with an allowable increase of 1/3 to this value for temporary loading conditions. This would have to be verified with additional borings and laboratory testing of the cored rock.

5.2.1 Settlement of WTG Foundation

The WTG foundations are anticipated to be established in rock. Because of this, elastic settlement of the foundation is anticipated to occur as the loads are applied, however, once the tower is constructed, additional settlements would be negligible.

5.2.2 Earth Pressure and Friction Factors

Passive earth pressures acting against the toe of the shallow foundations and friction on the base of the foundations may be considered to provide resistance to lateral forces tending to cause translational sliding. These structural members should be considered for counteracting lateral forces only if the member is placed in direct contact with tested and approved soils. If the foundation is constructed by using forms, lean concrete may be placed between the foundation and the undisturbed wall of the adjacent excavation in order to provide the direct contact required to consider passive pressure for counteracting lateral movement. The lean concrete should have a minimum 28-day compressive strength of 1,500 psi. An allowable passive pressure of 8,000 psf may be used for the underlying bedrock, for the foundation face located more than one-foot below the adjacent elevation of the bedrock. This is based on a factor of safety of two and requires confirmation with the final deisng..

An ultimate friction factor of 0.5 for mass concrete on the compacted granular fill can be used for design for those portions of the foundations with full positive pressure on the base of the foundation. Only long-term dead loads should be considered in calculating the available friction on the foundation base.

5.2.3 Rock Anchor Design and Installation

We anticipate that rock anchors are used in the final foundation designs to resist overturning loads and provide lateral stability, we recommend nominally prestressed anchors consisting of high-strength reinforcing bars grouted into the rock using polyester resin grout such as Fasloc or Celtite. These commercially available, two-component grouts are contained in plastic cartridges. The grout cartridges are placed in the hole and the bar is driven into the hole while being rotated in order to expose and mix the grout. The use of the concrete grout is an acceptable alternative, but will generally require longer anchors and a larger diameter drilled anchor hole for a given bar diameter. Due to the possible fractured and vesicular nature (presence of small voids within the rock mass) of the basalt (the extent of which needs to be determined with a final geotechnical report), the concrete grout alternative may be necessary to prevent reduction of anchor strength due to loss of resin grout into voids. Prior to final design of the tower foundations, additional subsurface investigations (boreholes) will be required to provide geotechnical data at foundation and anchor depths. Core samples from the borehole investigations will provide information on the prevalence of voids in the rock mass, which will allow URS to develop recommendations for rock anchor construction.

5.2.3.1 Rock Anchor Capacity

The load bearing capacity of each anchor depends on the "fixed anchor length" (L), the spacing of the anchors, and engineering properties of the grout and rock. For this project, we anticipate that rock anchors will be generally be used singly, or in single rows, where anchor spacing is greater than 0.25L. If anchor spacing is greater than 0.25L or consisting of multiple rows, we should be contacted to evaluate the effects of a single anchor capacity. Preliminary anchor design charts have been prepared (See Figures 5 and 6) to assist in the selection of anchor length to achieve a designed anchor capacity. The charts have been prepared based upon an analysis of the possible failure mode of the anchors, including the following:

- Bond failure between bar and grout;
- Bond failure between grout and rock;
- Pullout of inverted cone of rock surrounding the anchored tendon;
- Tensile yield of the tendon.

Based upon the properties of the rock and grout, and if the anchors meet the spacing and the distance requirements specified above, failure at the grout/rock interface will control the allowable anchor capacity up to 60% of the bar yield strength. Anchors used to resist lateral movements should not be placed at an angle shallower than 45 degrees to the surface.

Figure 5 presents anchor design of polyester resin grout with unconfined compressive strength of approximately 13,000 psi. Figure 6 presents alternative anchor design curve if 15,000-psi compressive strength concrete grout is used instead of the resin grout. The concrete grout may be placed by gravity flow prior to inserting the steel bar. Each bar should be fitted with centralizers that center the bar in the hole.

Holes may be drilled using an air track or similar rotary percussion device. Hole diameters should be at least ½-inches greater than the bar thread diameter if concrete grout is used. All holes must be thoroughly cleaned of debris prior to placement of the anchor.

In order to attain the higher anchor capacities required for the project, we recommend he use of steel alloy anchor bars with an ultimate tensile strength of 150 kips per square inch (ksi) conforming to ASTM standard A-722. Threaded and deformed bars of this type are available from DYWIDAG Systems International, Inc. The anchor should be nominally prestressed to approximately 10 percent of the design load to take up slack in the system and provide an appropriately stiff anchorage. A portion of this prestress will bleed off due to creep and to downward deformation of the foundation when the dead and live loads are applied. A sufficient residual prestress is expected to remain to ensure that excessive anchor system deformation during uplift does not occur before full uplift resistance is mobilized. Direct-pull hydraulic jacks or a torque wrench may be used to apply prestress. Following prestressing, the free anchor length may be grouted with low-strength concrete to protect against corrosion. Overall, based on the resistivity determinations, the site is not corrosive.

5.2.3.2 Rock Anchor Testing

It is important that each anchor performs satisfactorily, therefore, we recommend that each anchor be tested using either performance testing or proof testing criteria. At a minimum, the ten percent of the at each site should be performance tested. Following satisfactory completion of performance testing, we recommend that each remaining rock anchor be proof tested. Proof testing evaluates the as-built anchor capacity. Performances and proof testing should be completed by incrementally loading the anchors in accordance with the schedule below. At each increment, the movement of the anchor should be recorded to the nearest of 0.001 inch with reference to an independently fixed anchor point. The jack load should be monitored with a properly calibrated pressure gauge or load cell. The test load sequences presented in Table 5-1 should be employed.

Each load should be held at each increment just long enough to obtain the movement reading, but not more than one minute. The testing should not exceed the 80% of the bar yield strength. The 1.33P test load should be held for 10 minutes. Total movements should be recorded at 1, 2, 3, 4, 5, 6, and 10 minutes.

Performance and proof test acceptance criteria should be developed in conjunction with URS when details of the anchor design and materials are known. A URS representative should monitor all rock anchorage installation and testing to determine whether the rock layer has been sufficiently penetrated and to monitor the proof and performance tests.

Table 5-1: Rock Anchor Test Recommendations

Terminology
P= Design Load
AL= Alignment Load (2-10 percent of Design Load)
Performance Test Load Sequence*
AL
.25P, AL
.25P, .50P, AL
.25P, .50P, .75P, AL
.25P, .50P, .75P, 1.00P, AL
.25P, .50P, 1.00P, 1.20P, AL
.25P, .50P, 1.00P, 1.20P, 1.33P (Test Load), Adjust to Lock-off Load
Proof Test Load Sequence*
AL, .25P, .50P, .75P, 1.00P, 1.20P, 1.33P (Test Load), Adjust to Lock-off Load
*1986, Post-Tensioning Institute, "Recommendations for Prestressed Rock and Soil Anchors," Phoenix, Arizona.

5.3 RETAINING WALLS

Following are typical design parameters for wall types that we believe represent the range of systems that may be constructed at this site. Walls may be required to provide a level working pad at the tower pads or for the embankment modifications. Please contact us if any additional design values or wall types need to be addressed.

5.3.1 Retaining Wall Design Parameters

Lateral soil pressures on a retaining wall depend on several factors including retained soil type, wall fixity, drainage provisions and the influence of surface loads imposed behind the wall. We have provided typical design parameters for wall types that we believe represent the range of retaining wall systems that are likely to be constructed at this site. Our recommendations are based on the following assumptions:

- Retaining walls will be designed to restrain both existing soils and constructed fills.

- Retaining walls will be backfilled with free draining crushed rock, in accordance with Section 5.3.3 (Retaining Wall backfill) of this report.
- Adequate subsurface drainage will be provided.

5.3.2 Equivalent Fluid Densities (Soil)

Unrestrained walls have no fixity at the top and are free to rotate about their base through tilting or translation. Most cantilever retaining walls fall into this category (unless they are attached to buildings or other structures). A lateral movement of 0.005 times the height of the retaining wall may be required to achieve this active pressure. For these walls, we recommend that a lateral equivalent fluid density of 40 pcf be used for design. If the retaining walls are used to restrain sloping backfill, URS should be contacted for additional designs.

Restrained walls are rigid structures where essentially no relative movement occurs between the structure and the soil. Most basement walls and other rigid walls that are restrained by buildings, parking decks, floor slabs or other perpendicular walls fall into the category of restrained walls. For restrained walls, we recommend that a lateral equivalent fluid density of 60 pcf be used for design. If the retaining walls are used to restrain sloping backfill, URS should be contacted for additional designs.

5.3.3 Retaining Wall Backfill

Backfill within 3 feet of retaining walls should consist of free draining crushed rock, free of organics and debris. This material should meet the requirements of the 2006 WSDOT Standard Specifications for Road, Bridge and Municipal Construction, Section 9-03.14(1). Backfill beyond 3 feet from the wall should meet requirements described in Section 5.6.5 (Structural Fill Material). We recommend that all fill be compacted to 95% of the maximum dry density as determined by the Modified Proctor test (ASTM 1557). Additionally, we recommend that any backfill that is placed within 5 feet of the wall (measured horizontally) be compacted with lightweight, hand operated compaction equipment. Over-compaction of this fill can increase wall pressures.

We recommend the placement of a 4-inch diameter slotted PVC pipe wrapped in non-woven geotextile fabric at the base of the wall backfill to facilitate drainage of this area depending on the final elevation of the basement slab. These pipes should be drained to a collection point and sumped.

5.4 TOWER FOUNDATION EXCAVATION

5.4.1 Temporary Shoring

It is the responsibility of the contractor to deal with the temporary construction excavation and site safety including overseeing the means, methods, and sequencing of construction operations. URS does not assume any responsibility for the contractor's activities or construction site safety for the information provided in this section. In this site the rock layer is relatively at shallow depth (3 feet to 10 feet bgs) and there is sufficient space left for providing the adequate slope as per OSHA requirement for the basement excavations, and hence, the temporary shoring is not recommended. URS does anticipate, however, that the rock will be able to be constructed with a near vertical face, possibly using shallow anchor bolts and gunite to seal its surface. This will be determined with the final construction.

5.4.2 Dewatering

During the excavation of test pits at the site, no ground water was encountered up to a depth of 16 feet bgs. Hence it is anticipated that seepage of ground water will not be a problem within foundation excavation at the site. Presence of groundwater will be determined during subsequent geotechnical investigations to be performed in support of final foundation design.

5.4.3 Rock Excavation

It should be anticipated that hard rock will be encountered during excavation work. Machinery capable of removing these this large intact rock, such as heavy duty backhoes with rock ripping teeth, hydraulic thumbs or pneumatic rock breaking equipment, should be anticipated for this work. There is also a possibility that the rock will have to be blasted, pre-split or utilize expansive materials prior to excavation, depending on the final depth of excavation. The actual methods will be developed with final design.

5.5 SHALLOW FOUNDATIONS (ANCILLIARY STRUCTURES)

We understand that new footings may be utilized to support ancillary structures such as the transformer pads. For footings that bear on shallow, undisturbed native soils, we recommend a net allowable bearing pressure of 2,500 pounds per square foot (psf). This bearing capacity is based on a settlement limit of 0.5 inches.

Allowable bearing pressures may be increased by one-third when considering load cases that include transient loads such as wind and seismic forces. We recommend that a unit weight of 115 pcf be used to calculate the reduction of overburden pressure due to excavation. Backfill soils will be slightly heavier than excavated soils but not enough to significantly influence the bearing pressure.

Exterior footings could be turned down footings from the slab and should be founded at least 18 inches beneath the lowest exterior grade to provide frost protection. Continuous wall footings should have a minimum width of 18 inches and isolated column footing should have a minimum plan dimension of 24 inches.

For foundations designed and constructed as specified in this report, we estimate settlements on the order of 0.5-inches. We anticipate the majority of the settlement will occur during construction, essentially as the loads are applied. The remainder of the settlement will likely occur within three weeks following the application of the load.

5.5.1 Passive Loads and Friction Factor

Passive earth pressures acting on the sides of shallow foundations and friction on the base of the foundations may be considered to provide resistance to lateral forces tending to cause translational sliding. These structural members should be considered for counteracting lateral forces only if the member is placed in direct contact with tested and approved soils. If the foundation is constructed by using forms, lean concrete may be placed between the footing and the undisturbed soil of the adjacent excavation in order to provide the direct contact required to consider passive pressure for counteracting lateral movement. The lean concrete should have a minimum 28-day compressive strength of at least 1,500 psi. An allowable passive pressure having an equivalent fluid pressure of 250 pcf may be used for design. This is based on a factor of safety of two.

An ultimate friction factor of 0.3 for mass concrete on compacted tested and approved native subgrade can be used for design for those portions of the foundations with full positive pressure on the base of the foundation. Only long-term dead loads should be considered in calculating the available friction on the foundation base.

5.5.2 Slabs on Grade

The subgrade under all floor slab areas should be prepared in accordance with Section 5.5.1 We recommend that floor slabs be underlain by a granular base course at least 6-inch thick to provide uniformity of support and to act as a capillary break against moisture migration through the slab. The granular base course should consist of well-graded gravel or crushed rock with a maximum nominal size of ¾ inch and having less than 5 percent by weight passing the No. 200 sieve. The base course should be compacted to at least 95 percent of its maximum dry density as measured by the modified Proctor test (ASTM Standard D 1557). We recommend a modulus of subgrade reaction of 200 pounds per cubic inch (pci) for the base course.

Even with a capillary break as outlined above, there is the possibility of some floor moisture or dampness. If floor moisture is a critical consideration due to storage of materials directly on the floor slab, or because of the use of glued-down impervious floor coverings such as tile or linoleum, we recommend the use of an under-slab impermeable membrane placed directly below the slab. To maximize water tightness, the membrane must be installed in accordance with the manufacturer's recommendations.

5.6 CONSTRUCTION CONSIDERATIONS

5.6.1 Site Work Preparation

Prior to construction of any new foundations, all areas that will receive fill, base rock, or structures should be stripped of all surface vegetation, organic topsoil, and any deleterious materials that might be encountered. Any soft or unsuitable soils encountered during stripping or excavation should be removed and replaced with structural fill meeting the requirements described in Section 5.6.4 (Wet Weather Earthwork). All subgrades should be approved by the Engineer prior to the placement of any materials or foundation elements.

5.6.2 Shallow Foundation Excavation

We recommend that excavations for foundations in soil and weathered rock be accomplished with a straight-edged grading bucket to minimize disturbance of the bearing surfaces. Following excavation, the bearing surfaces should be thoroughly cleaned of loosened or disturbed soil, by hand if necessary. Any soft or unsuitable soils encountered at the base of foundation excavations should be removed and replaced with compacted structural fill meeting the requirements described in Section 5.6.4 (Wet Weather Earthwork).

5.6.3 Dry Weather Earthwork

After areas are stripped or excavated to design elevations, we recommend scarification of the resulting subgrade in all areas that will receive fill or structures to a depth of 8 inches. The scarified soil should be compacted to at least 95% of its maximum dry density as determined by the standard proctor test, ASTM D698.

5.6.4 Wet Weather Earthwork

We anticipate that the native soils found at the site will be sensitive to moisture and erosion. Therefore, during or after wet weather, it may be necessary to import granular materials for structural fill to protect open subgrade materials. It may also be necessary to install a granular working pad to support construction equipment. Delays in site earthwork activities should be anticipated during periods of heavy rainfall. Additionally, site clearing and stripping activities may expose subgrade material that may be damaged if subjected to disturbance from construction traffic. During wet weather, we recommend that site stripping and excavation be performed using an excavator with a straight-edged bucket that does not traverse the final subgrade.

When a granular working base is used to protect open subgrade material and construction equipment, the base should consist of a suitable thickness of crushed rock or ballast placed by end-dumping off an advancing pad of rock fill. Because construction practices can greatly affect the amount of rock required, we recommend that if conditions require the installation of a granular working blanket, the design, installation, and maintenance be made the responsibility of the contractor. After installation, the working blanket should be compacted with a minimum of 4 passes with a smooth-drum roller.

We recommend that the contractor minimize soil exposure during the rainy season by proper timing of grading and construction activities and be prepared to shut down all earthwork if heavy precipitation occurs. We recommend that water runoff be diverted from foundations and equipment pads, and that all runoff water be directed to proper drainage areas and not be allowed to pond.

5.6.5 Structural Fill Material

We recommend that all fills intended to support structures be placed in horizontal lifts not exceeding about 8 inches in loose thickness and be compacted to at least 95 percent of the maximum dry density as determined by the Modified Proctor method (ASTM D 1557), unless where specified above.

Imported structural fill should be clean, well-graded granular material, free of organics and debris and meeting the requirements of the 2006 WSDOT Standard Specifications for Road, Bridge and Municipal Construction, Section 9-03.14(1). The procedure to achieve proper density of a compacted fill depends on the size and type of compacting equipment, the number of passes, thickness of the layer being compacted, and certain soil properties. When the size of the excavation restricts the use of heavy equipment, smaller equipment can be used, and the soil must be placed in lifts thin enough to achieve the required compaction. We recommend that methods of compaction be left to the discretion of the contractor, with compaction testing provided by URS.

We do not recommend the use of on-site soils for structural fill. This material may be used for miscellaneous fill and landscaping applications provided these areas are not intended to support structures. On-site soils should be compacted to at least 95% of the maximum dry density as determined by the standard proctor test, ASTM D698.

5.6.6 Embankment Design

Once the required roadway improvements on the SDS property are determined for the construction traffic equipment, URS could develop a formal embankment design that will have a static Factor of Safety (FOS) of 1.3. URS anticipates the majority of embankments will be relatively small and constructed over level ground. URS envisions that the general embankment section will consist of two zones and have finished slopes of 2H:1V. The final designs for the embankments will come with the final geotechnical engineering report.

5.6.7 Temporary Slopes

Depending on the Contractor's proposed excavation and shoring plan, temporary cut slopes or shoring may be required during construction. If open cuts are utilized, maximum slope inclinations must be made in accordance with regulations established by OSHA. In accordance with OSHA, the sands and silty sand overburden soils encountered on site are classified as Type C. The maximum allowable temporary slope for Type C soils is 1½ horizontal to 1 vertical (1½H: 1V) if fully dewatered. Flatter slopes will be required if dewatering provisions are not considered for the site. The slopes should be inspected and maintained as required by OSHA. For the excavations into the underlying bedrock, URS will provide site specific designs from the borings to be advanced for the final report.

6 CONSTRUCTION QUALITY ASSURANCE

We recommend that URS be retained to provide construction monitoring and testing services during foundation construction. The purpose of our field monitoring services is to confirm that site conditions are as anticipated, to provide field recommendations as required based on conditions encountered, and to document the activities of the contractor to assess compliance with the project recommendations provided by URS. We also recommend that URS review and comment on the foundation plans. The purpose of this review would be to identify any potential problem areas and to provide cost saving or efficiency improving suggestions, if possible.

7 LIMITATIONS

This report presents recommendations pertaining to the proposed structures as represented to URS, as described herein. The findings and recommendations presented in this report are based upon soil conditions observed the available subsurface explorations, interpolation of the soil conditions between test pits, and extrapolation of these conditions throughout the proposed site area. They are further based on the assumption that the subsurface conditions do not deviate appreciably from those reported and those assumed. However, the possibility of different conditions cannot be discounted.

In the event that changes in design loads or structural characteristics described in this report are made, URS should be retained to review our design recommendations and their applicability to the revised design plans. In this way, any required supplemental recommendations can be made in a timely manner.

This report has been prepared for the specific project, purpose, and client stated in the report; the report may not be adequate for other uses. The use of the recommendations of this report for other projects or purposes or by other parties is not authorized.

Although URS has endeavored to characterize the surface and subsurface conditions at the site, URS is not as able to assess potential construction difficulties as is a contractor specializing in the work to be performed. Consequently, the Contractor is responsible, and URS is not, for final evaluation of potential construction difficulties.

This report has been prepared in accordance with the care and skill generally exercised at the present time by reputable professionals in the field of geotechnical engineering, under similar circumstances, for projects in the project locality. No other warranty, either expressed or implied, is made as to the professional advice presented herein.

8 REFERENCES

Bartlett, S.F., and Youd, T.L., 1992, "*Empirical Analysis of Horizontal Ground Displacement Generated by Liquefaction-induced Lateral Spread*", Technical Report NCEER-92-0021, National Center for Earthquake Engineering Research, Buffalo, New York.

Blakely, R.J., Wells., R.E., Yelin, T.S., Madin, I.P., and Beeson, M.H., 1995, "*Tectonic Setting of the Portland-Vancouver area, Oregon And Washington: Constraints From Low-Altitude Aeromagnetic Data*", Geological Society of America Bulletin 107, p. 1051-1062.

Geomatrix Consultants, Inc., 1995, "*Seismic Design Mapping State of Oregon: Final Report*", prepared for the Oregon Department of Transportation, Contract 11688.

Guffanti, M., and Weaver, C.S., 1988, *Distribution of late Cenozoic volcanic events in the Cascade Range: Volcanic arc segmentation and regional tectonic considerations*, Journal of Geophysical Research, v. 93, p. 6513-6529

International Code Council, Inc., 2006, *2006 International Building Code.*

Isihara, K., and Yoshimine, M., 1992, "Evaluation of Settlements in Sand Deposits Following Liquefaction of Sand Under Cyclic Stresses", Soils and Foundations, Vol. 32, No. 1, pp. 173-188.

Korosec, M.A., 1987, Geologic map of the Hood River quadrangle,Washington and Oregon: Washington State Department of Natural Resources, Division of Geologyand Earth Resources Open-File Report 87–6, 42 p.

Washington Department of Transportation (WSDOT), 2006, *Stanadard Specifications for Road, Bridge, and Municipal Construction,* Olympia, Washington.

Raytheon Engineers & Constructors, 2002, *Pacific Northwest Project Pile Location Plan, Sheet 02C0135E,* prepared for the BHP Coated Steel Corporation, Kalama, Washington, Drawing No. 59800-D-110012, Revision C, 10/18/2002.

Sherrod, D.R., and Smith, J.G., 1990, Quaternary extrusion of the Cascade Range, northwestern United States and southern British Columbia, Journal of Geophysical Research, v. 95, p. 19465-19474.

Skamani County Code, October, 2006, Chapter 21A.06.10 - Chapter 21A.06.40.

U.S. Soil Conservation Service, 1986. Technical Release 55: Urban Hydrology for Small Watersheds, U.S. Department of Agriculture.

U.S. State Plane Zones (NAD 1993).

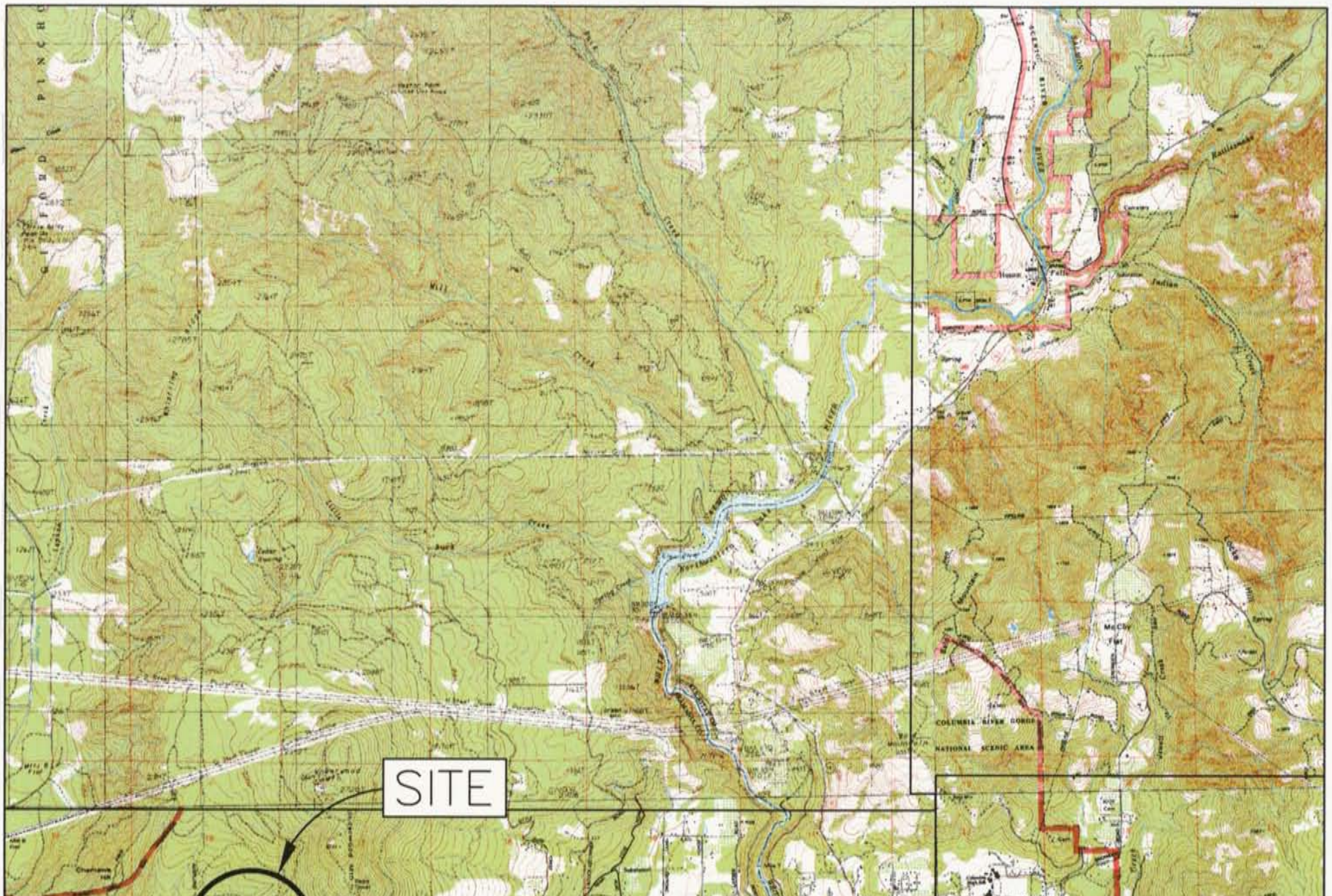
Winterkorn, H.F. and Fang, H-Y., 1975, *Foundation Engineering Handbook,* Van Nostrand

Reinhold Company, New York, New York.

Wells, R.E., Weaver, C.S., and Blakely, R.J., 1998. Forearc Migration in Cascadia and its Neotectonic Significance: *Geology*, v. 26, p. 759-762.

Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, Jr., L.F., Hynes, M.E., Ishihara, K., Koester, J.P., Liao, S.S.C., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R.B., and Stokoe II, K.H., 2001. *"Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils"*, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 10, pp. 817-833.

FIGURES

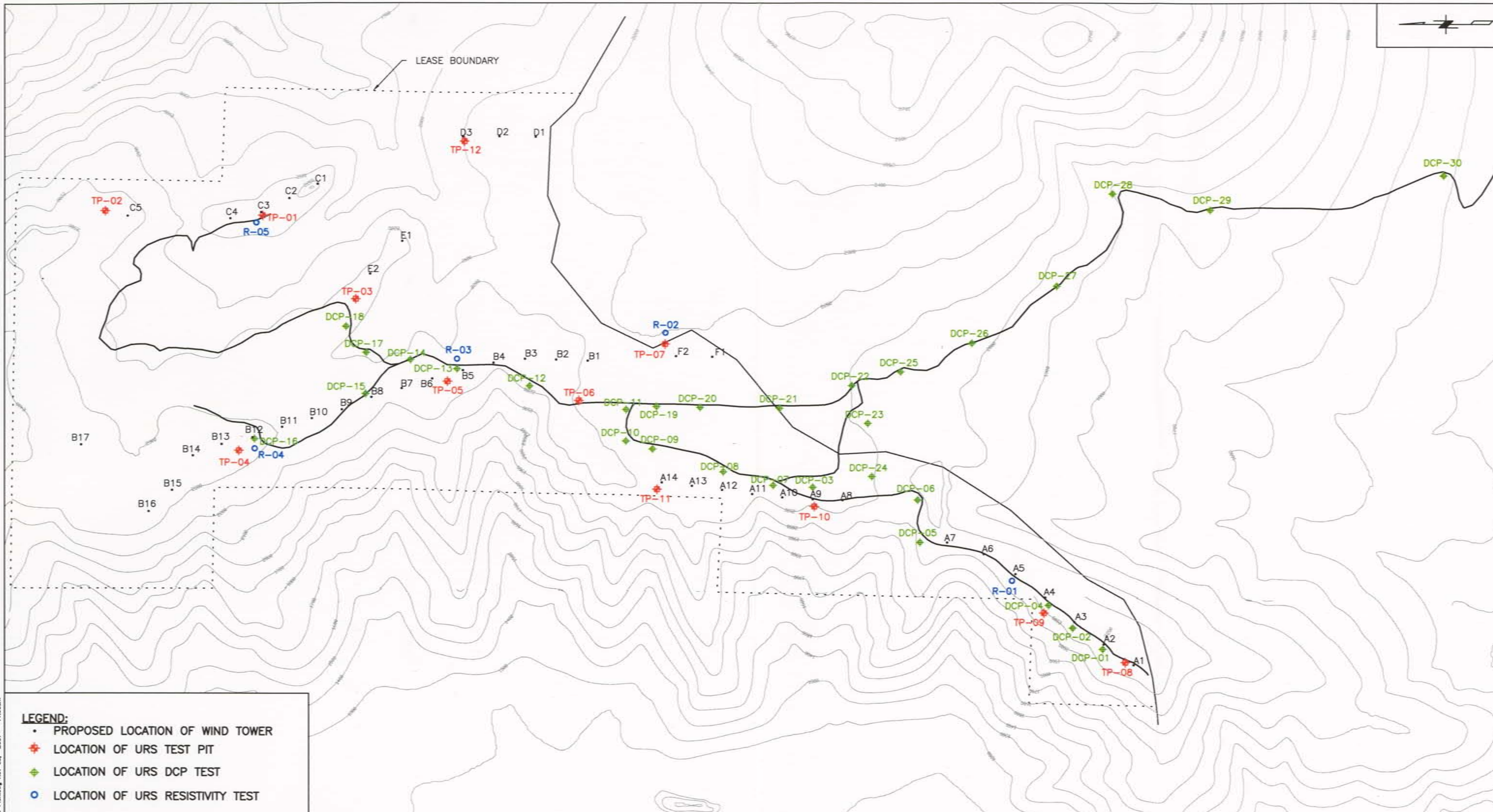


VICINITY MAP

SDS LUMBER
November 2007 SADDLEBACK WIND ENERGY PROJECT
33758687 WHITE SALMON, WA

URS

Figure 1



URS

600 0 600 1200
SCALE IN FEET

SITE PLAN

SDS LUMBER

November 2007 SADDLEBACK WIND ENERGY PROJECT

33758687 WHITE SALMON, WA

Figure 2

O:\33758687 SDS Lumber\CADD\SDS Site Plan.dwg Nov 05, 2007 - 11:00am

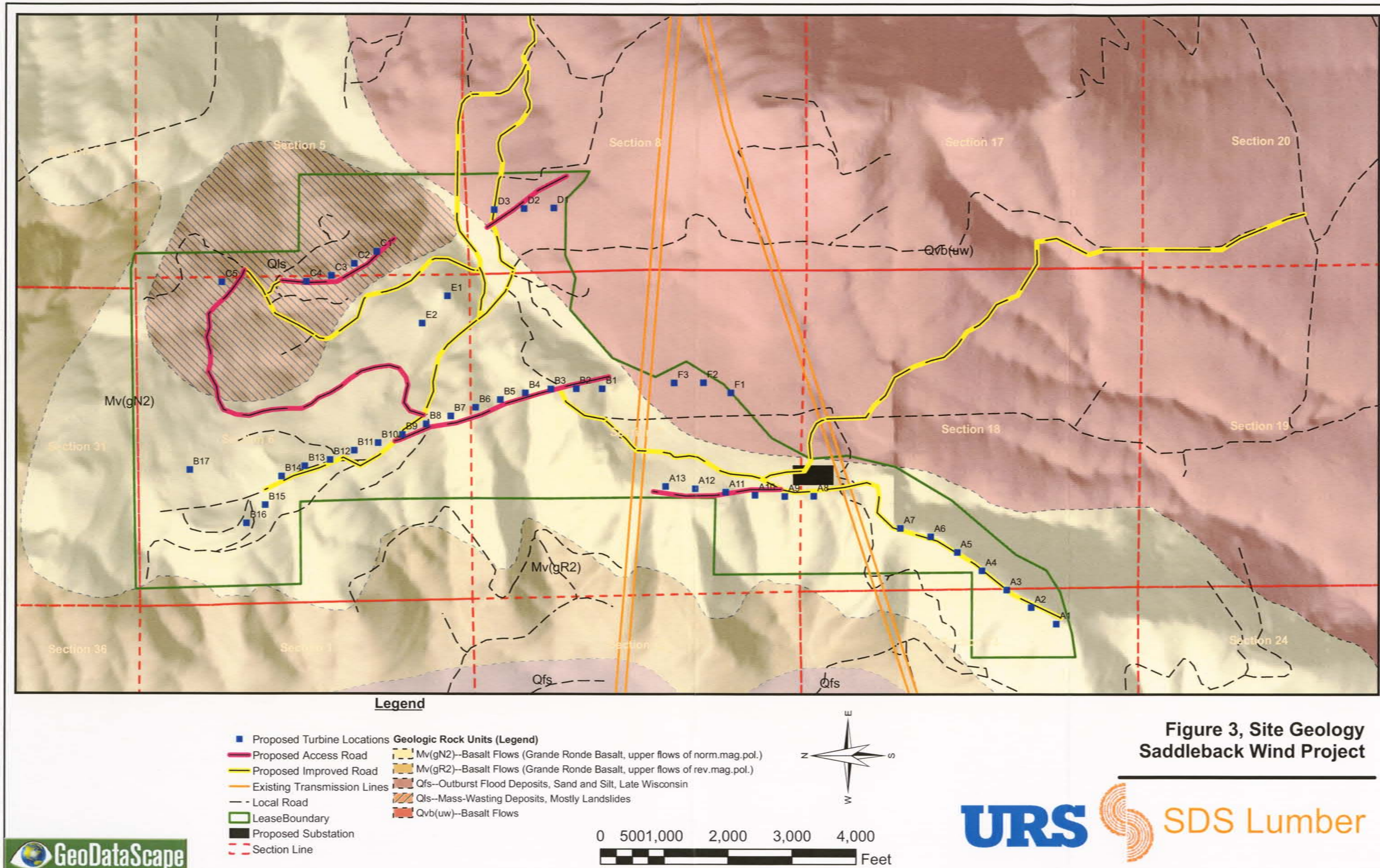
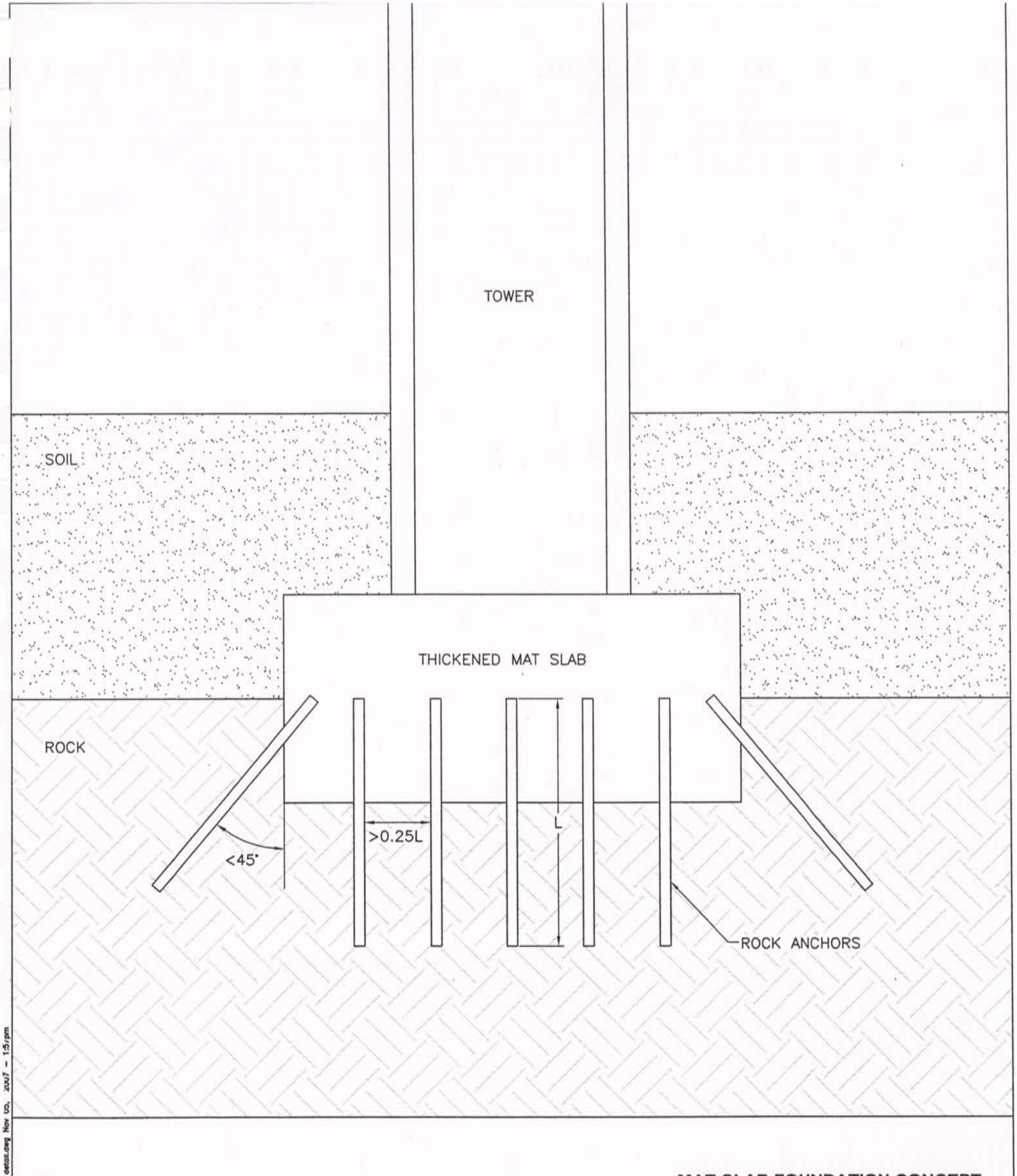


Figure 3, Site Geology
Saddleback Wind Project

File Path: P:\Projects\Sds Lumber\geology.mxd, Date: 10 18, 2007 7:11:41 AM, User: TW



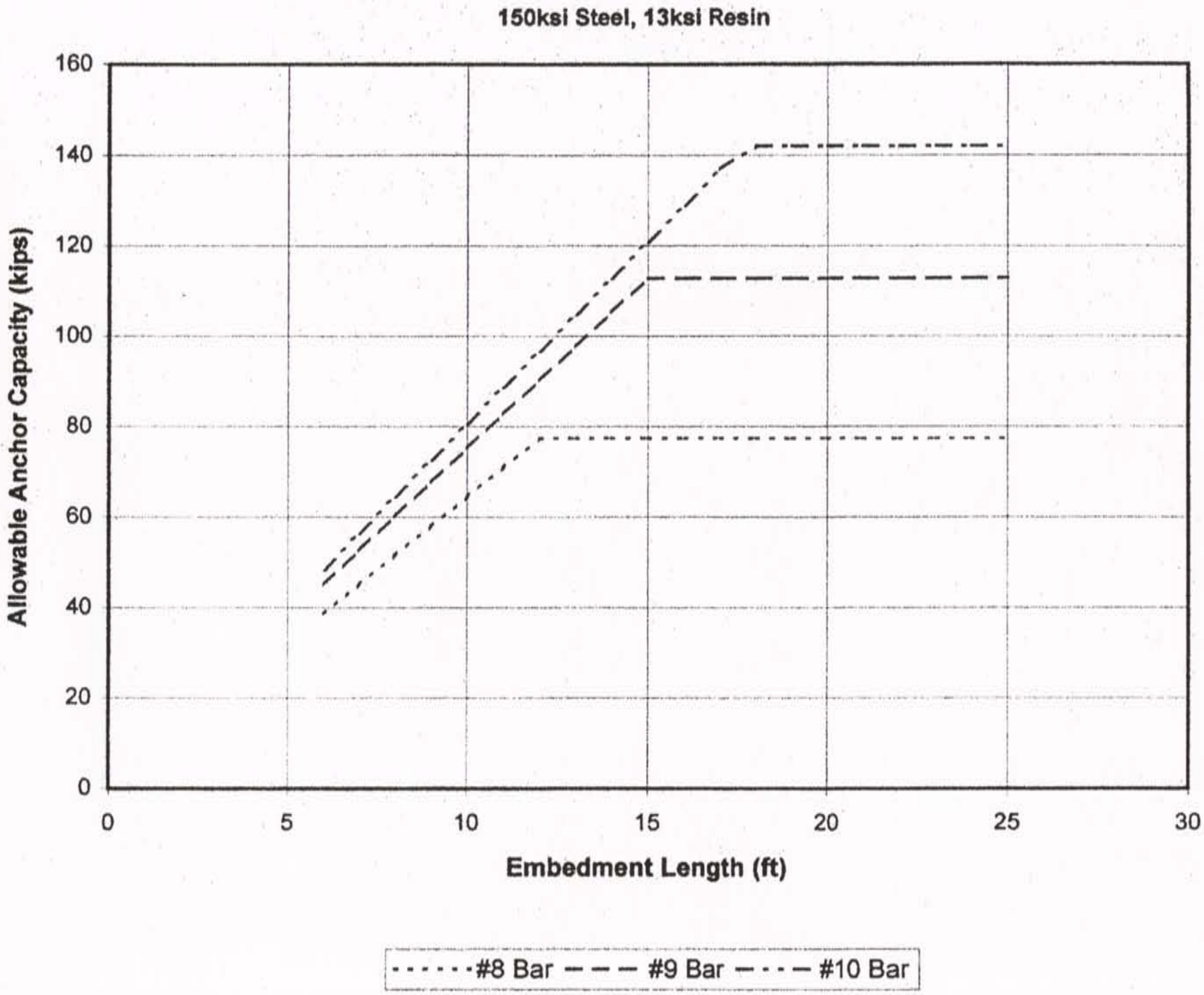
MAT-SLAB FOUNDATION CONCEPT

URS

November 2007
33758687

SDS LUMBER
SADDLEBACK WIND ENERGY PROJECT
WHITE SALMON, OREGON

FIGURE 4



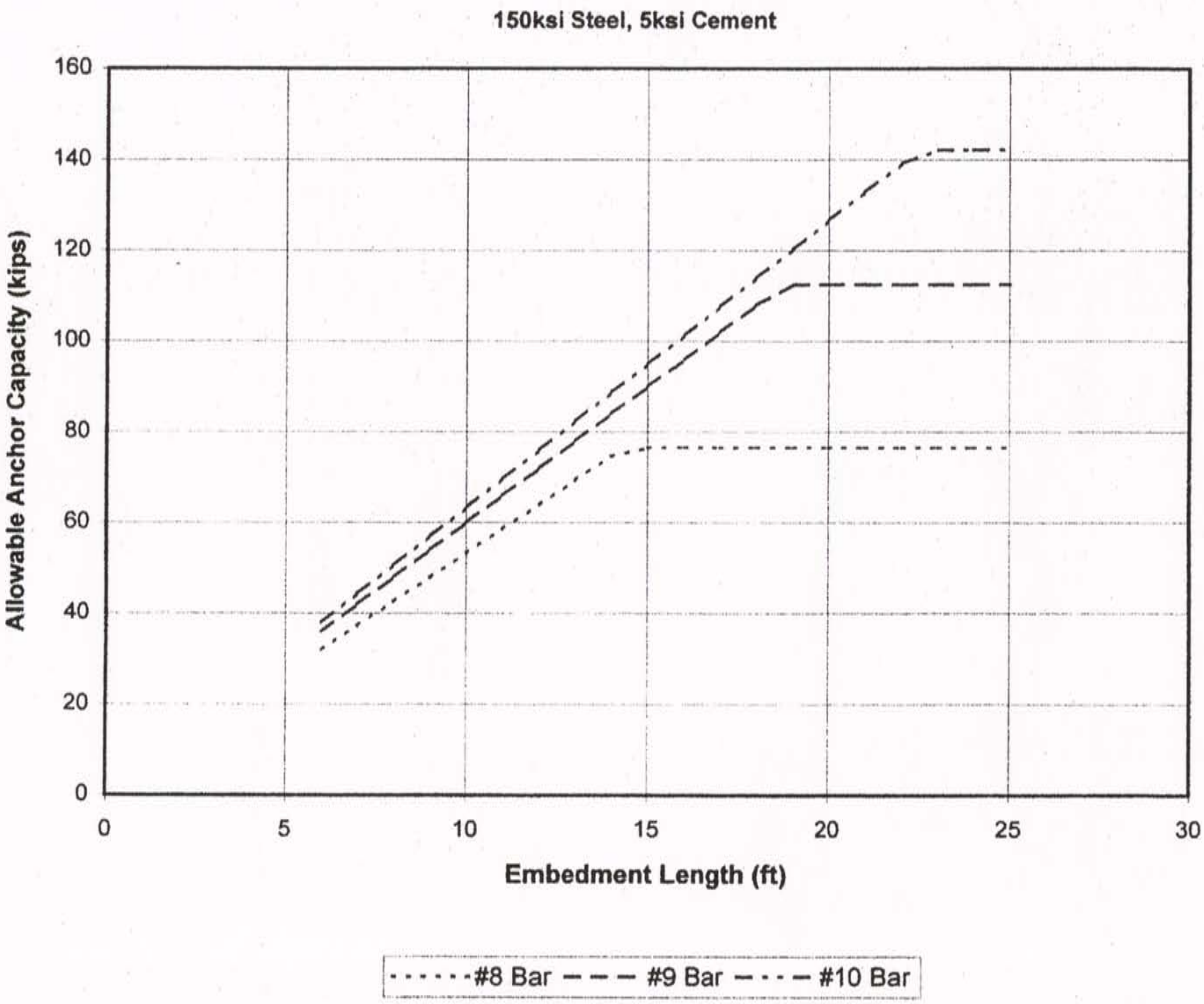
PRELIMINARY ROCK ANCHOR CAPACITY - RESIN

URS

November 2007
33758687

SDS LUMBER
SADDLEBACK WIND ENERGY PROJECT
WHITE SALMON, WA

FIGURE 5



PRELIMINARY ROCK ANCHOR CAPACITY - CEMENT

URS

November 2007
33758687

SDS LUMBER
SADDLEBACK WIND ENERGY PROJECT
WHITE SALMON, WA

FIGURE 6

APPENDIX A
LOGS OF TEST PITS

Project: Saddleback Wind Energy Project	Log of Test Pit TP-01
Project Location: White Salmon, Washington	
Project Number: 33758687	

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	13.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2134 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type	Sample Number	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2134	0			ML	**SANDY SILT [ML]**, brown, moist, soft, contains roots and rock [Topsoil/Disturbed Material]				
	1			CH	**SANDY FAT CLAY [CH]**, orange-brown, moist, medium stiff, mottled with yellow-brown, rock fragments, blocky, occasional roots. [Residuum]				
2132	2		1		*Becomes gray-brown*	57.2	52.1	3.5	
				SC	**CLAYEY SAND [SC]**, yellow-brown, possible decomposed bedrock				
	3				**BEDROCK**, orange-brown, gray-black mottled, highly to moderately weathered, very soft to soft, fine grained, slightly vesicular, black mineral coatings in vesicles, spheroidal weathering observed, grades to moderately weathered with depth			2.5	
2130	4								
	5								
2128	6								
	7								
2126	8		2						
	9								
2124	10								Difficult excavating
	11								
2122	12								
	13				End test pit at 13.0 feet bgs on 9/18/2007 due to refusal. Backfilled with excavated soils upon completion.				
2120	14								
	15								
2118	16								
	17								
2116	18								
	19								
2114	20								

Project:	**Saddleback Wind Energy Project**
Project Location:	**White Salmon, Washington**
Project Number:	**33758687**

Log of Test Pit TP-02

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	14.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2208 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2208	0			ML	**SANDY SILT [ML]**, brown, moist, soft, contains roots [Topsoil]				
	1				**BEDROCK**, light orange-brown, tuffaceous, highly weathered, black staining on fracture surfaces, very soft, large boulders of fresh rock, boulders are very soft to soft, subrounded				
2206	2								
	3	1							
2204	4								
	5				*Becomes dark orange-brown*				
2202	6								
	7				*Becomes light gray mottled with orange and black, highly to moderately weathered, highly fractured*				
2200	8								
	9								
2198	10								
	11								
2196	12								
	13								
2194	14				End test pit at 14.0 feet bgs on 9/18/2007 due to extent of excavator. Backfilled with excavated soils upon completion.				
	15								
2192	16								
	17								
2190	18								
	19								
2188	20								

Project: Saddleback Wind Energy Project Project Location: White Salmon, Washington Project Number: 33758687	**Log of Test Pit TP-03**

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	12.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2173 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
	0			ML	**SANDY SILT [ML]**, brown, moist, soft, occasional rock fragments [Topsoil]				
2172	1			SM	**SILTY SAND [SM]**, yellow-brown, moist, medium dense. [Colluvium]				
	2							4.5	
2170	3			SM	**SILTY SAND [SM]**, white and light orange mottled, dense [Decomposed Bedrock]			4.5+	
	4								
2168	5								
	6								
2166	7								
	8	1			*Contains breccia, angular, medium gray pieces of tuff in red-orange silty clay matrix*				
2164	9								
	10								
2162	11				Some structure and bedding observed				
	12				End test pit at 12.0 feet bgs on 9/18/2007. Backfilled with excavated soils upon completion.				
2160	13								
	14								
2158	15								
	16								
2156	17								
	18								
2154	19								
	20								

URS

Project: Saddleback Wind Energy Project
Project Location: White Salmon, Washington
Project Number: 33758687

Log of Test Pit TP-04

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	14.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2302 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2302	0			ML	**SANDY SILT [ML]**, brown, moist, soft [Topsoil]				
	1				**BEDROCK**, yellow-brown to gray mottled, tuffaceous, decomposed to highly weathered, pummice, rock fragments in dark orange soil, very small vesicles				
2300	2								
	3	1							
2298	4								
	5				*Becomes gray or salt and peppered, black staining on fracture surfaces, highly weathered, very soft*				
2296	6								
	7								
2294	8								
	9				*Becomes gray with orange-white specks, highly to moderately weathered, soft, spheroidal weathering patterns observed, large rounded boulders observed (~2.5 feet diameter)*				
2292	10								
	11								
2290	12								
	13								
2288	14				End test pit at 14.0 feet bgs on 9/18/2007. Backfilled with excavated soils upon completion.				
	15								
2286	16								
	17								
2284	18								
	19								
2282	20								

Project: Saddleback Wind Energy Project			
Project Location: White Salmon, Washington			
Project Number: 33758687			

Log of Test Pit TP-05

Date(s) Excavated	9/19/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	14.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2205 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
	0			ML	**SANDY SILT [ML]**, brown, moist, soft [Topsoil]				
2204	1	1		SM	**SILTY SAND [SM]**, moist, brown, dense. [Colluvium]	48.6	16.4	4.5+	
	2								
2202	3				**BEDROCK**, gray with orange specks, tuffaceous, highly weathered to decomposed, very soft, spheroidal weathering patterns observed				
	4								
2200	5								
	6								
2198	7								
	8								
2196	9								
	10				*Becomes highly to moderately weathered, black mineral deposits on fractures*				
2194	11								
	12								
2192	13	2							
	14				End test pit at 14.0 feet bgs on 9/18/2007. Backfilled with excavated soils upon completion.				
2190	15								
	16								
2188	17								
	18								
2186	19								
	20								

URS

Project: Saddleback Wind Energy Project	Log of Test Pit TP-06
Project Location: White Salmon, Washington	
Project Number: 33758687	

Date(s) Excavated	9/19/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	14.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2142 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2142	0			ML	**SANDY SILT [ML]**, brown, moist, soft [Topsoil]				
	1			ML	**SANDY SILT [ML]**, brown, moist, medium dense, occasional rock fragments [Colluvium]				
2140	2							3.0	
	3	1				60.6	25.7	4.5	
2138	4								
	5								
2136	6								
	7								
2134	8								
	9								
2132	10								
	11	2			**BEDROCK**, brown, black mottled, highly weathered to decomposed, very to extremely soft, no fractures or structure observed (Decomposed Volcanics/Volcaniclastics)				
2130	12								
	13								
2128	14				End test pit at 14.0 feet bgs on 9/18/2007. Backfilled with excavated soils upon completion.				
	15								
2126	16								
	17								
2124	18								
	19								
2122	20								

Project: Saddleback Wind Energy Project **Project Location:** White Salmon, Washington **Project Number:** 33758687	**Log of Test Pit TP-07**

Date(s) Excavated	9/19/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	8.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2184 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2184	0				SM	**SILTY SAND [SM]**, brown, moist, medium dense, contains highly weathered to decomposed rock fragments [Colluvium]				
	1								3.5	
2182	2		1							
	3					**BASALT**, gray-brown, highly weathered				
2180	4									
	5									
2178	6		2			*Becomes gray, yellow staining on fractures, moderate to slightly weathered, hard, vesicular*				Difficult excavating
	7									
2176	8		3			End test pit at 8.0 feet bgs on 9/18/2007 due to refusal. Backfilled with excavated soils upon completion.				
	9									
2174	10									
	11									
2172	12									
	13									
2170	14									
	15									
2168	16									
	17									
2166	18									
	19									
2164	20									

Log of Test Pit TP-08

Project: Saddleback Wind Energy Project
Project Location: White Salmon, Washington
Project Number: 33758687

Date(s) Excavated	9/19/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	7.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2214 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2214	0			ML	**SANDY SILT [ML]**, brown, moist, soft [Topsoil]				
	1				**BEDROCK**, medium gray with black and orange specks, orange black staining on surfaces, tuffaceous, highly to moderately weathered, very soft to soft, vesicles present				
2212	2								
	3	1							
2210	4				*Becomes moderately weathered, soft to medium hard*				
	5								
2208	6								Difficult excavating
	7				End test pit at 7.0 feet bgs on 9/19/2007 due to refusal. Backfilled with excavated soils upon completion.				
2206	8								
	9								
2204	10								
	11								
2202	12								
	13								
2200	14								
	15								
2198	16								
	17								
2196	18								
	19								
2194	20								

Project: Saddleback Wind Energy Project	
Project Location: White Salmon, Washington	**Log of Test Pit TP-09**
Project Number: 33758687	

Date(s) Excavated	9/19/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2176 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2176	0				ML	**SANDY SILT [ML]**, brown, mosit, soft [Topsoil]				
	1					**BEDROCK**, light gray to black, salt and pepper, some yellow-brown, orange and black staining on surfaces, tuffaceous, highly to moderately weathered, very soft, spheroidal weathering patterns observed				
2174	2									
	3		1							
2172	4									
	5									
2170	6					*Becomes dark gray, moderately weathered, soft, traces of mica?*				Excavator notes material encountered at 6.0 feet bgs would be used for road bed
	7									
2168	8		2			*Becomes green-gray*				
	9									
2166	10									
	11					End test pit at 11.0 feet bgs on 9/19/2007. Backfilled with excavated soils upon completion.				
2164	12									
	13									
2162	14									
	15									
2160	16									
	17									
2158	18									
	19									
2156	20									

URS

Project: Saddleback Wind Energy Project **Project Location:** White Salmon, Washington **Project Number:** 33758687	**Log of Test Pit TP-10**

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	8.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2181 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
	0				ML	**SANDY SILT [ML]**, brown, moist, soft, rock fragments observed [Topsoil]				
2180	1									
	2					**BEDROCK**, meidum gray to brown with black and yellow specks, tuffaceous, highly weathered, very soft with hard core stones				
2178	3		1							
	4					*Becomes black and orange stained on fracture surfaces, highly to moderately weathered, spheroidal weather patterns observed*				
2176	5									
	6					*Becomes gray with black staining, soft to hard*				
2174	7									
	8					End test pit at 8.0 feet bgs on 9/18/2007 due to refusal. Backfilled with excavated soils upon completion.				
2172	9									
	10									
2170	11									
	12									
2168	13									
	14									
2166	15									
	16									
2164	17									
	18									
2162	19									
	20									

Project: Saddleback Wind Energy Project **Project Location:** White Salmon, Washington **Project Number:** 33758687	**Log of Test Pit TP-11**

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	16.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2119 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
	0			ML	**SANDY SILT [ML]**, brown, moist, soft [Topsoil]				
2118	1	1		SM	**SILTY SAND [SM]**, brown, yellow and gray, moist, rock fragments. [Colluvium]	48.9	30.6	3.0	
	2			ML	**SANDY SILT [ML]**, reddish brown with medium gray core stones, black and orange on fracture surfaces, sandy silt, some structure observed including remnant vesicles [Decomposed Bedrock]				
2116	3	2							
	4							4.5	
2114	5								
	6				*Becomes highly weathered to decomposed*				
2112	7								
	8								
2110	9								
	10				**BEDROCK**, brown to gray, orange-black staining on fracture surfaces, tuffaceous, highly weathered to decomposed				
2108	11								
	12								
2106	13								
	14								
2104	15	3							
	16				End test pit at 16.0 feet bgs on 9/19/2007. Backfilled with excavated soils upon completion.				
2102	17								
	18								
2100	19								
	20								

Project: Saddleback Wind Energy Project	Log of Test Pit TP-12
Project Location: White Salmon, Washington	
Project Number: 33758687	

Date(s) Excavated	9/18/2007	Logged By	EAM	Checked By	DBM
Length of Excavation	~10 feet	Width of Excavation	~5 feet	Depth of Excavation	8.0 feet
Excavation Equipment	Track Mounted Excavator	Excavation Contractor	SDS Lumber	Approximate Surface Elevation	2070 feet MSL
Water Observations	N/A			Weather	Sunny, 60's
Location	See site map			Surface Condition	

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Fines (%)	Moisture (%)	Pocket Penetrometer (tsf)	REMARKS AND OTHER TESTS
2070	0				ML	**SANDY SILT [ML]**, brown, moist, soft [Topsoil]				
	1				SM	**SILTY SAND [SM]**, brown, moist to dry, loose, occasional rock fragments [Colluvium]				
2068	2		1				38.7	15.3		
	2					**BEDROCK**, rock fragments in silty sand matrix, ~20% rock fragments, fragments are gray, decomposed to highly weathered, soft, porous [Decomposed Basalt]				
	3									
2066	4									
	5									
2064	6					*Rock becomes light gray with black mottles and yellow coatings, moderately to highly weathered, large boulders encountered (2-3 feet diameter)*				
	7									Difficult excavating
2062	8		2							
						End test pit at 8.0 feet bgs on 9/18/2007 due to refusal. Backfilled with excavated soils upon completion.				
	9									
2060	10									
	11									
2058	12									
	13									
2056	14									
	15									
2054	16									
	17									
2052	18									
	19									
2050	20									

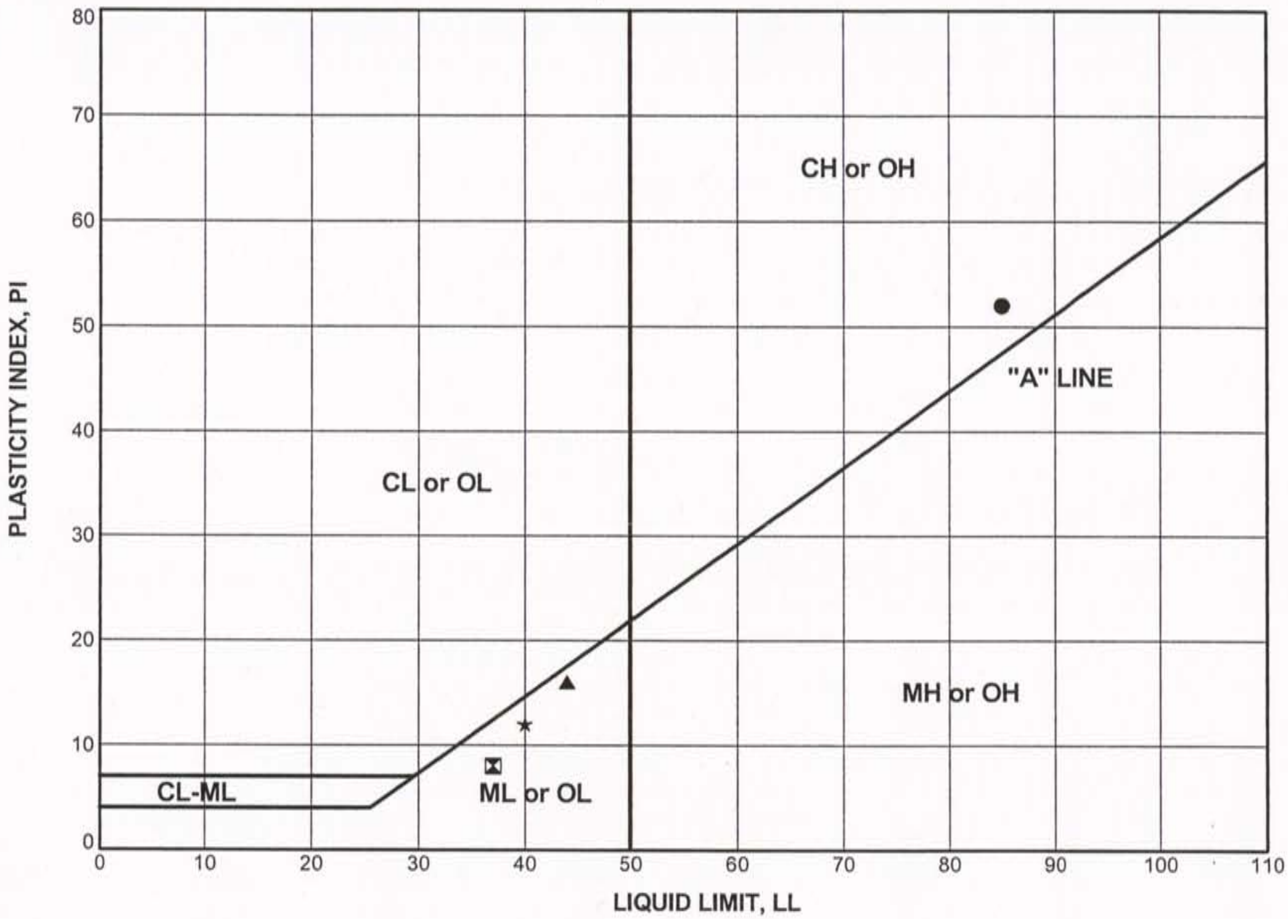
APPENDIX B
FIELD SOIL RESISTIVITY AND LABORATORY TESTING

Resistivity tests for the proposed Wind Energy Project site were performed on September 24, 2007 to assess the resistivity of the near surface soil. Table B-1 presents the results of these measurements. The soil resistivity at locations R-1, R-2, R-3, and R-5 are shown graphically in Figure B-1. Soil resistivity at location R-4 is shown in Figure B-2.

Table B-1: Measured Resistivity (ohm-cm)

Date Completed	Location	Spacing (ft)	Effective Depth (ft)	Reading	Multiplier	Resistivity (Ω cm)
9/24/2007	**R-1**	5.0	10.0	7.1	10	**67983**
9/24/2007	**R-1**	10.0	20.0	1.6	10	**30640**
9/24/2007	**R-1**	20.0	40.0	4.2	1	**16086**
9/24/2007	**R-2**	5.0	10.0	3.8	100	**363850**
9/24/2007	**R-2**	10.0	20.0	2.4	100	**459600**
9/24/2007	**R-2**	20.0	40.0	1.4	100	**536200**
9/24/2007	**R-3**	5.0	10.0	0.9	100	**86175**
9/24/2007	**R-3**	10.0	20.0	0.4	100	**76600**
9/24/2007	**R-3**	20.0	40.0	2.6	10	**99580**
9/24/2007	**R-4**	5.0	10.0	11.0	100000	*
9/24/2007	**R-4**	10.0	20.0	10.6	1000	*
9/24/2007	**R-4**	20.0	40.0	11.0	100000	*
9/24/2007	**R-5**	5.0	10.0	3.0	10	**28725**
9/24/2007	**R-5**	10.0	20.0	2.0	10	**38300**
9/24/2007	**R-5**	20.0	40.0	1.2	10	**45960**

* Field Resistivity found to be in excess of 1,000,000 ohm-cm.



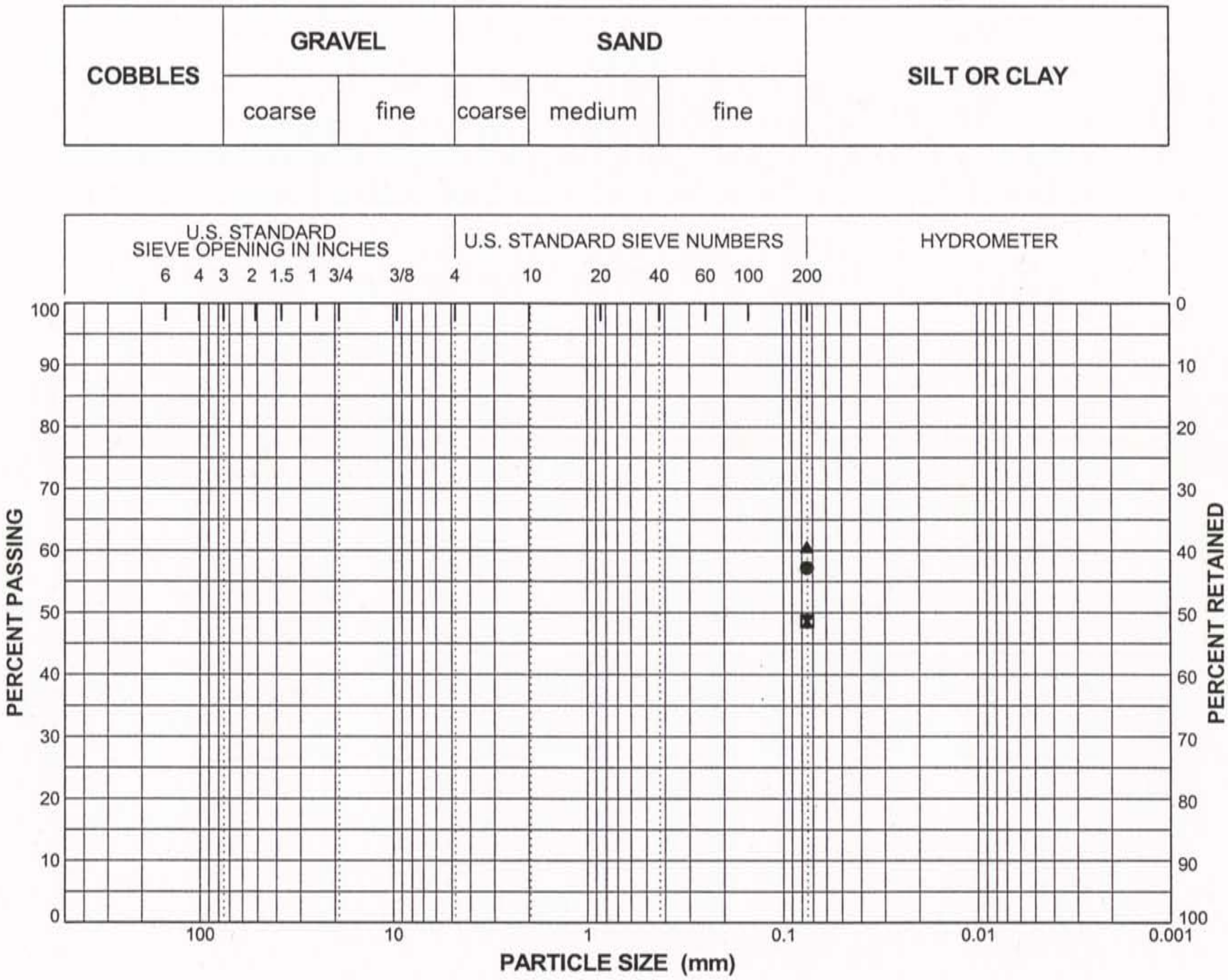
Boring ID	Sample #	Depth (feet)	Symbol	Sample Moisture %	LL	PL	PI	Classification
TP-01	1	2.0-2.5	●	52.1	85	33	52	Sandy Fat Clay [CH]
TP-05	1	1.0-1.5	⧗	16.4	37	29	8	Silty Sand [SM]
TP-06	1	2.5-3.0	▲	25.7	44	28	16	Sandy Silt [ML]
TP-11	1	1.0-1.5	★	30.6	40	28	12	Silty Sand [SM]

Report: ATTERBERG_PLOT_12 PTS; File: WINDFARM.GPJ; 11/5/2007 TP-11

Saddleback Wind Energy Project
White Salmon, Washington
33758687

PLASTICITY CHART

URS



Boring ID	Sample #	Depth (feet)	Sample Moisture (%)	Dry Density (lbs/ft^3)	Symbol	LL	PI	% G	% S	% F	Classification
TP-01	1	2.0-2.5	52.1		●	85	52			57.2	Sandy Fat Clay [CH]
TP-05	1	1.0-1.5	16.4		⧗	37	8			48.6	Silty Sand [SM]
TP-06	1	2.5-3.0	25.7		▲	44	16			60.6	Sandy Silt [ML]
TP-11	1	1.0-1.5	30.6		★	40	12			48.9	Silty Sand [SM]

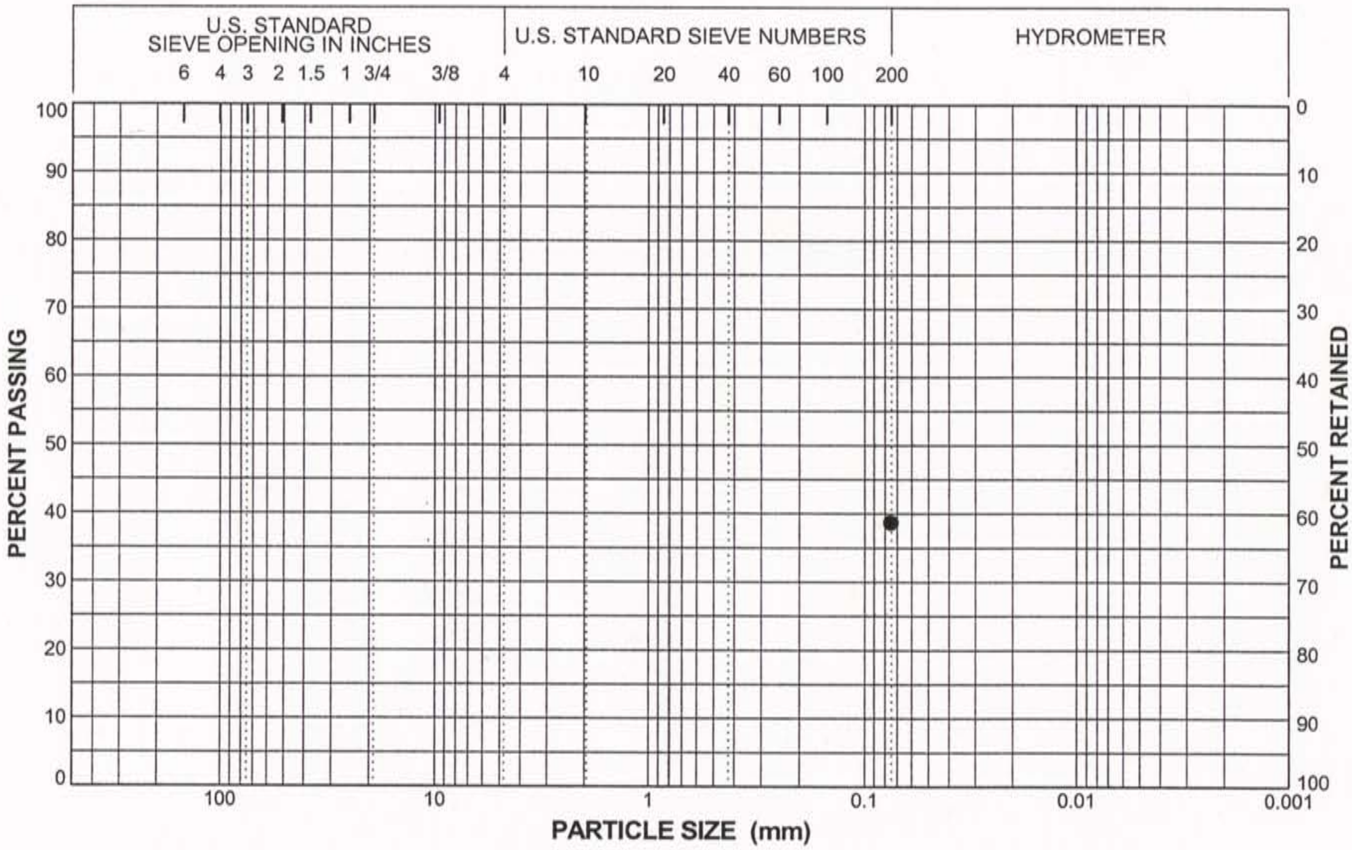
Report: SIEVE_4_PORT; File: WINDFARM.GPJ; 10/23/2007 TP-11

Saddleback Wind Energy Project
White Salmon, Washington
33758687

PARTICLE SIZE DISTRIBUTION CURVES

URS

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



Boring ID	Sample #	Depth (feet)	Sample Moisture (%)	Dry Density (lbs/ft³)	Symbol	LL	PI	% G	% S	% F	Classification
TP-12	1	1.5-2.0	15.3		●					38.7	Silty Sand [SM]

Report: SIEVE_4_PORT; File: WINDFARM.GPJ; 10/23/2007 TP-12

Saddleback Wind Energy Project
White Salmon, Washington
33758687

PARTICLE SIZE DISTRIBUTION CURVES

URS

APPENDIX C
PAVEMENT ENGINEERING

PAVEMENT ENGINEERING REPORT

Anticipated Haul Route

URS observed the anticipated haul route from the SDS Lumber facility to the Saddleback site during a site visit in September, 2007. We anticipate the route to run along SR 14 to Cook-Underwood Road, up Cook-Underwood Road to Kollock-Knapp Road, up Kollock-Knapp Road to a sharp right hand turn onto Scoggins Road, and then a left onto the logging road on SDS property (CG-2930) to the Saddleback site.

Anticipated Haul Routes

Very little information is available about the existing pavement and base thicknesses along the haul route. From observations made while driving along the haul route, the pavements appear to be generally in good condition however, we understand that the pavements along Cook-Underwood Road had been recently improved with a chip seal and/or minor overlay. Some areas of the Kollock-Knapp Road showed signs of distress.

Construction for the proposed project is not anticipated to start for about three years. Therefore, three years of local traffic will traverse the pavement prior to the initiation of construction traffic. URS recommends that just prior to the initiation of construction for the project a comprehensive pavement assessment program be undertaken to establish the condition of the existing pavements. This would then be coupled with a mechanistic-empirical approach for establishment of remaining pavement life just prior to construction traffic. Once this is done, the potential effects of construction traffic on the pavements current state could be captured. For the proposed project URS recommends a comprehensive investigation of the existing pavements including: a visual pavement condition survey; Falling Weight Deflectometer testing; pavement coring; laboratory testing; and Dynamic Cone Penetrometer testing. This program will give a baseline metric for the pavement, base and subgrade conditions prior to the construction traffic.

No information was available at the time of this report regarding the existing average daily traffic (ADT) volumes along the proposed haul route. This information will be necessary during the analysis portion of the work, just prior to the construction traffic. If this information is not readily available, a traffic survey should be performed to determine the ADT and type of vehicle traffic along the proposed haul route. This information will be used to determine the remaining life of the existing pavement section and the pavement section that will be required post construction.

Truck Hauling Information

In order to mobilize the sections of wind tower equipment to the site, it is anticipated that they will arrive on rail to the SDS Lumber facility, be off loaded onto specialized trucks, and then transported up hill to the Saddleback site. URS understands that they could possibly arrive by barge also, but this is to be determined. The final vendor for the wind towers has not been selected at the time of this report. URS has made some general assumptions regarding typical tower configuration for the purpose of this report. URS understands that at the time of this report, the towers will be about 250 feet in height, with blades that are approximately 135 feet in length. We assume that each wind tower consist of the tower section, hub, blades and a nacelle. Heavy and oversized pieces, such as the tower sections and blades will be trucked to the site individually, while other components will be bundled together for transport from SDS Lumber.

Tubular towers are typically transported in 60 to 90-foot long sections that weight from 42 to 59 tons. Three rotor blades are required for each tower and are about 135 feet in length and about 7 tons each. The entire rotor assembly weighs approximately 35 tons. The nacelle is approximately 30 feet long, 12 feet wide by 12 feet high and weighs approximately 57 tons. Specialized trucking equipment is required to transport the tower pieces from SDS Lumber to the Saddleback site. Truck size and axle loading depends on the piece of equipment being transported and any anticipated restrictions that will be encountered along the haul route such as low overhead conditions, uneven traveling surfaces and load restrictions. URS anticipates that approximately 8-10 truck hauls will be required for each tower installed. Therefore, more than 500 heavy haul trips will be required over the county roads for the towers only, in addition to construction equipment. This quantity does not include delivery of construction materials such as concrete required for the foundation, grading equipment to construct roads and prepare the site or other construction traffic associated with neighborhood construction and deliveries.

URS is able to obtain information from Anderson Trucking Services, Inc. (ATS), who specialize in wind turbine transportation, on typical axle loading information for the 80-meter high, GE 1.5 Wind Turbine Generators. URS will include this information in our final report.

Strategy and Design Parameters for Haul Roads On SDS Property

URS drove and observed the haul roads on SDS property during our September, 2007 site visit. The existing logging road (CG-2930) to the Saddleback site has primarily been used for accessing stands of timber for harvesting and exporting timber from the site. The dirt road is currently surfaced with soil and rock and is in poor condition. In its current state the road is not suitable for the trucks that will be carrying the wind tower equipment.

URS will analyze the existing topography and work within the equipment limitations of the haul trucks that will be transporting the equipment to the site. Likely this will include rebuilding large sections of the existing road and surfacing with rock. For areas with steep slopes, we anticipate flattening and rebuilding the slopes and placing asphalt in select areas to allow access by the hauling equipment. The asphalt could remain in place or be removed at the end of the project. URS will develop design parameters for the pavement suitable to protect the section through construction.

Strategy and Design Parameters for Haul Roads On SDS Property

URS drove and observed the haul roads on SDS property during our September, 2007 site visit. The existing logging road (CG-2930) to the Saddleback site has primarily been used for accessing stands of timber for harvesting and exporting timber from the site. The dirt road is currently surfaced with soil and rock and is in poor condition. In its current state the road is not suitable for the trucks that will be carrying the wind tower equipment.

URS will analyze the existing topography and work within the equipment limitations of the haul trucks that will be transporting the equipment to the site. Likely this will include rebuilding large sections of the existing road and surfacing with rock. For areas with steep slopes, we anticipate flattening and rebuilding the slopes and placing asphalt in select areas to allow access by the hauling equipment. The asphalt could remain in place or be removed at the end of the project. URS will develop design parameters for the pavement suitable to protect the section through construction.

Pre and Post Heavy Haul Strategy for Pavement Assessments

URS will implement a thorough investigation program to capture the existing pavement, aggregate base and subgrade conditions along the alignment prior to heavy hauls. This program will consist of the following:

- A visual pavement condition survey and report of the surface of the existing pavements along the haul route to quantify weak or deteriorated areas that may need repair
- Pavement core holes to obtain the pavement thicknesses along the haul route
- Sampling of the near surface soils for classification
- Laboratory testing, as necessary, of the soils to further refine their classification and strength parameters

- Dynamic Cone Penetrometer (DCP) testing in selected locations where pavement widening may need to occur to determine the strength of the near surface subgrade soils

- Falling Weight Deflectometer (FWD) testing along the haul route to assess the *insitu* strength of the asphalt, aggregate base and subgrade soils

URS will use the results of this investigation to determine the capacity of the existing pavement section and what, if any, modification to the pavement section may be required to support the heavy haul trucks. URS concern is that the heavy loading may significantly deteriorate the existing pavement section, which was likely not designed for such heavy loads. URS will provide design recommendations for improving the pavement section, as necessary, prior to the beginning of the hauling program.

Design parameters critical to this analysis include determining the number of equivalent single axle loads (ESALs), which are based on trailer loading, number of axles and their configuration, and the thickness and resilient modulus of the subgrade, aggregate base and pavement materials. These factors combined with recommended values for initial serviceability, standard deviation, reliability, and a terminal serviceability as outlined by the American Association of State Highway and Transportation Officials (AASHTO) make up the main components of this analysis. Using these values, URS will determine minimum acceptable asphalt and aggregate base thicknesses to support the proposed loading.

At the completion of the hauling program and construction, URS proposes to perform a visual assessment of the surface conditions of the pavement, similar to what was performed before the construction began. The visual assessment will identify weak or deteriorated areas along the haul route which may require mitigation. Depending on the outcome of the preconstruction pavement analysis and the visual observation of post construction conditions, URS may prepare a mitigation design to repair the pavements to pre-construction conditions or better. 20 years is the typical pavement design life.

DCP TEST DATA

DCP-01

Project: Saddleback Windfarm
Location: White Salmon, WA

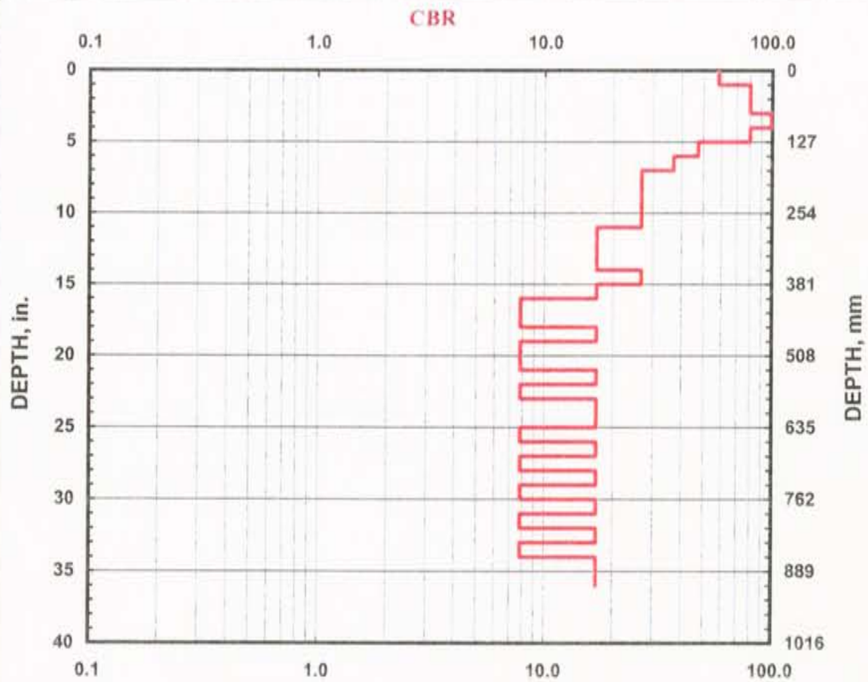
Date: 9/19/2007
Project No.: 33758687
Start: 0 feet bgs

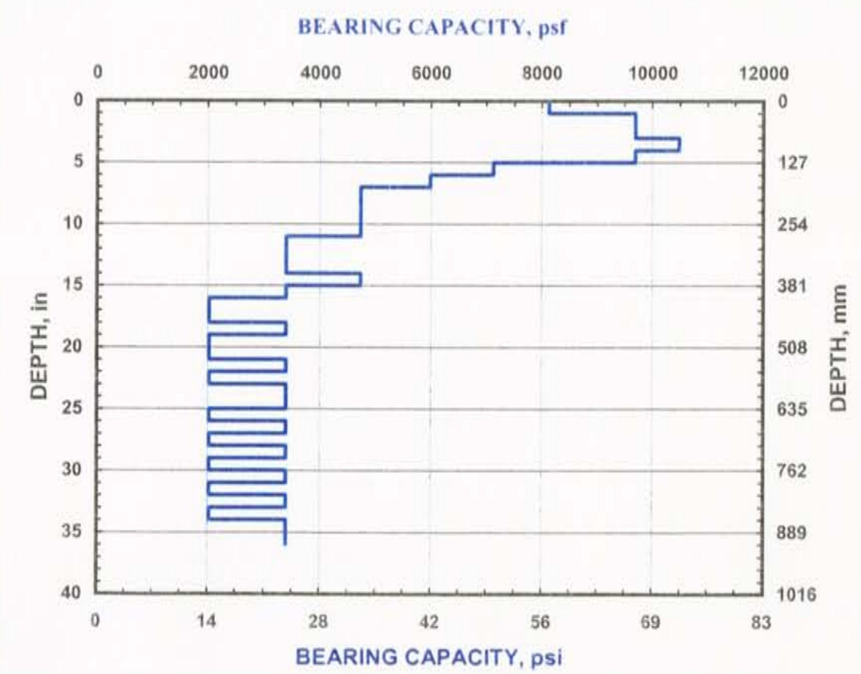
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
6	25	1	1.0
8	51	1	2.0
8	76	1	3.0
10	102	1	4.0
8	127	1	5.0
5	152	1	6.0
4	178	1	7.0
3	203	1	8.0
3	229	1	9.0
3	254	1	10.0
3	279	1	11.0
2	305	1	12.0
2	330	1	13.0
2	356	1	14.0
3	381	1	15.0
2	406	1	16.0
1	432	1	17.0
1	457	1	18.0
2	483	1	19.0
1	508	1	20.0
1	533	1	21.0
2	559	1	22.0
1	584	1	23.0
2	610	1	24.0
2	635	1	25.0
1	660	1	26.0
2	686	1	27.0
1	711	1	28.0
2	737	1	29.0
1	762	1	30.0
2	787	1	31.0
1	813	1	32.0
2	838	1	33.0
1	864	1	34.0
2	889	1	35.0
2	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-02

Project: *Saddleback Windfarm*
Location: White Salmon, WA

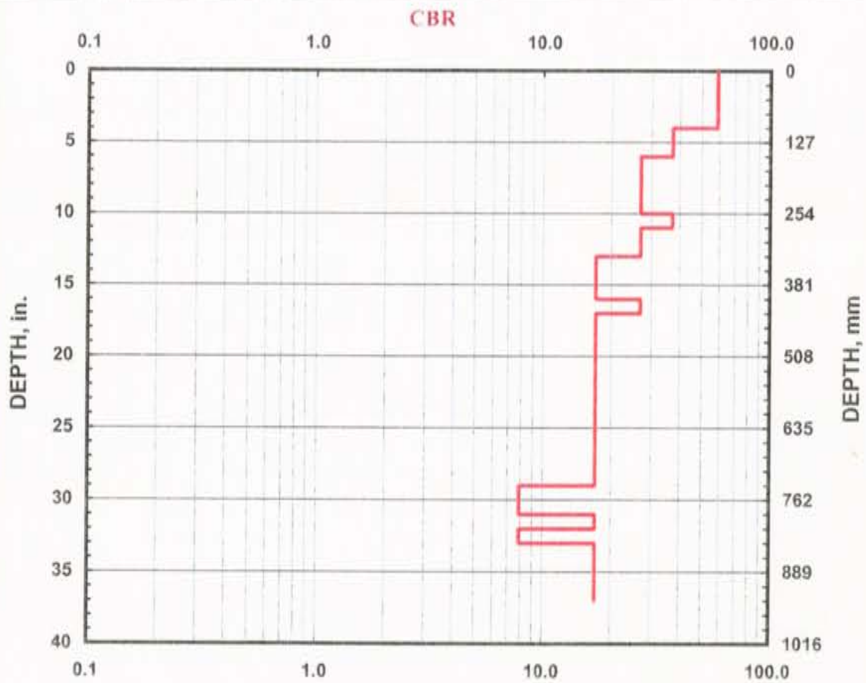
Date: 9/19/2007
Project No.: 33758687
Start: 0 feet bgs

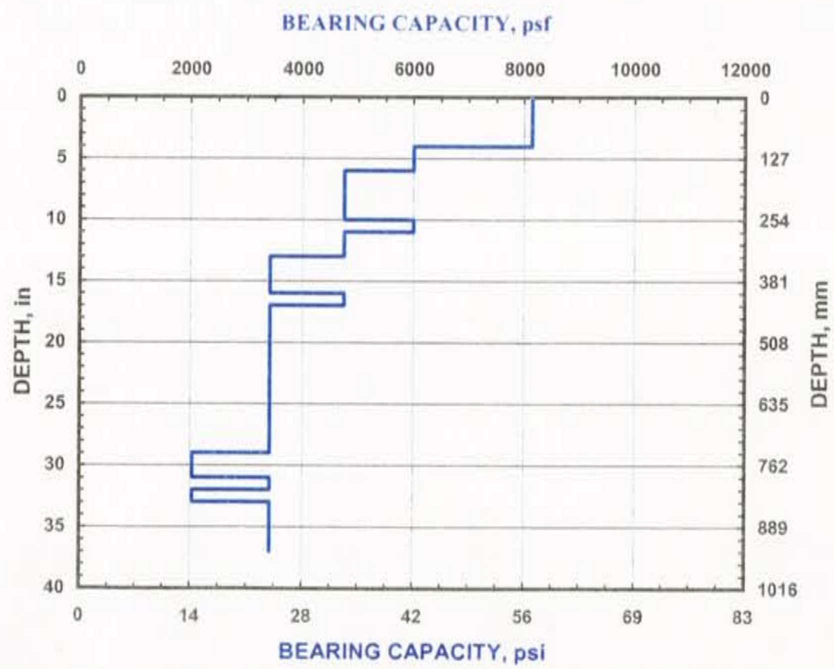
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
6	25	1	1.0
6	51	1	2.0
6	76	1	3.0
6	102	1	4.0
4	127	1	5.0
4	152	1	6.0
3	178	1	7.0
3	203	1	8.0
3	229	1	9.0
3	254	1	10.0
4	279	1	11.0
3	305	1	12.0
3	330	1	13.0
2	356	1	14.0
2	381	1	15.0
2	406	1	16.0
3	432	1	17.0
2	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
2	559	1	22.0
2	584	1	23.0
2	610	1	24.0
2	635	1	25.0
2	660	1	26.0
2	686	1	27.0
2	711	1	28.0
2	737	1	29.0
1	762	1	30.0
1	787	1	31.0
2	813	1	32.0
1	838	1	33.0
2	864	1	34.0
2	889	1	35.0
2	914	1	36.0
2	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-03

Project: *Saddleback Windfarm*
Location: White Salmon, WA

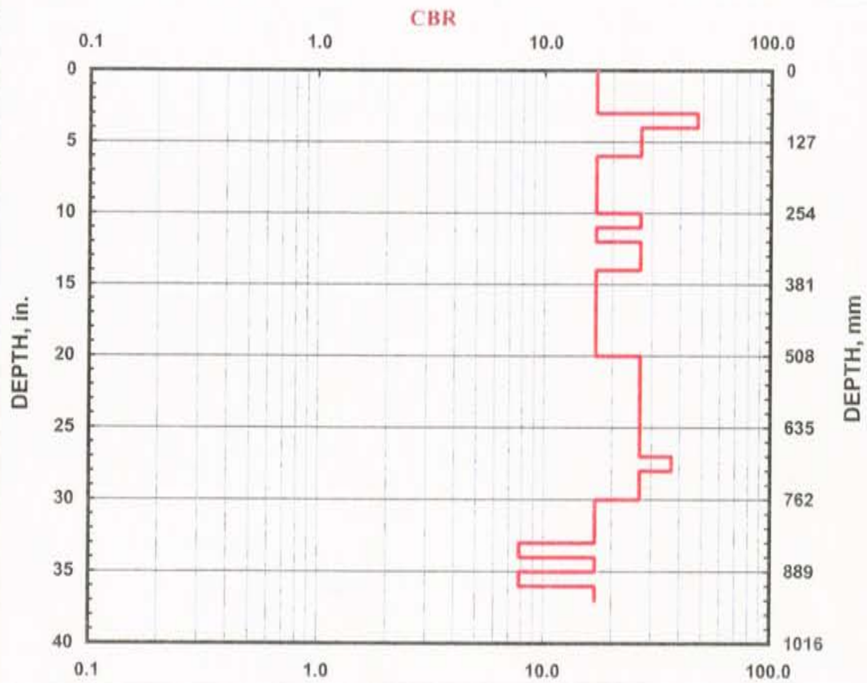
Hammer: ○ 10.1 lbs. ◉ 17.6 lbs. ○ Both hammers used

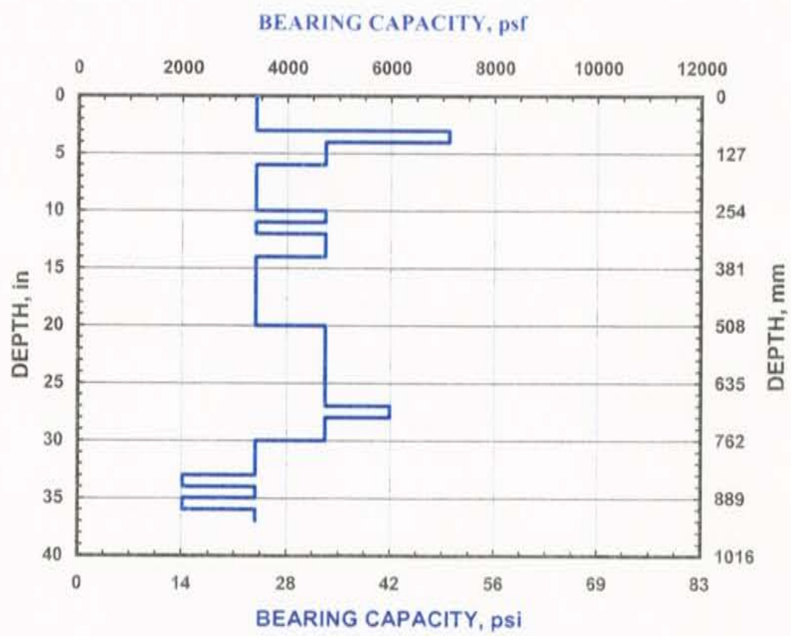
Soil Type: ○ CH ○ CL ◉ All other soils

Date: 9/19/2007
Project No.: 33758687
Start: 0 feet bgs

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
2	51	1	2.0
2	76	1	3.0
5	102	1	4.0
3	127	1	5.0
3	152	1	6.0
2	178	1	7.0
2	203	1	8.0
2	229	1	9.0
2	254	1	10.0
3	279	1	11.0
2	305	1	12.0
3	330	1	13.0
3	356	1	14.0
2	381	1	15.0
2	406	1	16.0
2	432	1	17.0
2	457	1	18.0
2	483	1	19.0
2	508	1	20.0
3	533	1	21.0
3	559	1	22.0
3	584	1	23.0
3	610	1	24.0
3	635	1	25.0
3	660	1	26.0
3	686	1	27.0
4	711	1	28.0
3	737	1	29.0
3	762	1	30.0
2	787	1	31.0
2	813	1	32.0
2	838	1	33.0
1	864	1	34.0
2	889	1	35.0
1	914	1	36.0
2	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-04

Project: *Saddleback Windfarm*
Location: White Salmon, WA

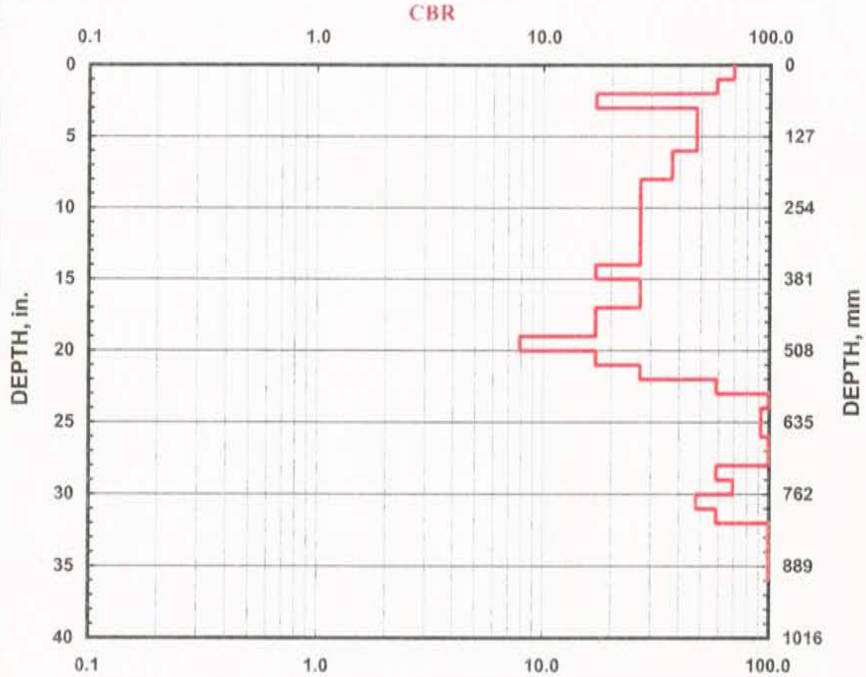
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

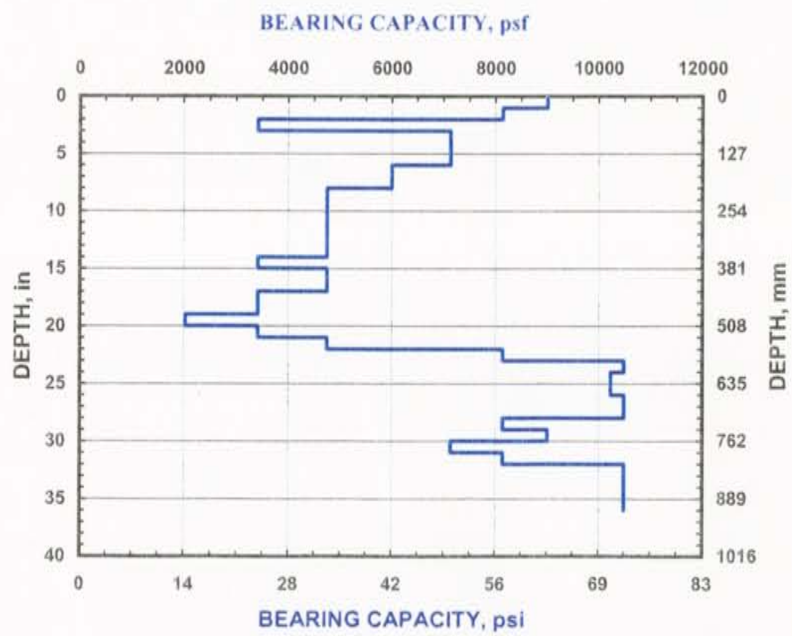
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
7	25	1	1.0
6	51	1	2.0
2	76	1	3.0
5	102	1	4.0
5	127	1	5.0
5	152	1	6.0
4	178	1	7.0
4	203	1	8.0
3	229	1	9.0
3	254	1	10.0
3	279	1	11.0
3	305	1	12.0
3	330	1	13.0
3	356	1	14.0
2	381	1	15.0
3	406	1	16.0
3	432	1	17.0
2	457	1	18.0
2	483	1	19.0
1	508	1	20.0
2	533	1	21.0
3	559	1	22.0
6	584	1	23.0
10	610	1	24.0
9	635	1	25.0
9	660	1	26.0
11	686	1	27.0
10	711	1	28.0
6	737	1	29.0
7	762	1	30.0
5	787	1	31.0
6	813	1	32.0
10	838	1	33.0
23	864	1	34.0
19	889	1	35.0
12	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-05

Project: *Saddleback Windfarm*
Location: White Salmon, WA

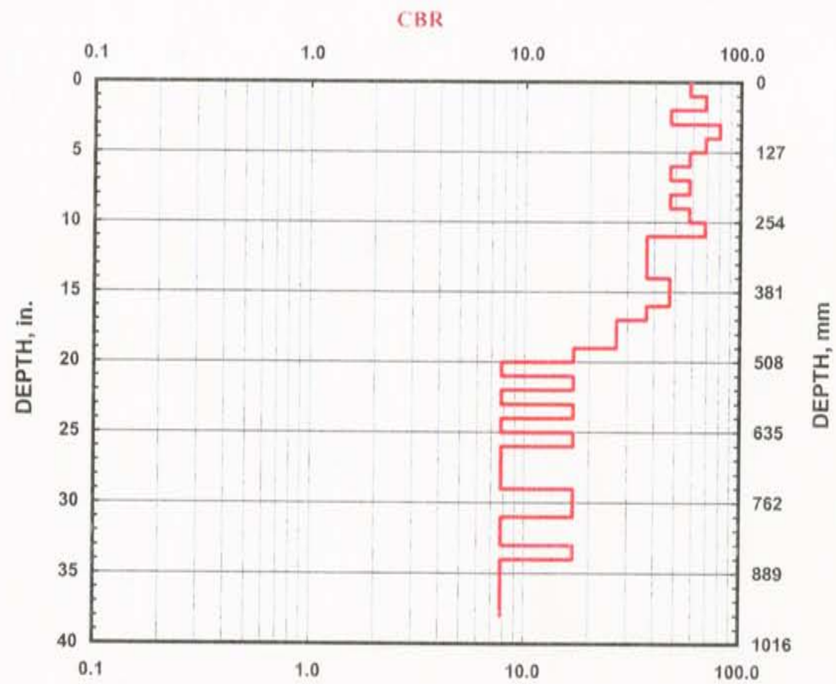
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

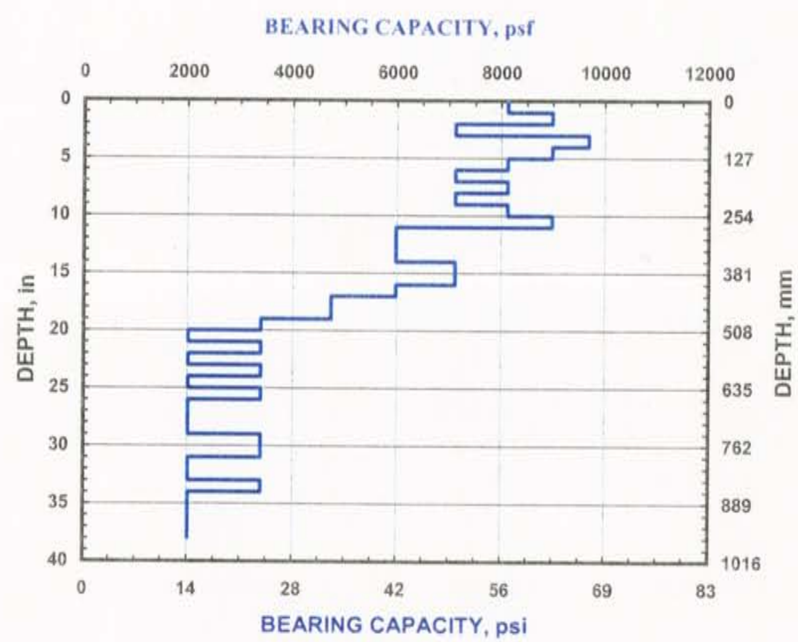
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
6	25	1	1.0
7	51	1	2.0
5	76	1	3.0
8	102	1	4.0
7	127	1	5.0
6	152	1	6.0
5	178	1	7.0
6	203	1	8.0
5	229	1	9.0
6	254	1	10.0
7	279	1	11.0
4	305	1	12.0
4	330	1	13.0
4	356	1	14.0
5	381	1	15.0
5	406	1	16.0
4	432	1	17.0
3	457	1	18.0
3	483	1	19.0
2	508	1	20.0
1	533	1	21.0
2	559	1	22.0
1	584	1	23.0
2	610	1	24.0
1	635	1	25.0
2	660	1	26.0
1	686	1	27.0
1	711	1	28.0
1	737	1	29.0
2	762	1	30.0
2	787	1	31.0
1	813	1	32.0
1	838	1	33.0
2	864	1	34.0
1	889	1	35.0
1	914	1	36.0
1	940	1	37.0
1	965	1	38.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-06

Project: Saddleback Windfarm
Location: White Salmon, WA

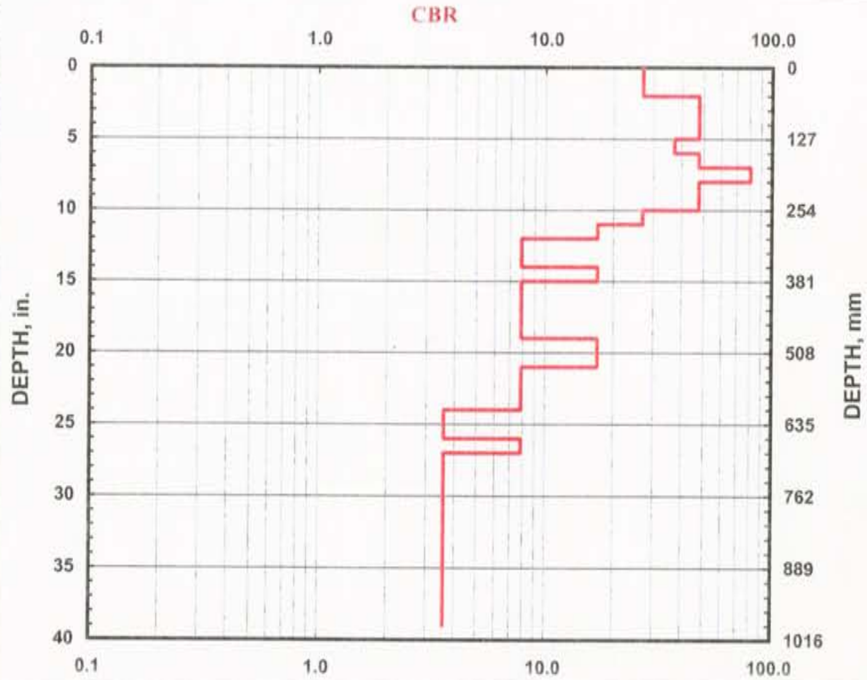
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

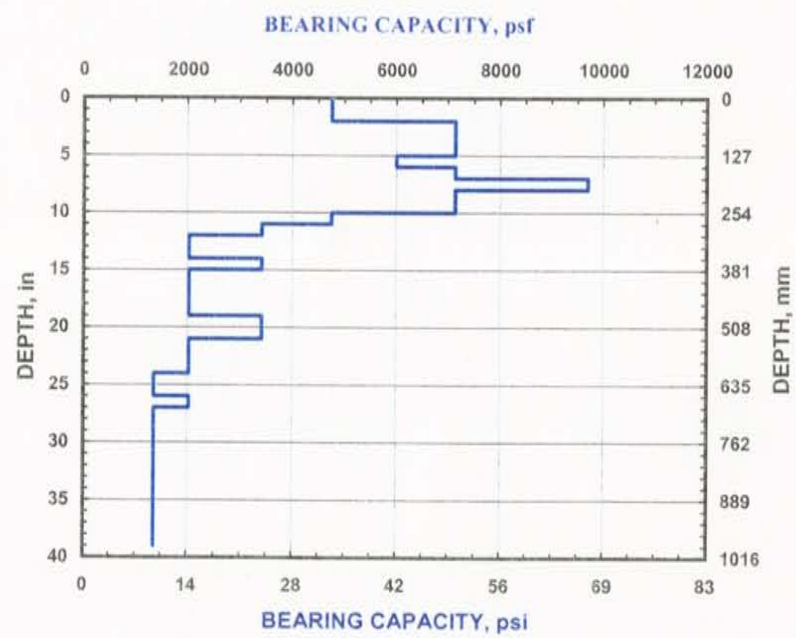
Hammer: ○ 10.1 lbs. ◉ 17.6 lbs. ○ Both hammers used

Soil Type: ○ CH ○ CL ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
3	25	1	1.0
3	51	1	2.0
5	76	1	3.0
5	102	1	4.0
5	127	1	5.0
4	152	1	6.0
5	178	1	7.0
8	203	1	8.0
5	229	1	9.0
5	254	1	10.0
3	279	1	11.0
2	305	1	12.0
1	330	1	13.0
1	356	1	14.0
2	381	1	15.0
1	406	1	16.0
1	432	1	17.0
1	457	1	18.0
1	483	1	19.0
2	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
1	660	1	26.0
1	686	1	27.0
1	737	1	29.0
1	787	1	31.0
1	838	1	33.0
1	889	1	35.0
1	940	1	37.0
1	991	1	39.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-07

Project: Saddleback Windfarm
Location: White Salmon, WA

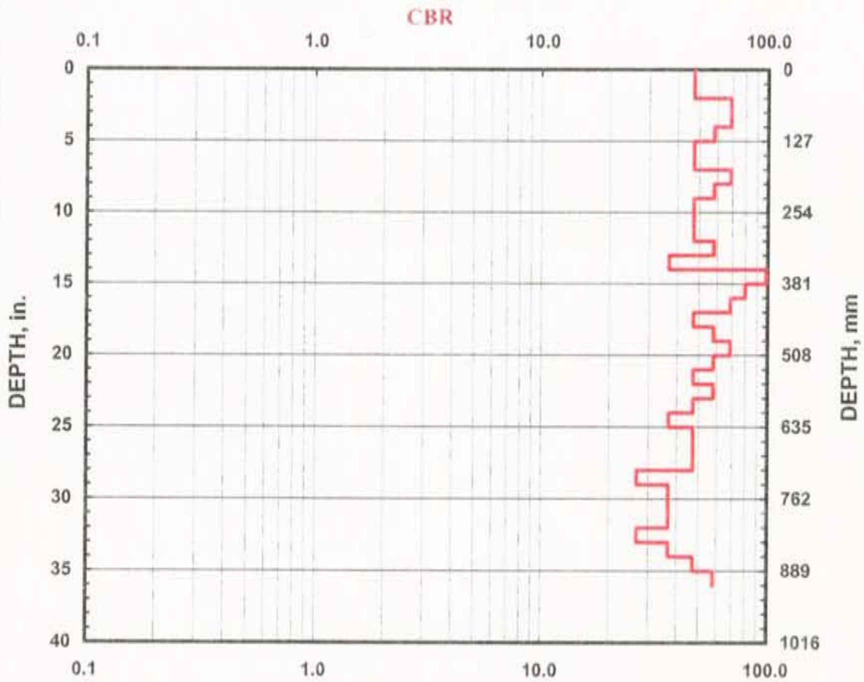
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

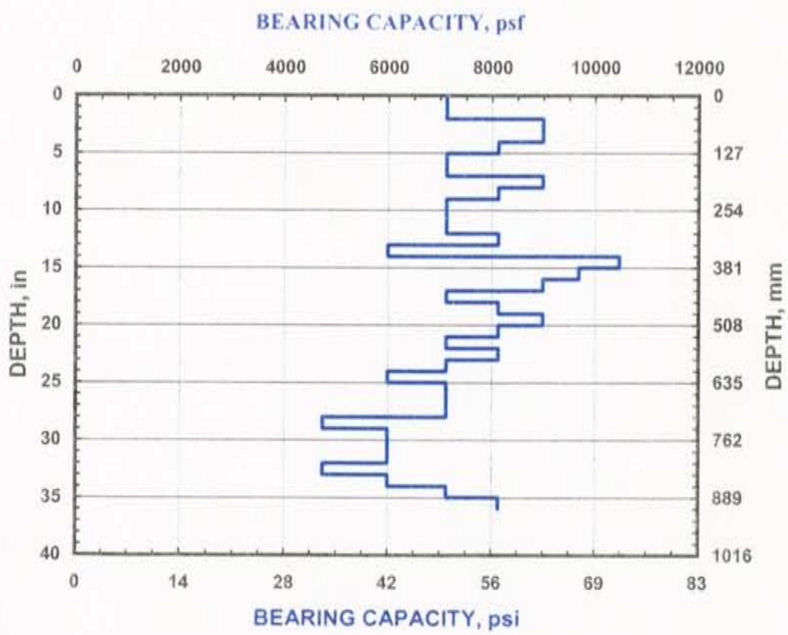
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
5	25	1	1.0
5	51	1	2.0
7	76	1	3.0
7	102	1	4.0
6	127	1	5.0
5	152	1	6.0
5	178	1	7.0
7	203	1	8.0
6	229	1	9.0
5	254	1	10.0
5	279	1	11.0
5	305	1	12.0
6	330	1	13.0
4	356	1	14.0
10	381	1	15.0
8	406	1	16.0
7	432	1	17.0
5	457	1	18.0
6	483	1	19.0
7	508	1	20.0
6	533	1	21.0
5	559	1	22.0
6	584	1	23.0
5	610	1	24.0
4	635	1	25.0
5	660	1	26.0
5	686	1	27.0
5	711	1	28.0
3	737	1	29.0
4	762	1	30.0
4	787	1	31.0
4	813	1	32.0
3	838	1	33.0
4	864	1	34.0
5	889	1	35.0
6	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-08

Project: Saddleback Windfarm
Location: White Salmon, WA

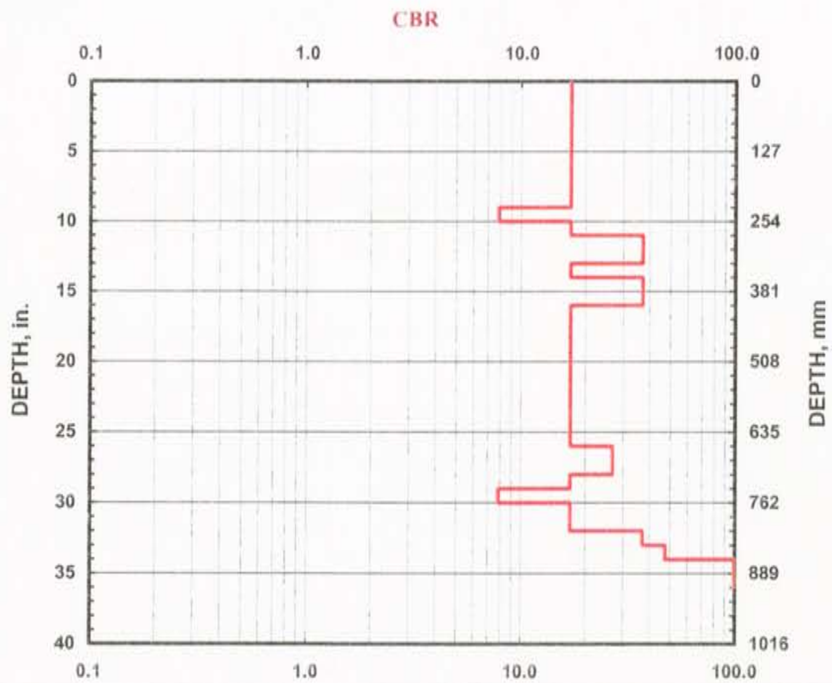
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

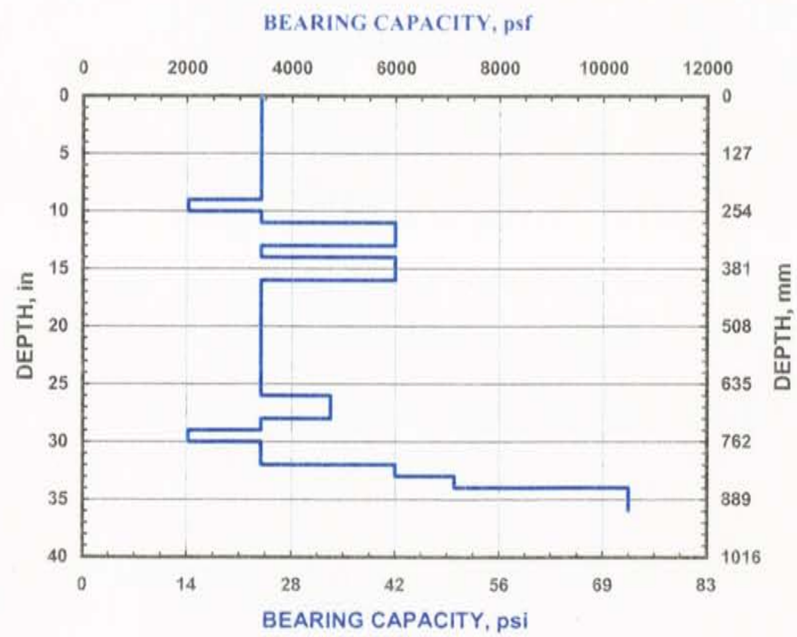
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
2	51	1	2.0
2	76	1	3.0
2	102	1	4.0
2	127	1	5.0
2	152	1	6.0
2	178	1	7.0
2	203	1	8.0
2	229	1	9.0
1	254	1	10.0
2	279	1	11.0
4	305	1	12.0
4	330	1	13.0
2	356	1	14.0
4	381	1	15.0
4	406	1	16.0
2	432	1	17.0
2	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
2	559	1	22.0
2	584	1	23.0
2	610	1	24.0
2	635	1	25.0
2	660	1	26.0
3	686	1	27.0
3	711	1	28.0
2	737	1	29.0
1	762	1	30.0
2	787	1	31.0
2	813	1	32.0
4	838	1	33.0
5	864	1	34.0
12	889	1	35.0
11	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-09

Project: Saddleback Windfarm
Location: White Salmon, WA

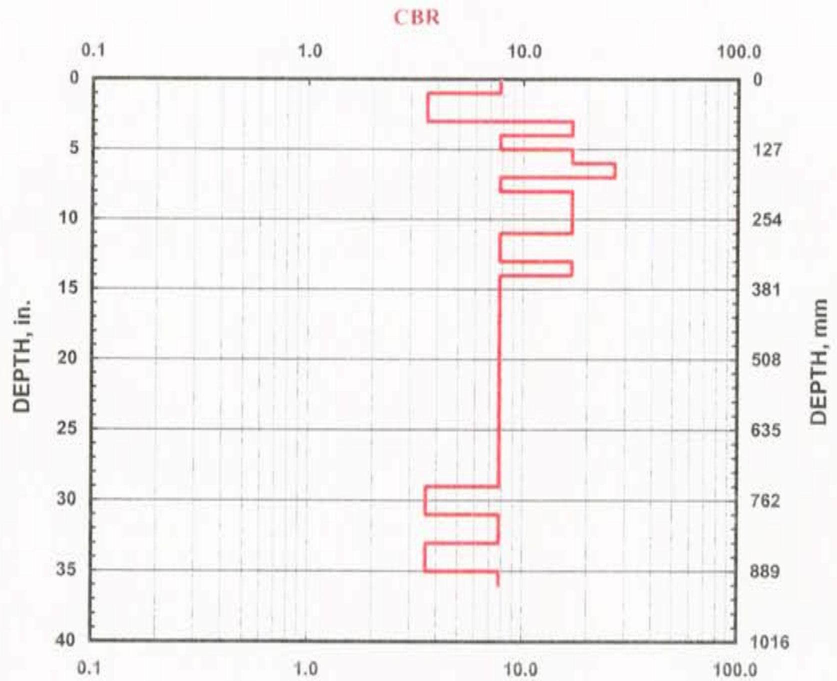
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

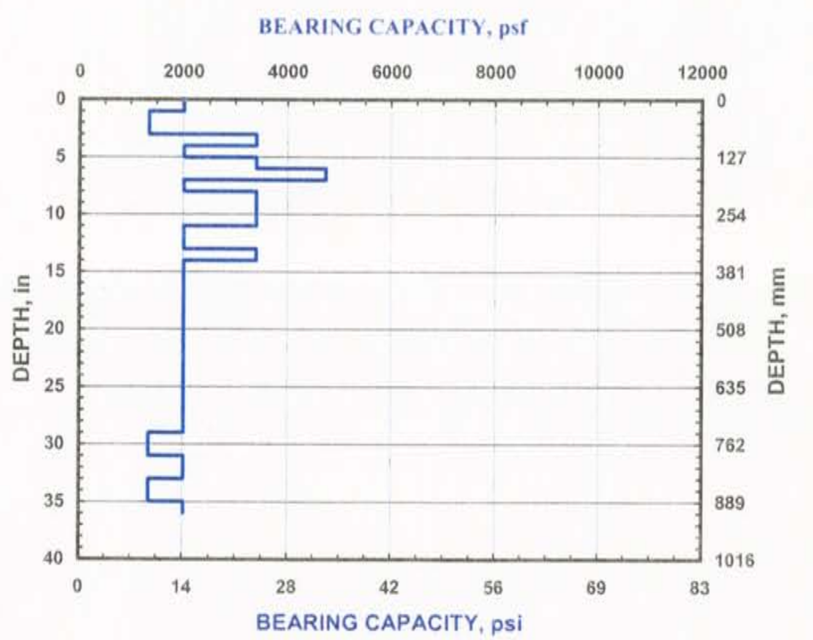
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
1	25	1	1.0
1	76	1	3.0
2	102	1	4.0
1	127	1	5.0
2	152	1	6.0
3	178	1	7.0
1	203	1	8.0
2	229	1	9.0
2	254	1	10.0
2	279	1	11.0
1	305	1	12.0
1	330	1	13.0
2	356	1	14.0
1	381	1	15.0
1	406	1	16.0
1	432	1	17.0
1	457	1	18.0
1	483	1	19.0
1	508	1	20.0
1	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
1	635	1	25.0
1	660	1	26.0
1	686	1	27.0
1	711	1	28.0
1	737	1	29.0
1	787	1	31.0
1	813	1	32.0
1	838	1	33.0
1	889	1	35.0
1	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-10

Project: *Saddleback Windfarm*
Location: White Salmon, WA

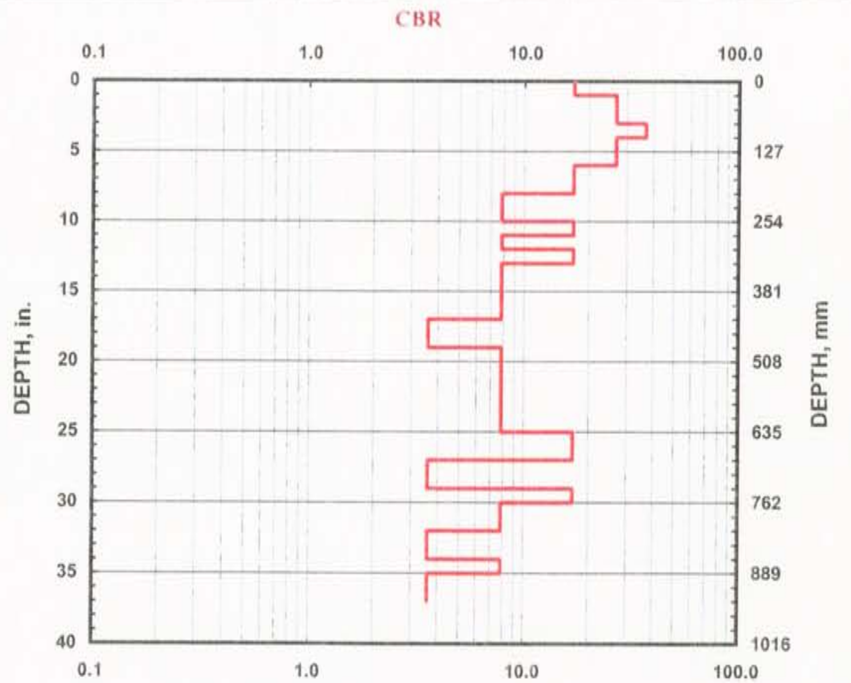
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

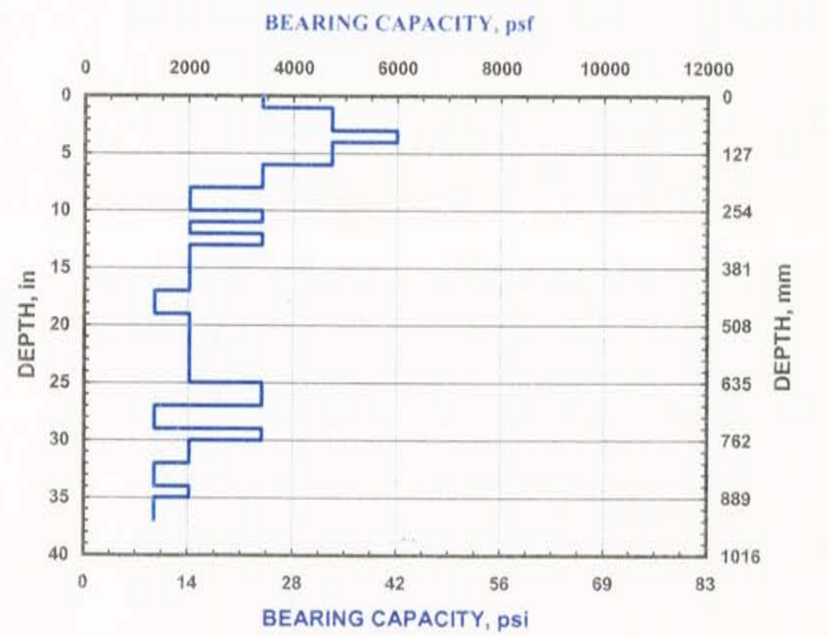
Hammer: ○ 10.1 lbs. ◉ 17.6 lbs. ○ Both hammers used

Soil Type: ○ CH ○ CL ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
3	51	1	2.0
3	76	1	3.0
4	102	1	4.0
3	127	1	5.0
3	152	1	6.0
2	178	1	7.0
2	203	1	8.0
1	229	1	9.0
1	254	1	10.0
2	279	1	11.0
1	305	1	12.0
2	330	1	13.0
1	356	1	14.0
1	381	1	15.0
1	406	1	16.0
1	432	1	17.0
1	483	1	19.0
1	508	1	20.0
1	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
1	635	1	25.0
2	660	1	26.0
2	686	1	27.0
1	737	1	29.0
2	762	1	30.0
1	787	1	31.0
1	813	1	32.0
1	864	1	34.0
1	889	1	35.0
1	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-11

Project: *Saddleback Windfarm*

Location: White Salmon, WA

Date: 9/24/2007

Project No.: 33758687

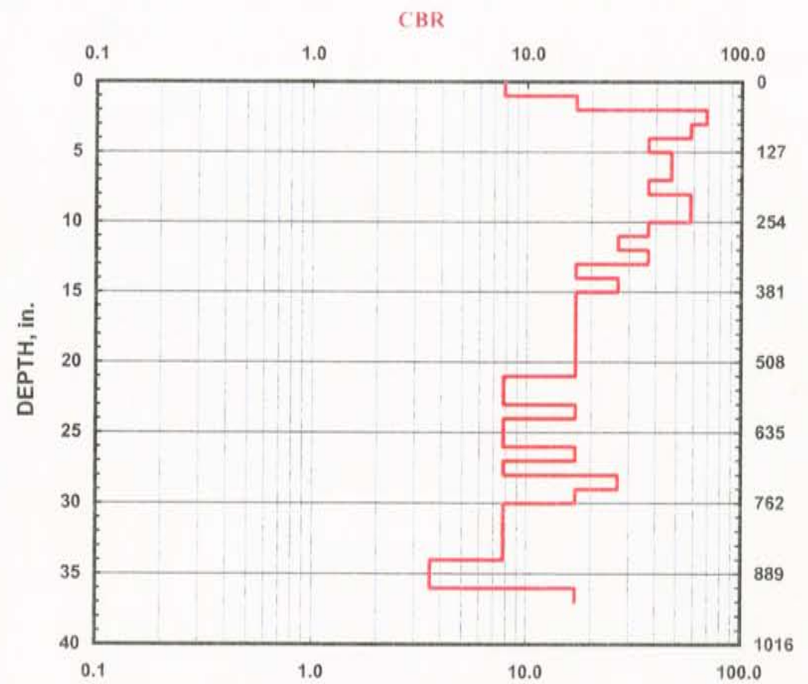
Start: 0 feet bgs

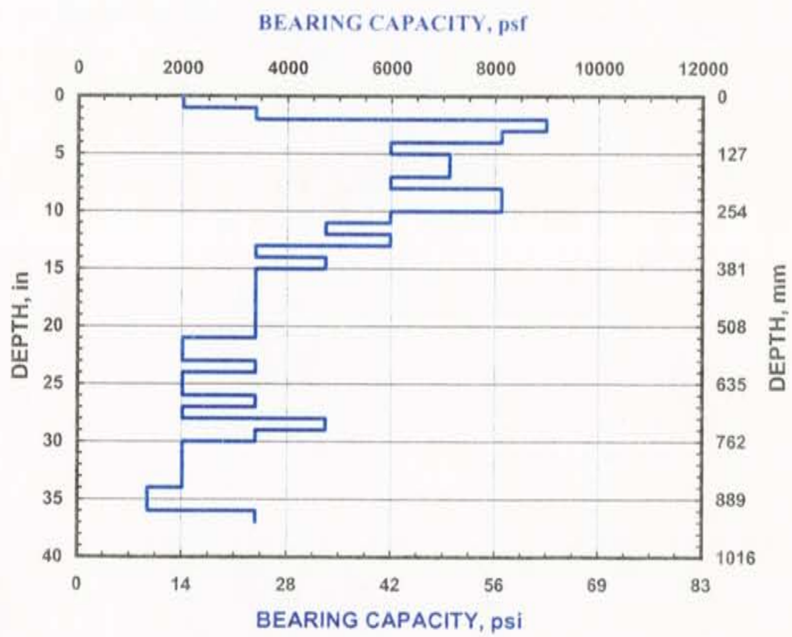
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
1	25	1	1.0
2	51	1	2.0
7	76	1	3.0
6	102	1	4.0
4	127	1	5.0
5	152	1	6.0
5	178	1	7.0
4	203	1	8.0
6	229	1	9.0
6	254	1	10.0
4	279	1	11.0
3	305	1	12.0
4	330	1	13.0
2	356	1	14.0
3	381	1	15.0
2	406	1	16.0
2	432	1	17.0
2	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
2	610	1	24.0
1	635	1	25.0
1	660	1	26.0
2	686	1	27.0
1	711	1	28.0
3	737	1	29.0
2	762	1	30.0
1	787	1	31.0
1	813	1	32.0
1	838	1	33.0
1	864	1	34.0
1	914	1	36.0
2	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-12

Project: *Saddleback Windfarm*
Location: White Salmon, WA

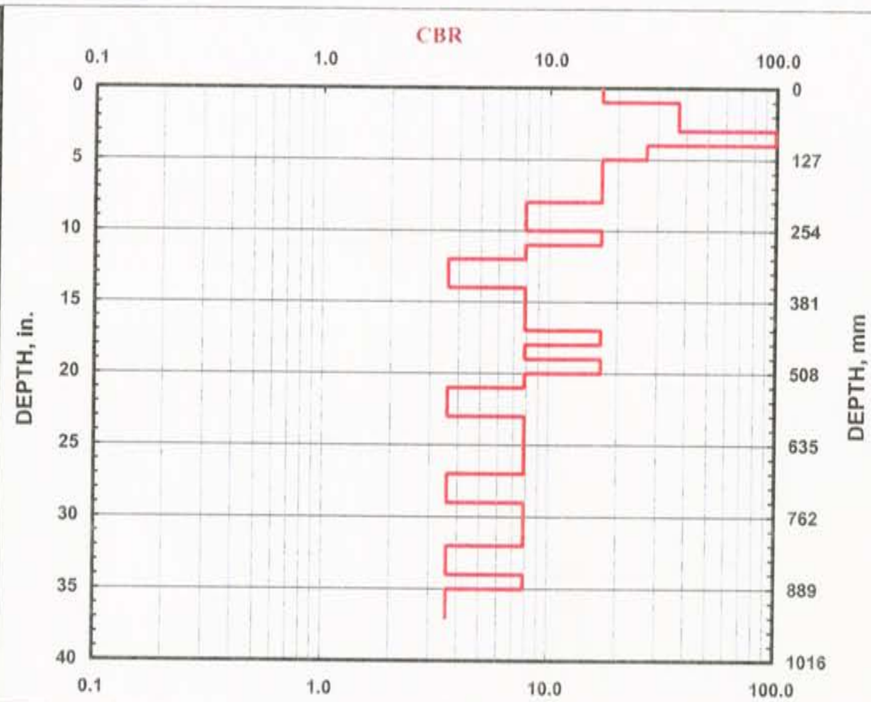
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

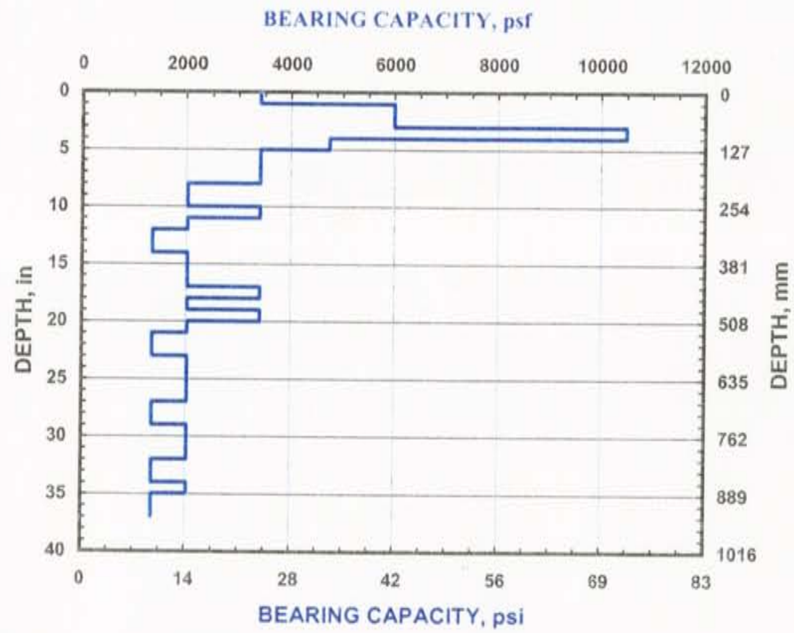
Hammer
○ 10.1 lbs.
◉ 17.6 lbs.
○ Both hammers used

Soil Type
○ CH
○ CL
◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
4	51	1	2.0
4	76	1	3.0
15	102	1	4.0
3	127	1	5.0
2	152	1	6.0
2	178	1	7.0
2	203	1	8.0
1	229	1	9.0
1	254	1	10.0
2	279	1	11.0
1	305	1	12.0
1	356	1	14.0
1	381	1	15.0
1	406	1	16.0
1	432	1	17.0
2	457	1	18.0
1	483	1	19.0
2	508	1	20.0
1	533	1	21.0
1	584	1	23.0
1	610	1	24.0
1	635	1	25.0
1	660	1	26.0
1	686	1	27.0
1	737	1	29.0
1	762	1	30.0
1	787	1	31.0
1	813	1	32.0
1	864	1	34.0
1	889	1	35.0
1	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-13

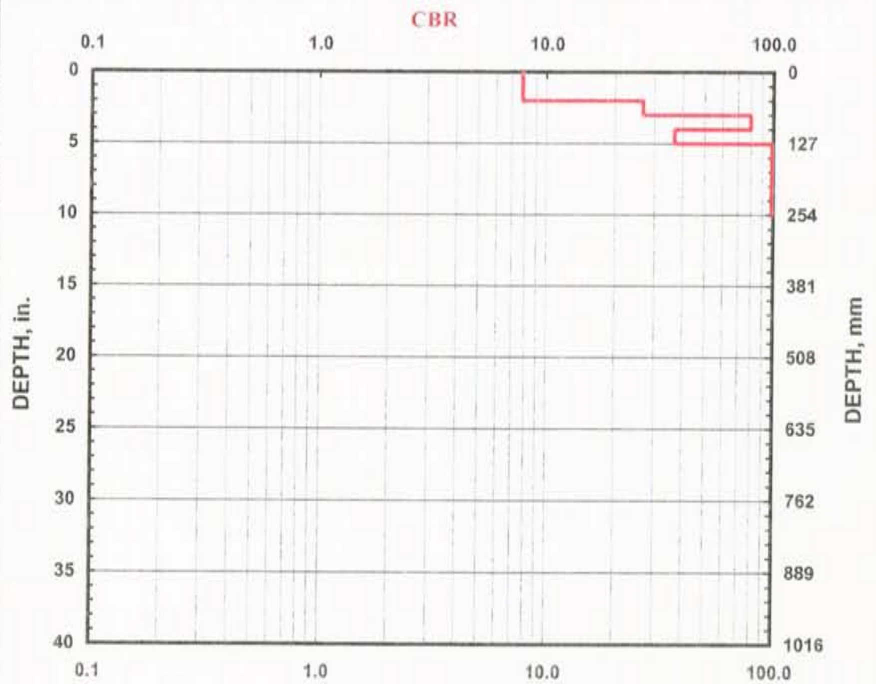
Project: *Saddleback Windfarm*
Location: White Salmon, WA

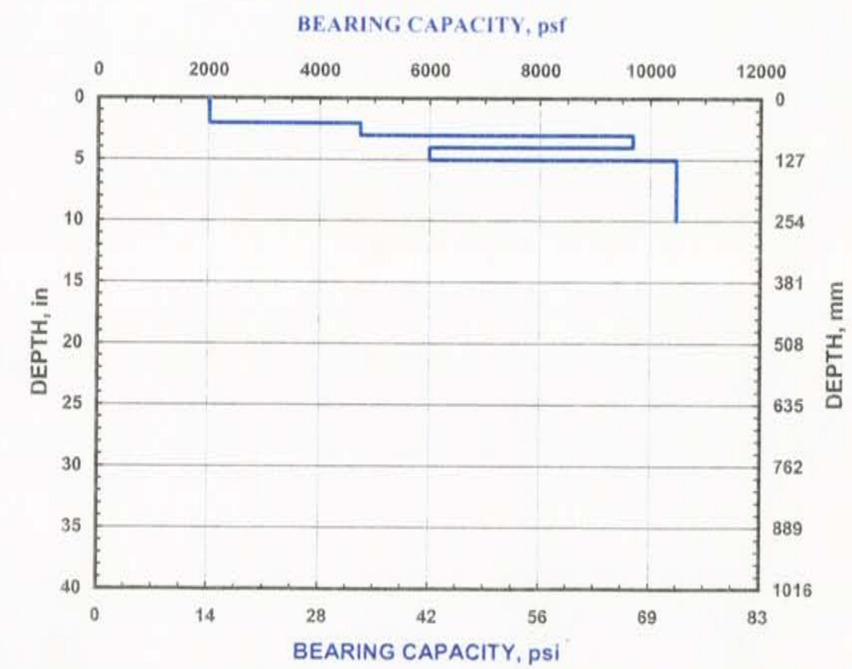
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
1	25	1	1.0
1	51	1	2.0
3	76	1	3.0
8	102	1	4.0
4	127	1	5.0
17	152	1	6.0
14	178	1	7.0
20	203	1	8.0
15	229	1	9.0
16	254	1	10.0





Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)

DCP TEST DATA

DCP-14

Project: *Saddleback Windfarm*
Location: White Salmon, WA

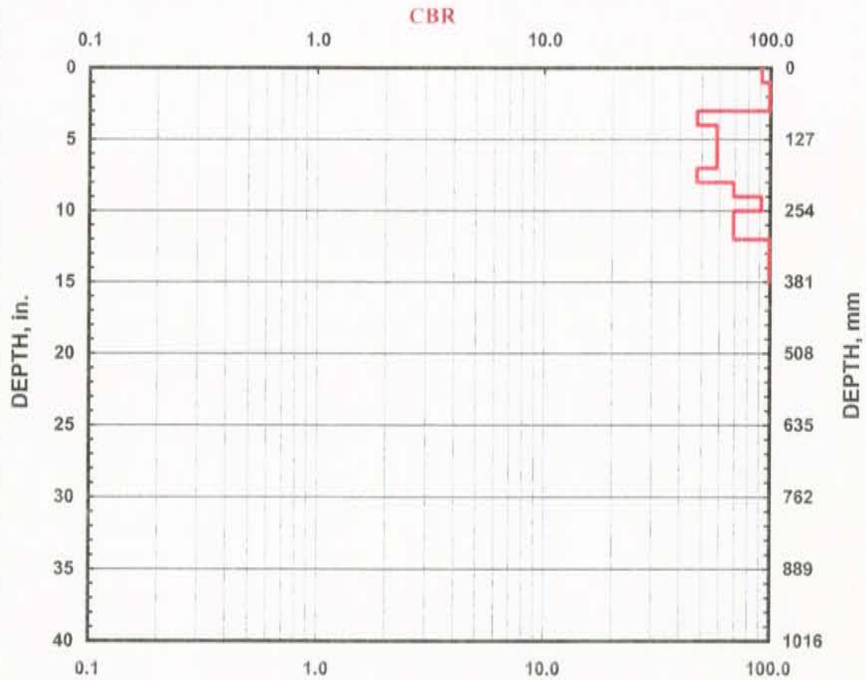
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

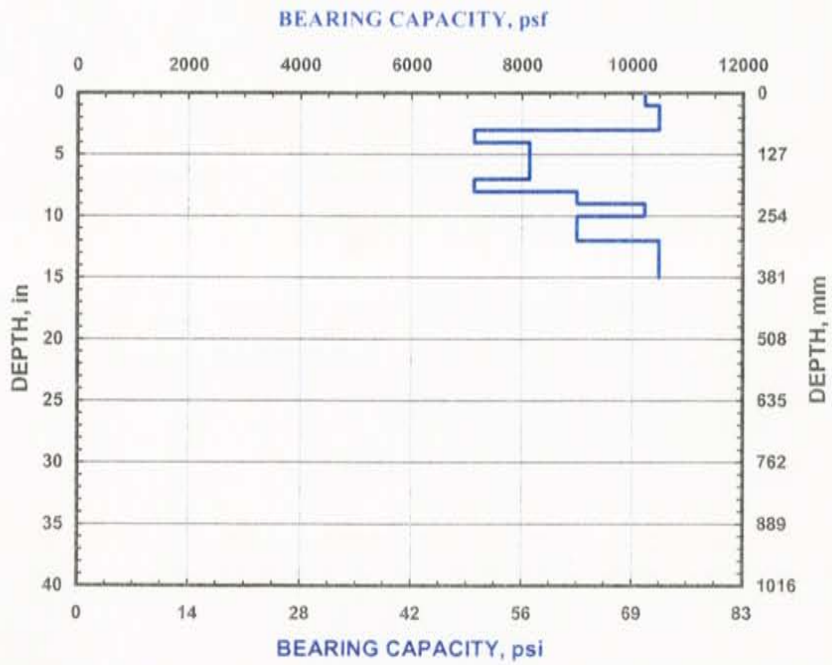
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
9	25	1	1.0
23	51	1	2.0
11	76	1	3.0
5	102	1	4.0
6	127	1	5.0
6	152	1	6.0
6	178	1	7.0
5	203	1	8.0
7	229	1	9.0
9	254	1	10.0
7	279	1	11.0
7	305	1	12.0
10	330	1	13.0
28	356	1	14.0
50	381	1	15.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-15

Project: Saddleback Windfarm
Location: White Salmon, WA

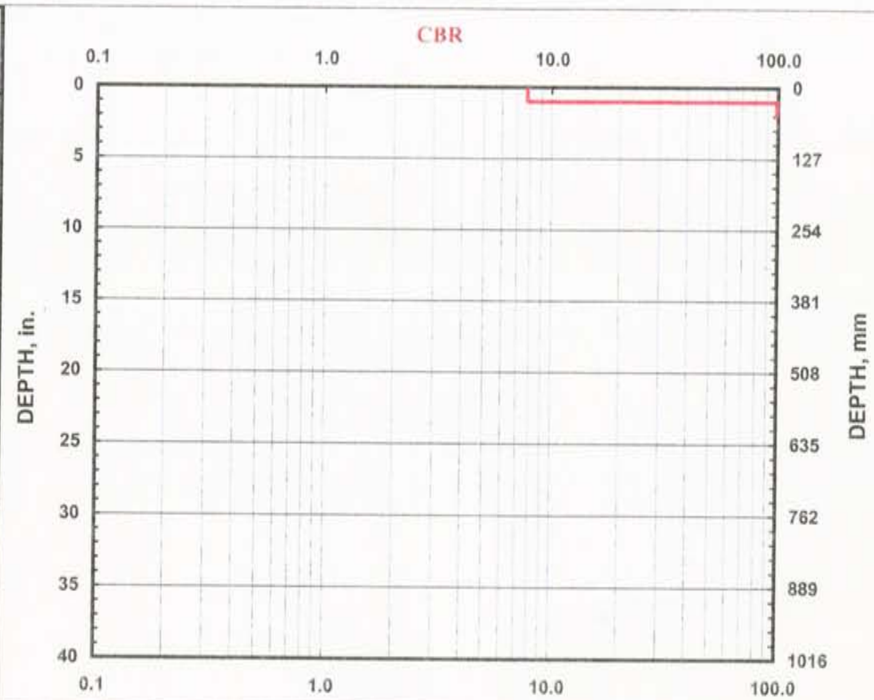
Date: 9/24/2007
Project No.: 33758687
Start: 0 feet bgs

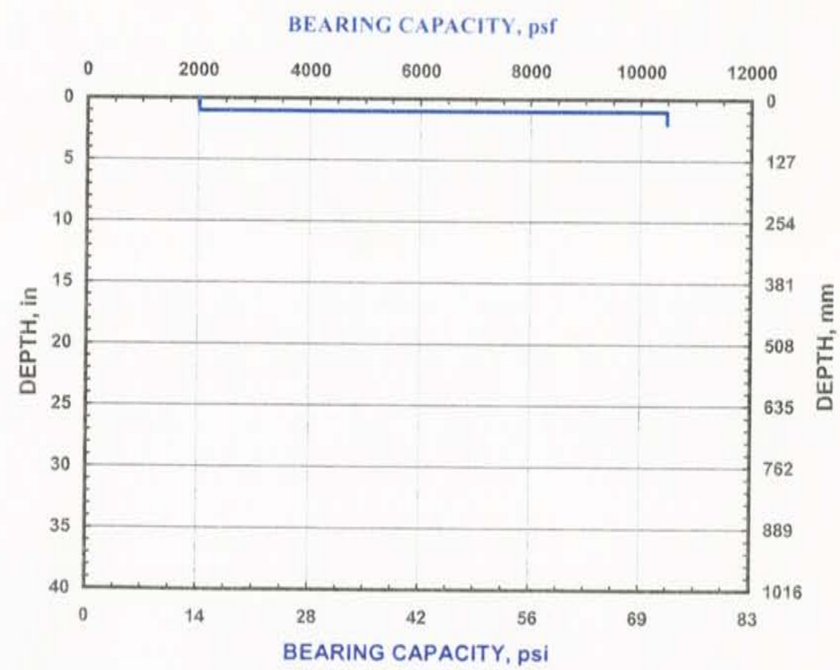
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
1	25	1	1.0
50	51	1	2.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-16

Project: *Saddleback Windfarm*
Location: White Salmon, WA

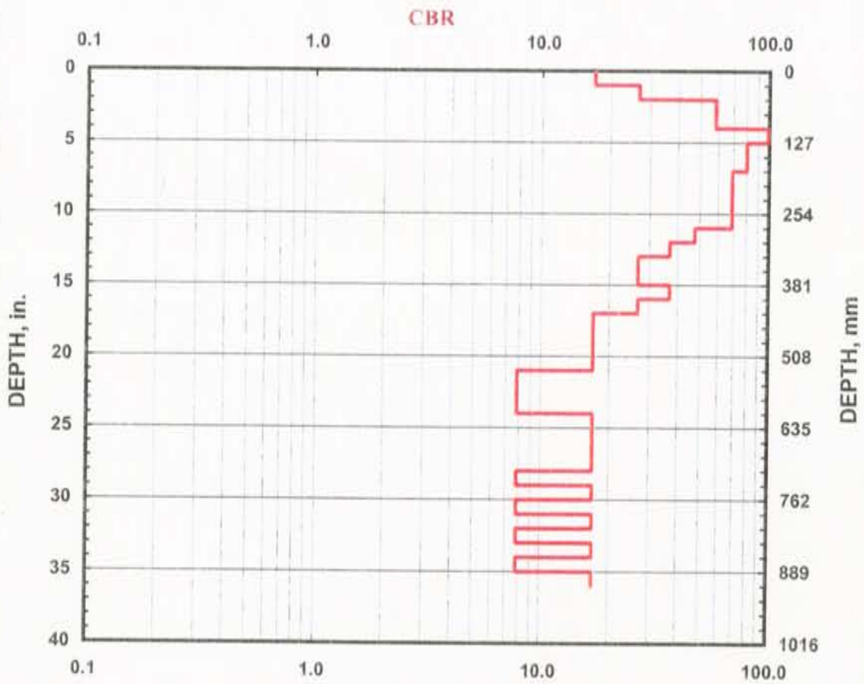
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

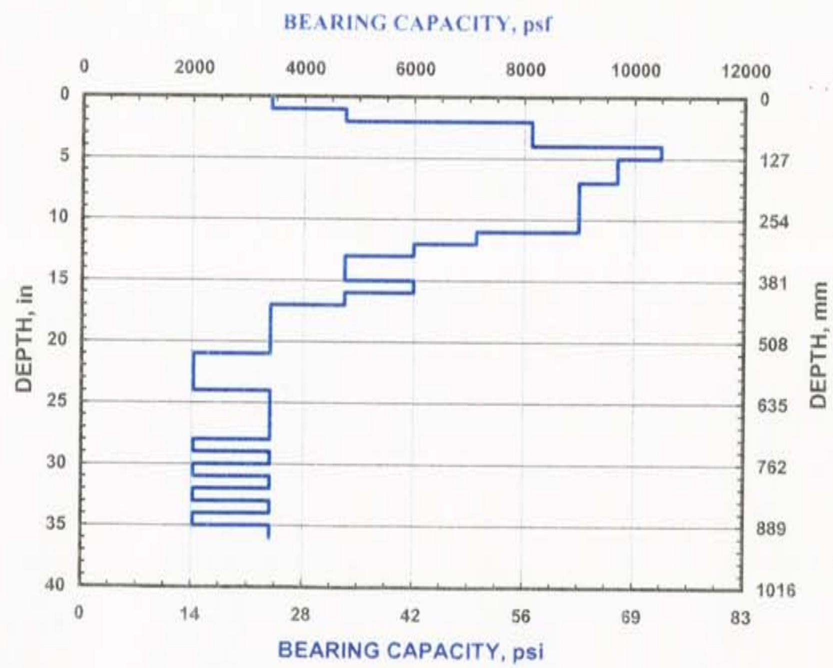
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
3	51	1	2.0
6	76	1	3.0
6	102	1	4.0
10	127	1	5.0
8	152	1	6.0
8	178	1	7.0
7	203	1	8.0
7	229	1	9.0
7	254	1	10.0
7	279	1	11.0
5	305	1	12.0
4	330	1	13.0
3	356	1	14.0
3	381	1	15.0
4	406	1	16.0
3	432	1	17.0
2	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
2	635	1	25.0
2	660	1	26.0
2	686	1	27.0
2	711	1	28.0
1	737	1	29.0
2	762	1	30.0
1	787	1	31.0
2	813	1	32.0
1	838	1	33.0
2	864	1	34.0
1	889	1	35.0
2	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-17

Project: Saddleback Windfarm
Location: White Salmon, WA

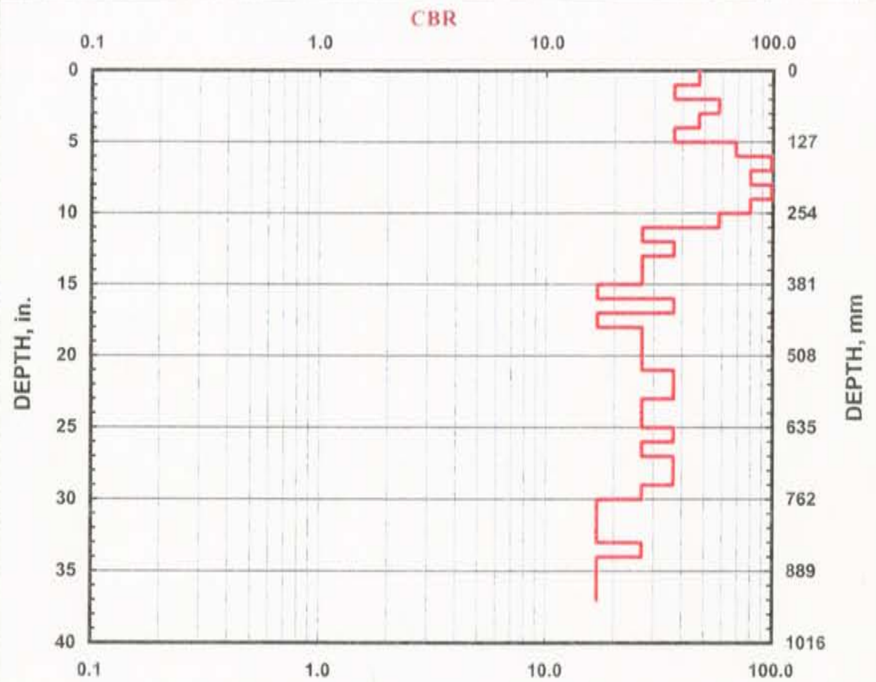
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

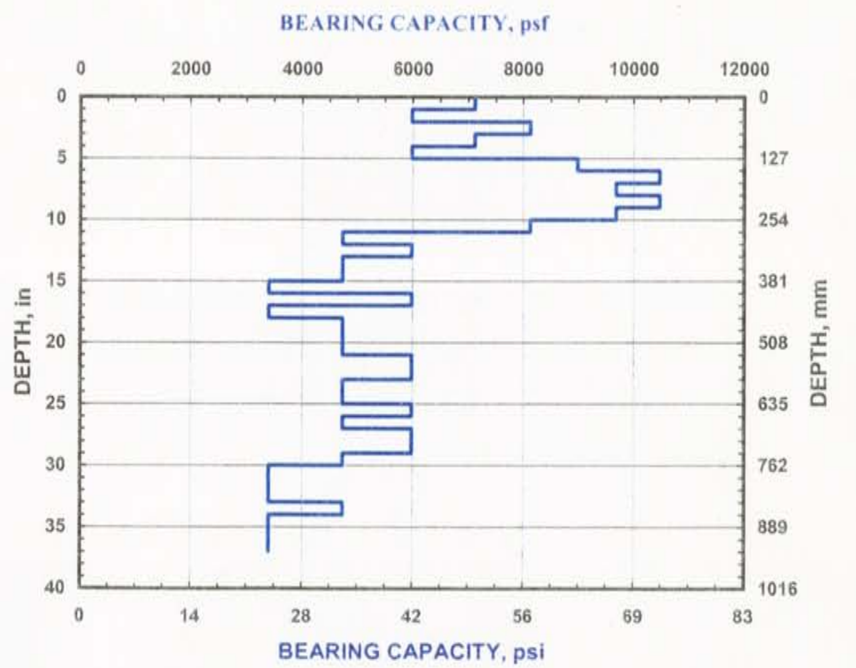
Hammer: ○ 10.1 lbs. ◉ 17.6 lbs. ○ Both hammers used

Soil Type: ○ CH ○ CL ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
5	25	1	1.0
4	51	1	2.0
6	76	1	3.0
5	102	1	4.0
4	127	1	5.0
7	152	1	6.0
10	178	1	7.0
8	203	1	8.0
20	229	1	9.0
8	254	1	10.0
6	279	1	11.0
3	305	1	12.0
4	330	1	13.0
3	356	1	14.0
3	381	1	15.0
2	406	1	16.0
4	432	1	17.0
2	457	1	18.0
3	483	1	19.0
3	508	1	20.0
3	533	1	21.0
4	559	1	22.0
4	584	1	23.0
3	610	1	24.0
3	635	1	25.0
4	660	1	26.0
3	686	1	27.0
4	711	1	28.0
4	737	1	29.0
3	762	1	30.0
2	787	1	31.0
2	813	1	32.0
2	838	1	33.0
3	864	1	34.0
2	889	1	35.0
2	914	1	36.0
2	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-18

Project: Saddleback Windfarm
Location: White Salmon, WA

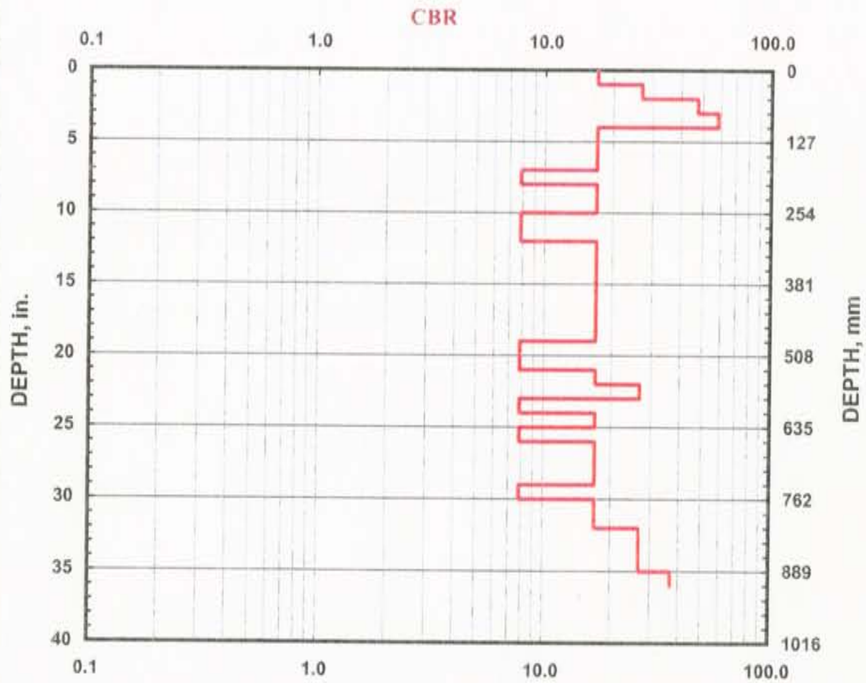
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

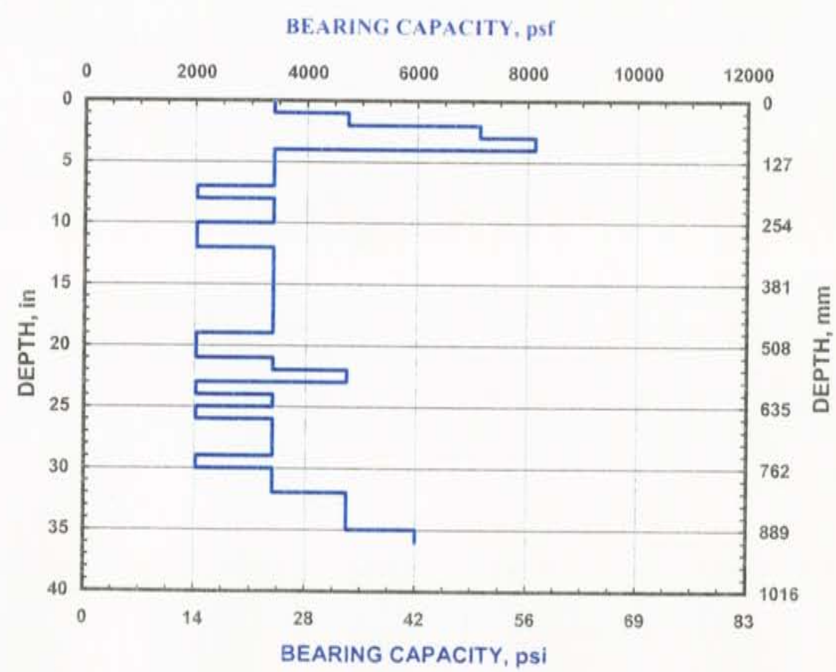
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
3	51	1	2.0
5	76	1	3.0
6	102	1	4.0
2	127	1	5.0
2	152	1	6.0
2	178	1	7.0
1	203	1	8.0
2	229	1	9.0
2	254	1	10.0
1	279	1	11.0
1	305	1	12.0
2	330	1	13.0
2	356	1	14.0
2	381	1	15.0
2	406	1	16.0
2	432	1	17.0
2	457	1	18.0
2	483	1	19.0
1	508	1	20.0
1	533	1	21.0
2	559	1	22.0
3	584	1	23.0
1	610	1	24.0
2	635	1	25.0
1	660	1	26.0
2	686	1	27.0
2	711	1	28.0
2	737	1	29.0
1	762	1	30.0
2	787	1	31.0
2	813	1	32.0
3	838	1	33.0
3	864	1	34.0
3	889	1	35.0
4	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-19

Project: *Saddleback Windfarm*
Location: White Salmon, WA

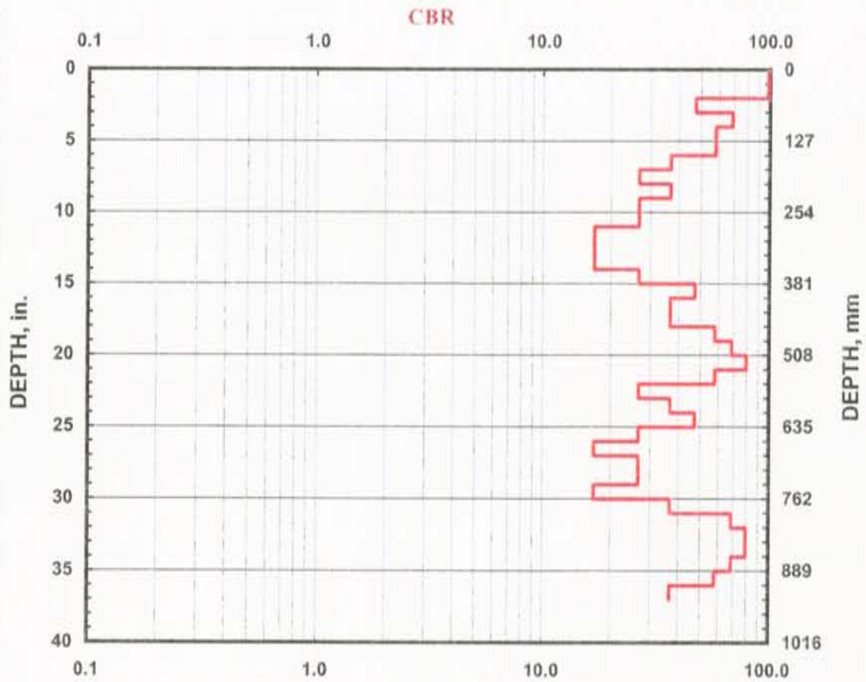
Date: 7/3/2007
Project No.: 33758687
Start: 0 feet bgs

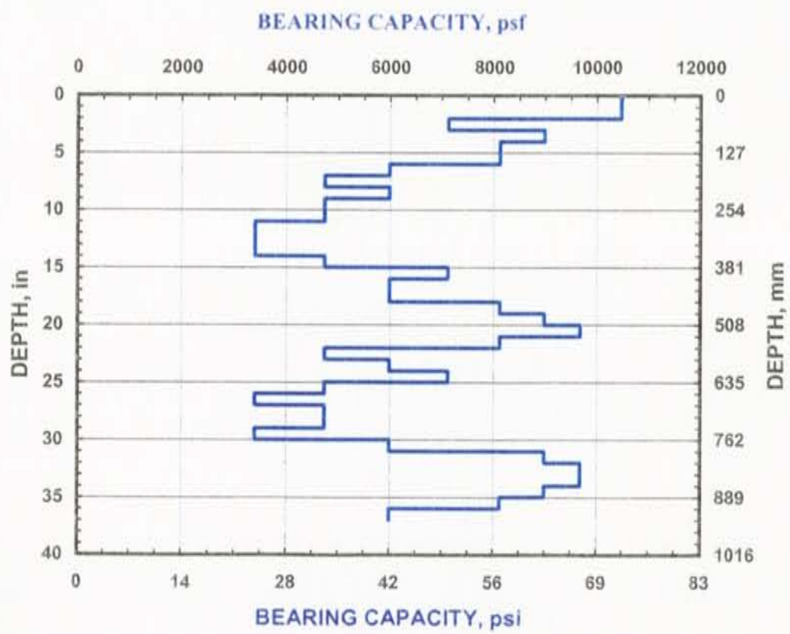
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
12	25	1	1.0
10	51	1	2.0
5	76	1	3.0
7	102	1	4.0
6	127	1	5.0
6	152	1	6.0
4	178	1	7.0
3	203	1	8.0
4	229	1	9.0
3	254	1	10.0
3	279	1	11.0
2	305	1	12.0
2	330	1	13.0
2	356	1	14.0
3	381	1	15.0
5	406	1	16.0
4	432	1	17.0
4	457	1	18.0
6	483	1	19.0
7	508	1	20.0
8	533	1	21.0
6	559	1	22.0
3	584	1	23.0
4	610	1	24.0
5	635	1	25.0
3	660	1	26.0
2	686	1	27.0
3	711	1	28.0
3	737	1	29.0
2	762	1	30.0
4	787	1	31.0
7	813	1	32.0
8	838	1	33.0
8	864	1	34.0
7	889	1	35.0
6	914	1	36.0
4	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-20

Project: Saddleback Windfarm
Location: White Salmon, WA

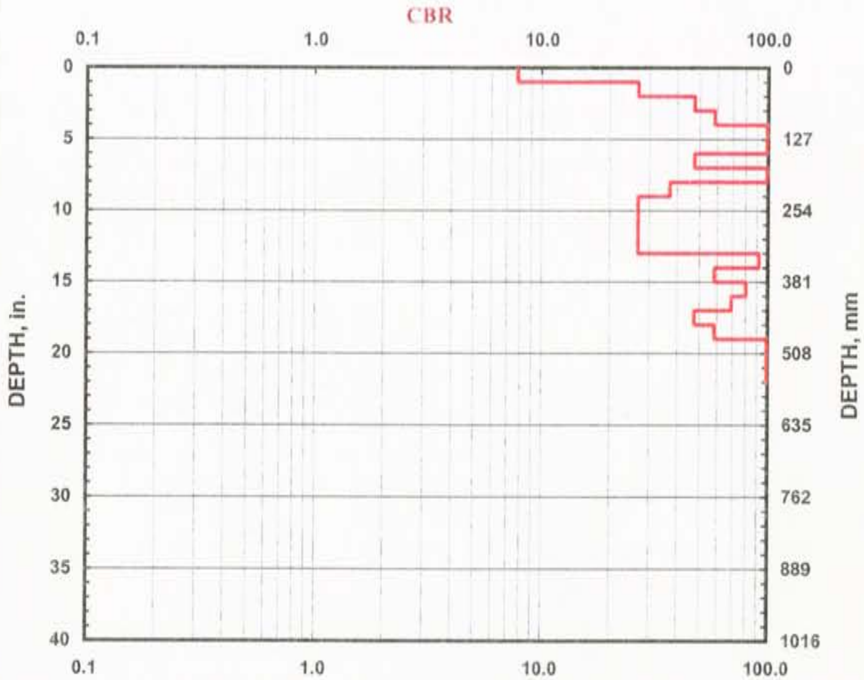
Date: 7/3/2007
Project No.: 33758687
Start: 0 feet bgs

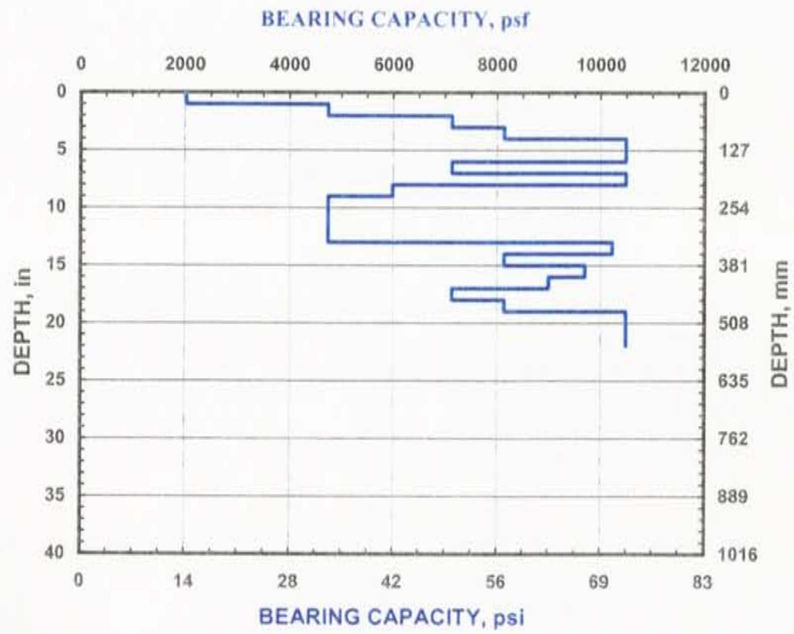
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
1	25	1	1.0
3	51	1	2.0
5	76	1	3.0
6	102	1	4.0
15	127	1	5.0
13	152	1	6.0
5	178	1	7.0
10	203	1	8.0
4	229	1	9.0
3	254	1	10.0
3	279	1	11.0
3	305	1	12.0
3	330	1	13.0
9	356	1	14.0
6	381	1	15.0
8	406	1	16.0
7	432	1	17.0
5	457	1	18.0
6	483	1	19.0
10	508	1	20.0
20	533	1	21.0
50	559	1	22.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-21

Project: *Saddleback Windfarm*
Location: White Salmon, WA

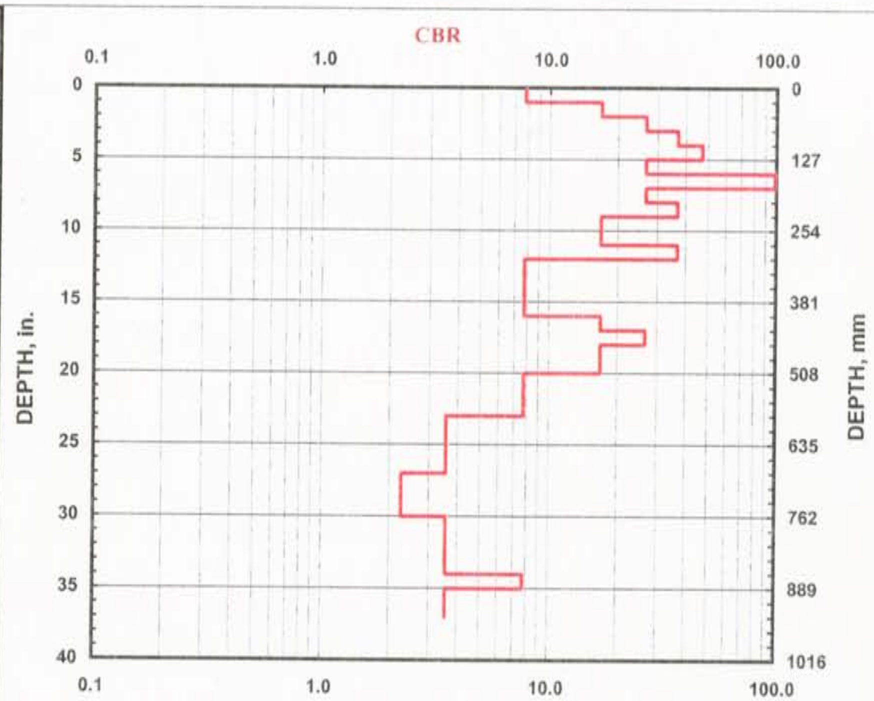
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

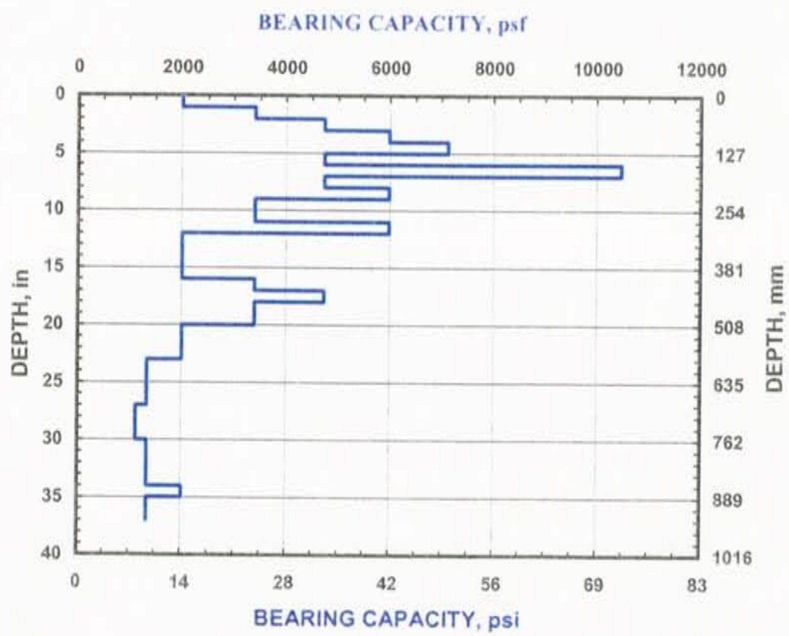
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
1	25	1	1.0
2	51	1	2.0
3	76	1	3.0
4	102	1	4.0
5	127	1	5.0
3	152	1	6.0
11	178	1	7.0
3	203	1	8.0
4	229	1	9.0
2	254	1	10.0
2	279	1	11.0
4	305	1	12.0
1	330	1	13.0
1	356	1	14.0
1	381	1	15.0
1	406	1	16.0
2	432	1	17.0
3	457	1	18.0
2	483	1	19.0
2	508	1	20.0
1	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	635	1	25.0
1	686	1	27.0
1	762	1	30.0
1	813	1	32.0
1	864	1	34.0
1	889	1	35.0
1	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-22

Project: *Saddleback Windfarm*
Location: White Salmon, WA

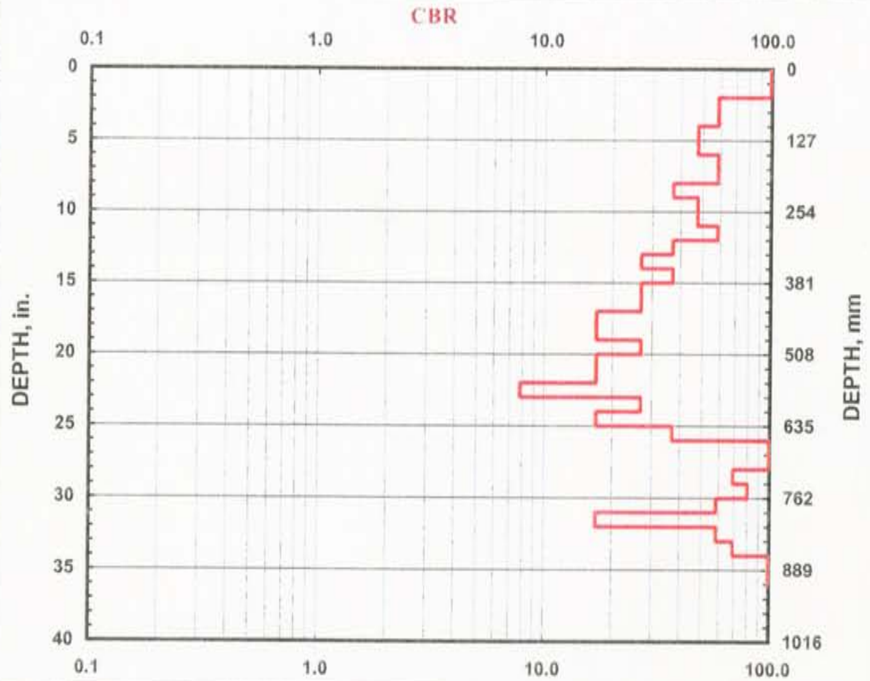
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

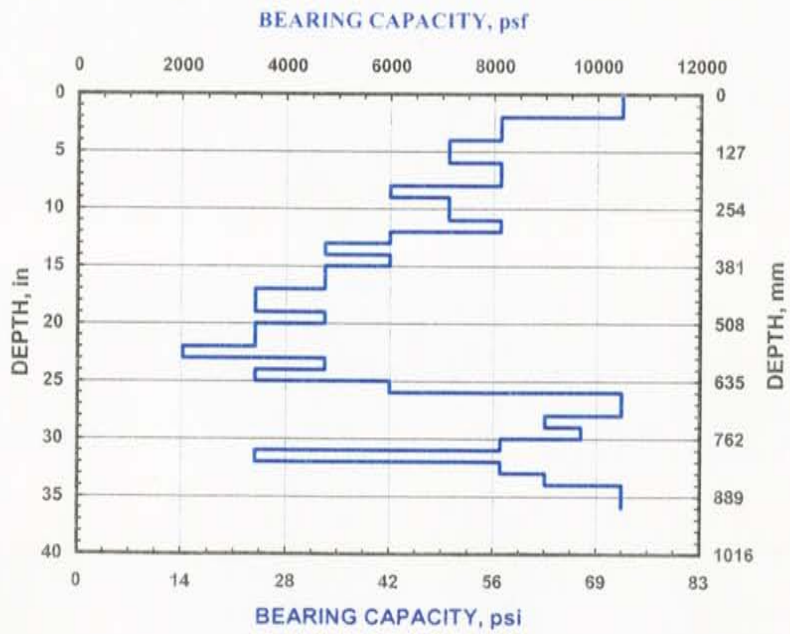
Hammer
○ 10.1 lbs.
◉ 17.6 lbs.
○ Both hammers used

Soil Type
○ CH
○ CL
◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
15	25	1	1.0
10	51	1	2.0
6	76	1	3.0
6	102	1	4.0
5	127	1	5.0
5	152	1	6.0
6	178	1	7.0
6	203	1	8.0
4	229	1	9.0
5	254	1	10.0
5	279	1	11.0
6	305	1	12.0
4	330	1	13.0
3	356	1	14.0
4	381	1	15.0
3	406	1	16.0
3	432	1	17.0
2	457	1	18.0
2	483	1	19.0
3	508	1	20.0
2	533	1	21.0
2	559	1	22.0
1	584	1	23.0
3	610	1	24.0
2	635	1	25.0
4	660	1	26.0
12	686	1	27.0
12	711	1	28.0
7	737	1	29.0
8	762	1	30.0
6	787	1	31.0
2	813	1	32.0
6	838	1	33.0
7	864	1	34.0
15	889	1	35.0
15	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-23

Project: *Saddleback Windfarm*
Location: White Salmon, WA

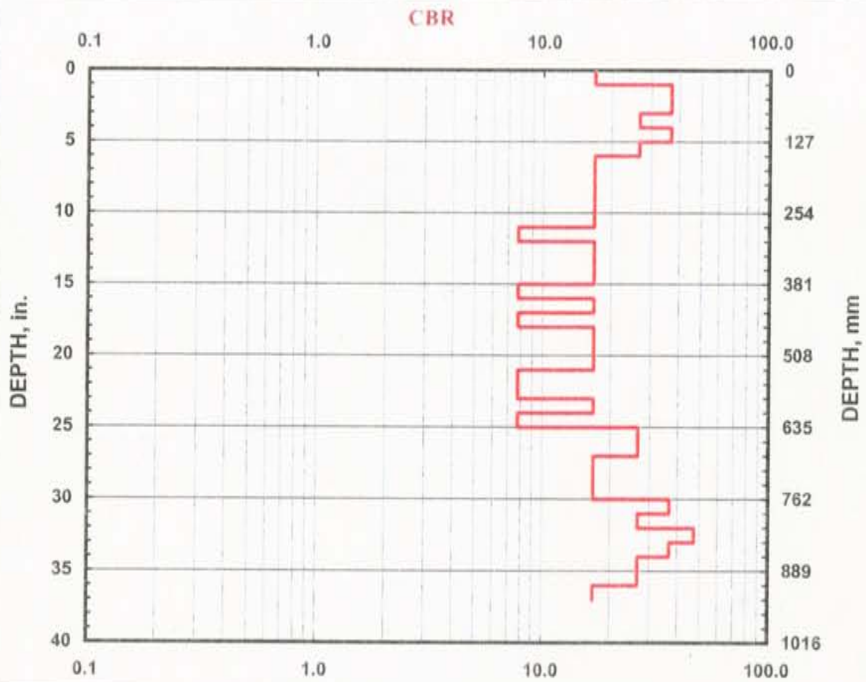
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

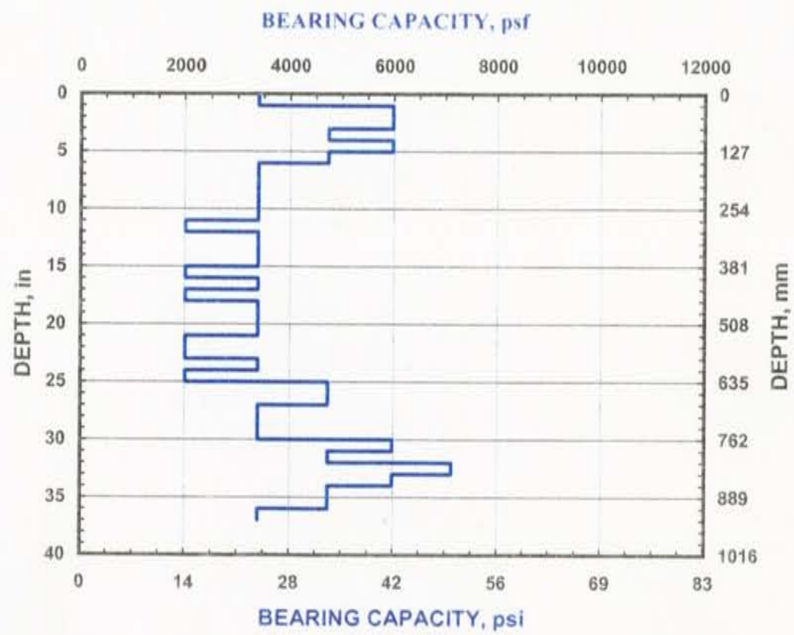
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
4	51	1	2.0
4	76	1	3.0
3	102	1	4.0
4	127	1	5.0
3	152	1	6.0
2	178	1	7.0
2	203	1	8.0
2	229	1	9.0
2	254	1	10.0
2	279	1	11.0
1	305	1	12.0
2	330	1	13.0
2	356	1	14.0
2	381	1	15.0
1	406	1	16.0
2	432	1	17.0
1	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
2	610	1	24.0
1	635	1	25.0
3	660	1	26.0
3	686	1	27.0
2	711	1	28.0
2	737	1	29.0
2	762	1	30.0
4	787	1	31.0
3	813	1	32.0
5	838	1	33.0
4	864	1	34.0
3	889	1	35.0
3	914	1	36.0
2	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-24

Project: Saddleback Windfarm
Location: White Salmon, WA

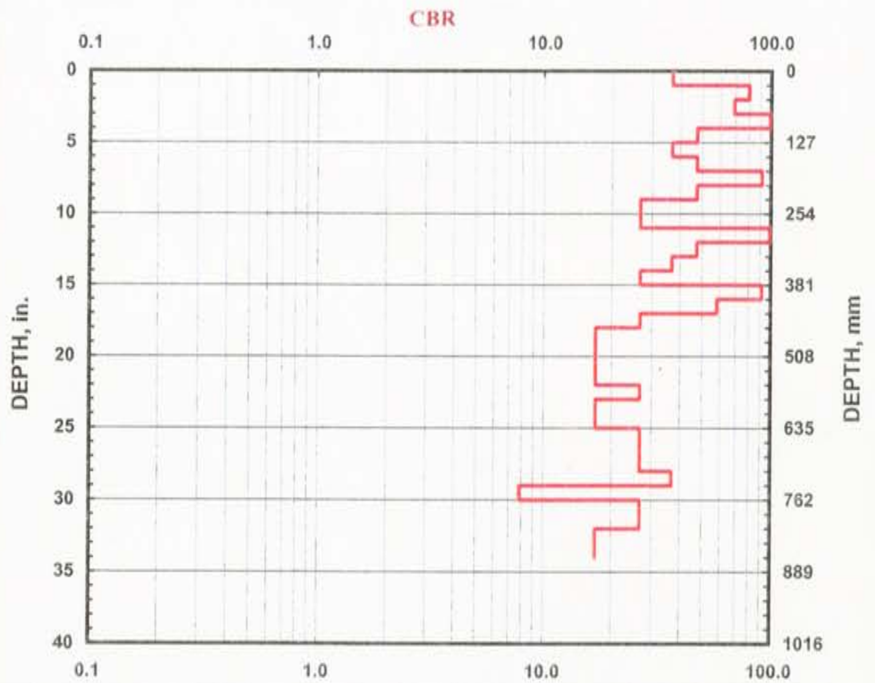
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

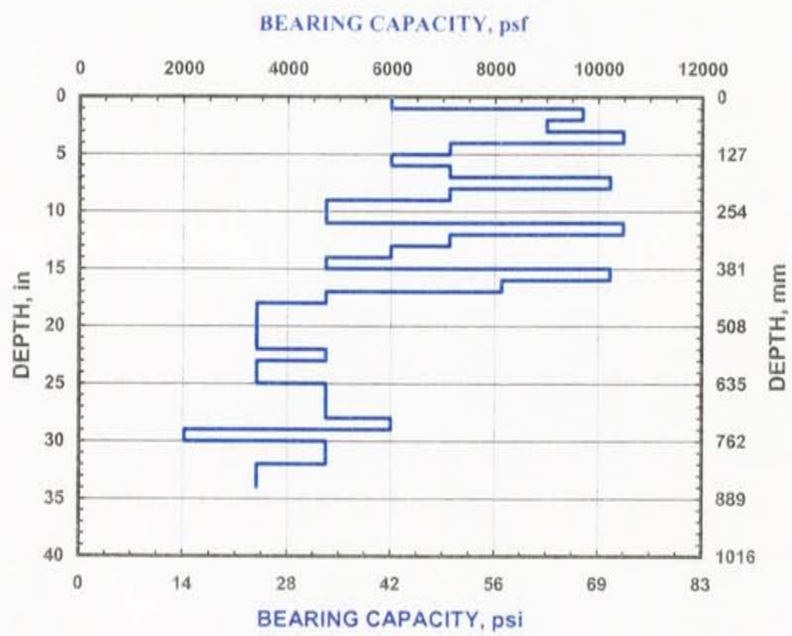
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
4	25	1	1.0
8	51	1	2.0
7	76	1	3.0
10	102	1	4.0
5	127	1	5.0
4	152	1	6.0
5	178	1	7.0
9	203	1	8.0
5	229	1	9.0
3	254	1	10.0
3	279	1	11.0
10	305	1	12.0
5	330	1	13.0
4	356	1	14.0
3	381	1	15.0
9	406	1	16.0
6	432	1	17.0
3	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
2	559	1	22.0
3	584	1	23.0
2	610	1	24.0
2	635	1	25.0
3	660	1	26.0
3	686	1	27.0
3	711	1	28.0
4	737	1	29.0
1	762	1	30.0
3	787	1	31.0
3	813	1	32.0
2	838	1	33.0
2	864	1	34.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-25

Project: Saddleback Windfarm
Location: White Salmon, WA

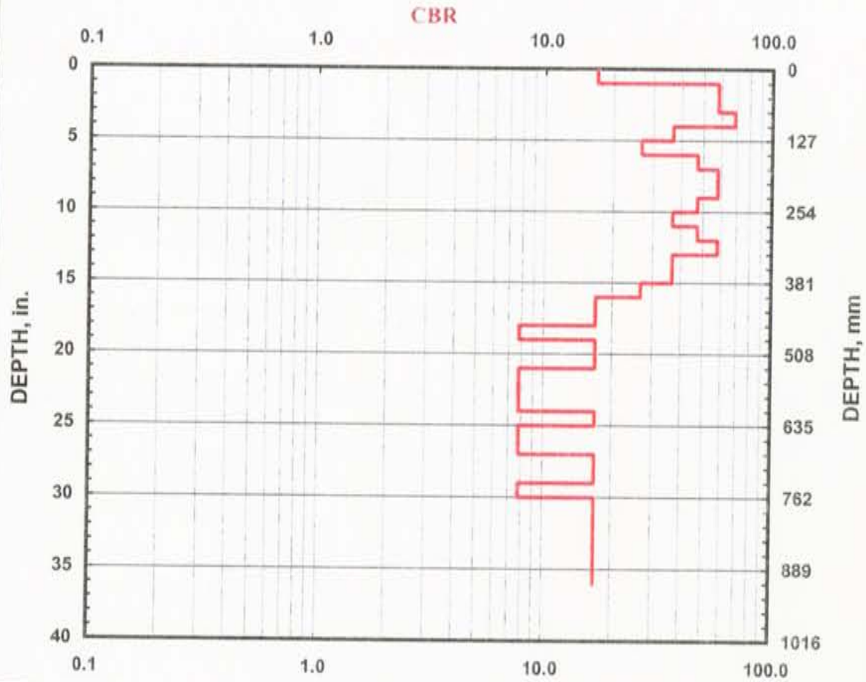
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

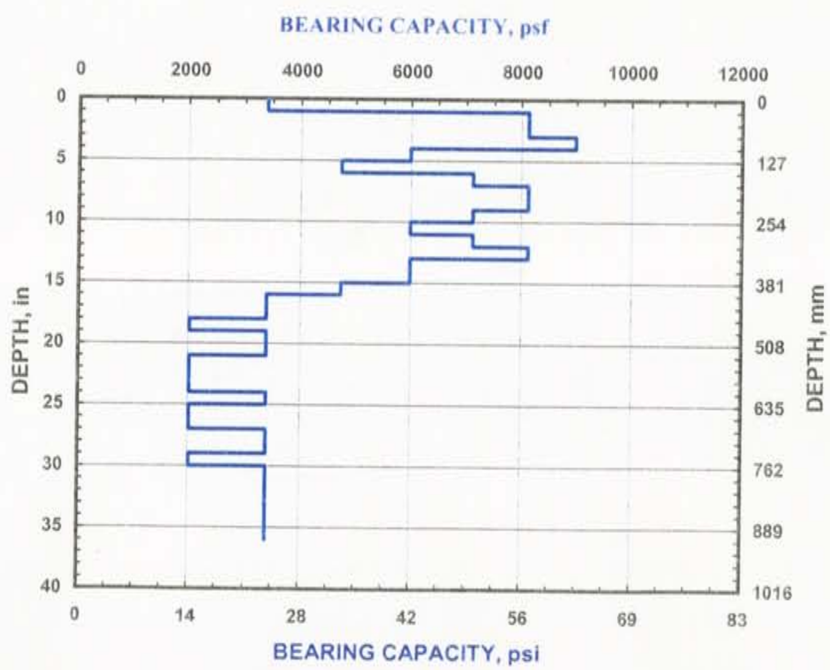
Hammer: ○ 10.1 lbs. ◉ 17.6 lbs. ○ Both hammers used

Soil Type: ○ CH ○ CL ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
2	25	1	1.0
6	51	1	2.0
6	76	1	3.0
7	102	1	4.0
4	127	1	5.0
3	152	1	6.0
5	178	1	7.0
6	203	1	8.0
6	229	1	9.0
5	254	1	10.0
4	279	1	11.0
5	305	1	12.0
6	330	1	13.0
4	356	1	14.0
4	381	1	15.0
3	406	1	16.0
2	432	1	17.0
2	457	1	18.0
1	483	1	19.0
2	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
2	635	1	25.0
1	660	1	26.0
1	686	1	27.0
2	711	1	28.0
2	737	1	29.0
1	762	1	30.0
2	787	1	31.0
2	813	1	32.0
2	838	1	33.0
2	864	1	34.0
2	889	1	35.0
2	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA
DCP-26

Project: *Saddleback Windfarm*
Location: White Salmon, WA

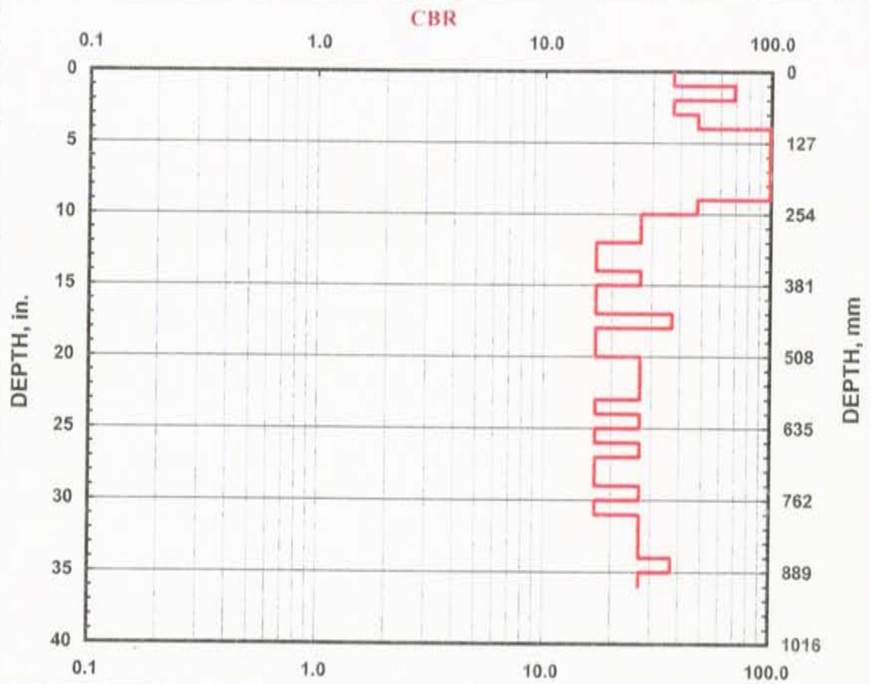
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

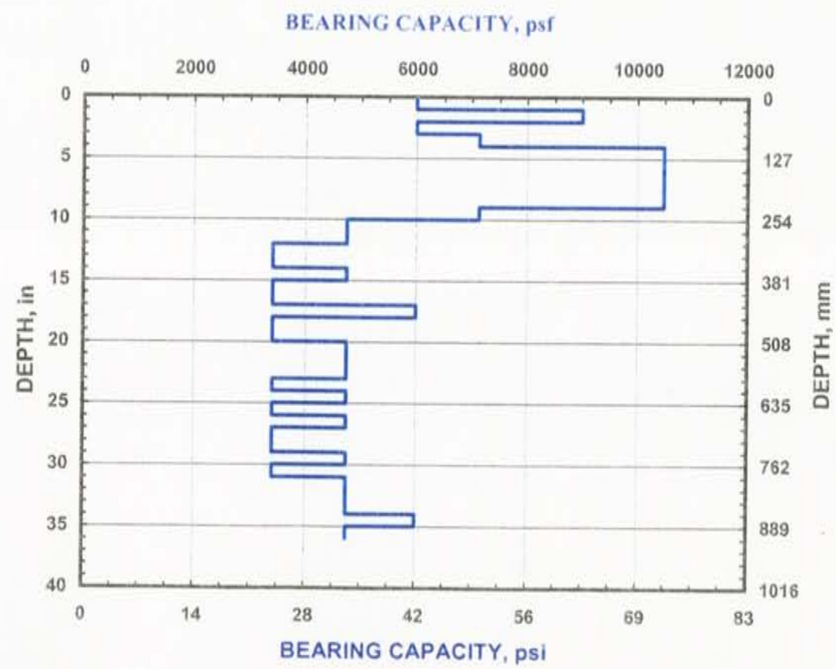
Hammer
○ 10.1 lbs.
◉ 17.6 lbs.
○ Both hammers used

Soil Type
○ CH
○ CL
◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
4	25	1	1.0
7	51	1	2.0
4	76	1	3.0
5	102	1	4.0
21	127	1	5.0
18	152	1	6.0
21	178	1	7.0
19	203	1	8.0
12	229	1	9.0
5	254	1	10.0
3	279	1	11.0
3	305	1	12.0
2	330	1	13.0
2	356	1	14.0
3	381	1	15.0
2	406	1	16.0
2	432	1	17.0
4	457	1	18.0
2	483	1	19.0
2	508	1	20.0
3	533	1	21.0
3	559	1	22.0
3	584	1	23.0
2	610	1	24.0
3	635	1	25.0
2	660	1	26.0
3	686	1	27.0
2	711	1	28.0
2	737	1	29.0
3	762	1	30.0
2	787	1	31.0
3	813	1	32.0
3	838	1	33.0
3	864	1	34.0
4	889	1	35.0
3	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-27

Project: Saddleback Windfarm
Location: White Salmon, WA

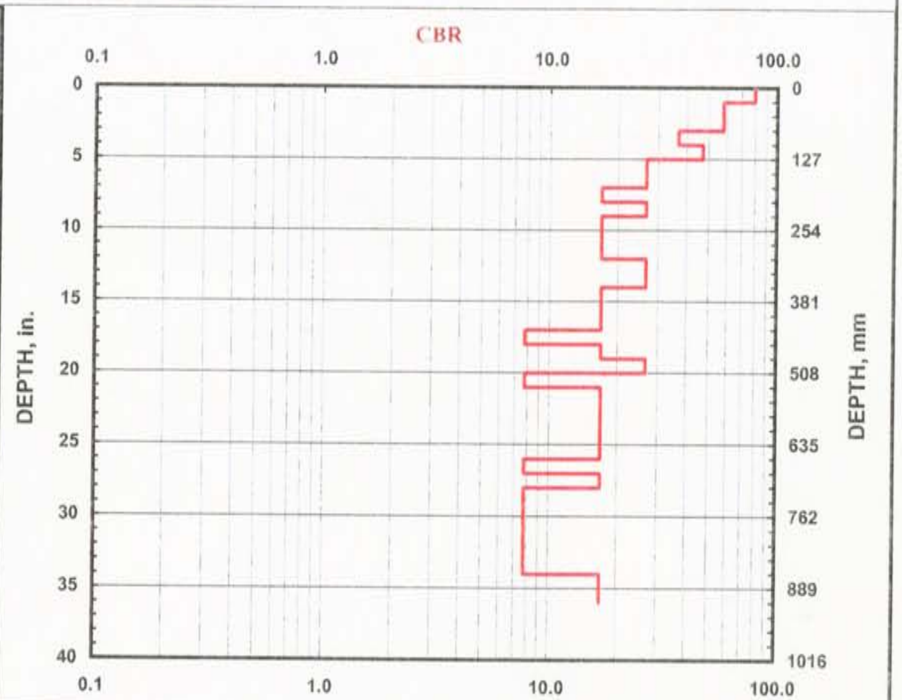
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

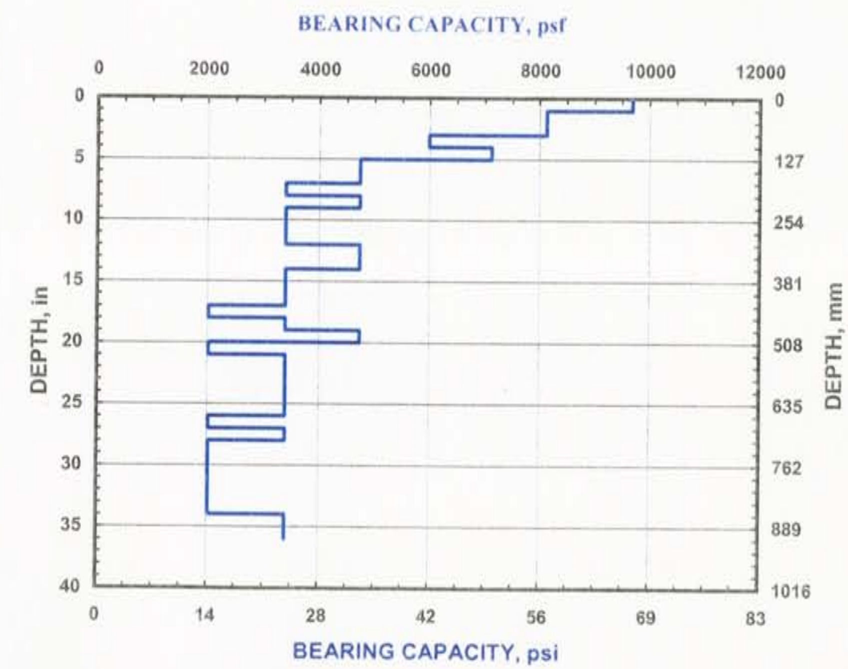
Hammer: ○ 10.1 lbs. ◉ 17.6 lbs. ○ Both hammers used

Soil Type: ○ CH ○ CL ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
8	25	1	1.0
6	51	1	2.0
6	76	1	3.0
4	102	1	4.0
5	127	1	5.0
3	152	1	6.0
3	178	1	7.0
2	203	1	8.0
3	229	1	9.0
2	254	1	10.0
2	279	1	11.0
2	305	1	12.0
3	330	1	13.0
3	356	1	14.0
2	381	1	15.0
2	406	1	16.0
2	432	1	17.0
1	457	1	18.0
2	483	1	19.0
3	508	1	20.0
1	533	1	21.0
2	559	1	22.0
2	584	1	23.0
2	610	1	24.0
2	635	1	25.0
2	660	1	26.0
1	686	1	27.0
2	711	1	28.0
1	737	1	29.0
1	762	1	30.0
1	787	1	31.0
1	813	1	32.0
1	838	1	33.0
1	864	1	34.0
2	889	1	35.0
2	914	1	36.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-28

Project: *Saddleback Windfarm*
Location: White Salmon, WA

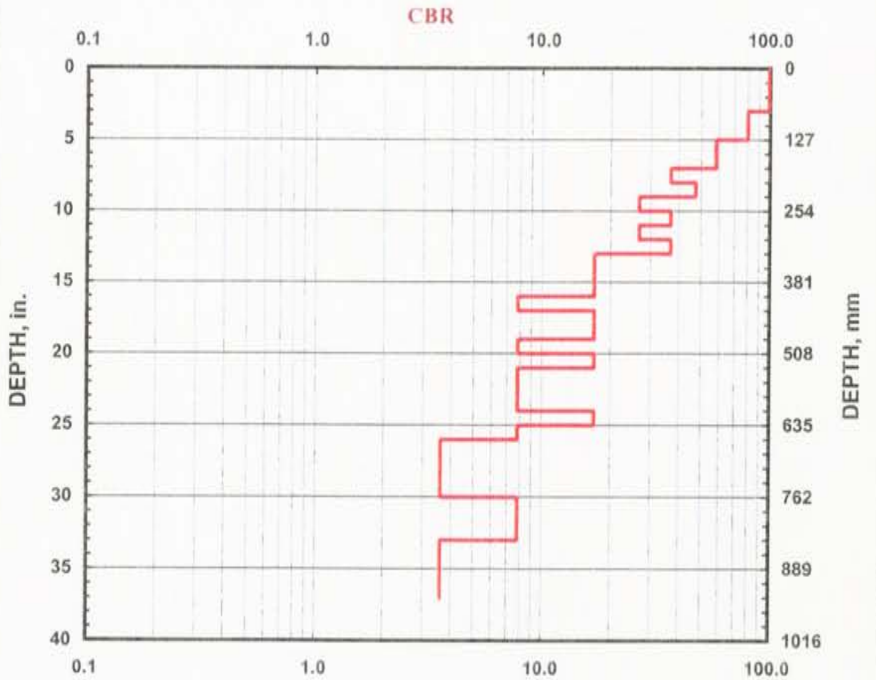
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

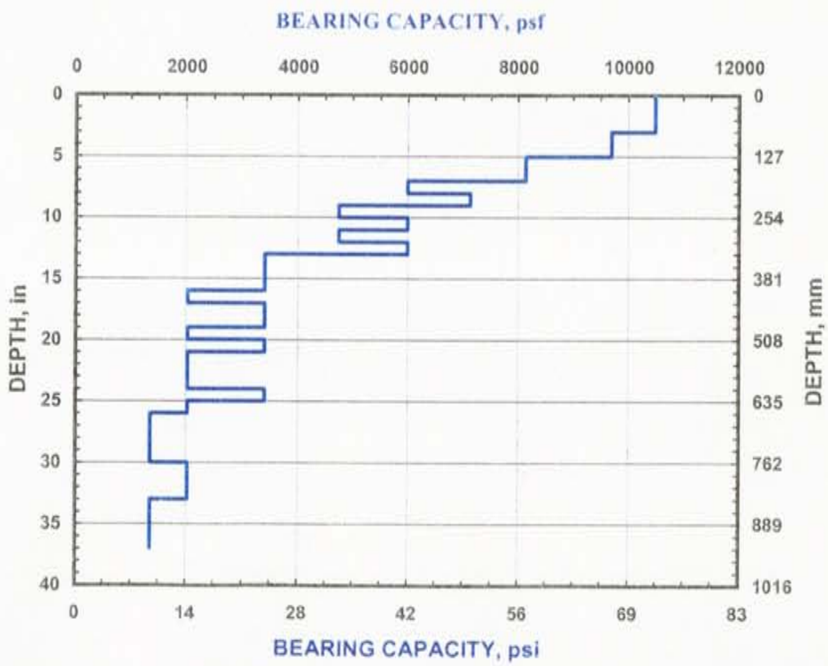
Hammer
○ 10.1 lbs.
◉ 17.6 lbs.
○ Both hammers used

Soil Type
○ CH
○ CL
◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
12	25	1	1.0
14	51	1	2.0
15	76	1	3.0
8	102	1	4.0
8	127	1	5.0
6	152	1	6.0
6	178	1	7.0
4	203	1	8.0
5	229	1	9.0
3	254	1	10.0
4	279	1	11.0
3	305	1	12.0
4	330	1	13.0
2	356	1	14.0
2	381	1	15.0
2	406	1	16.0
1	432	1	17.0
2	457	1	18.0
2	483	1	19.0
1	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
2	635	1	25.0
1	660	1	26.0
1	711	1	28.0
1	762	1	30.0
1	787	1	31.0
1	813	1	32.0
1	838	1	33.0
1	889	1	35.0
1	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-29

Project: *Saddleback Windfarm*
Location: White Salmon, WA

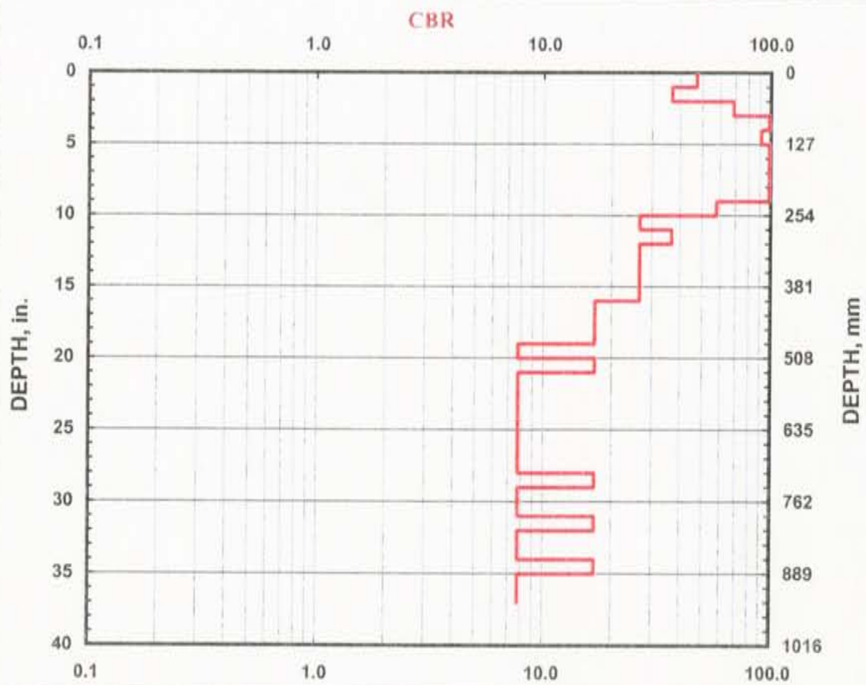
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

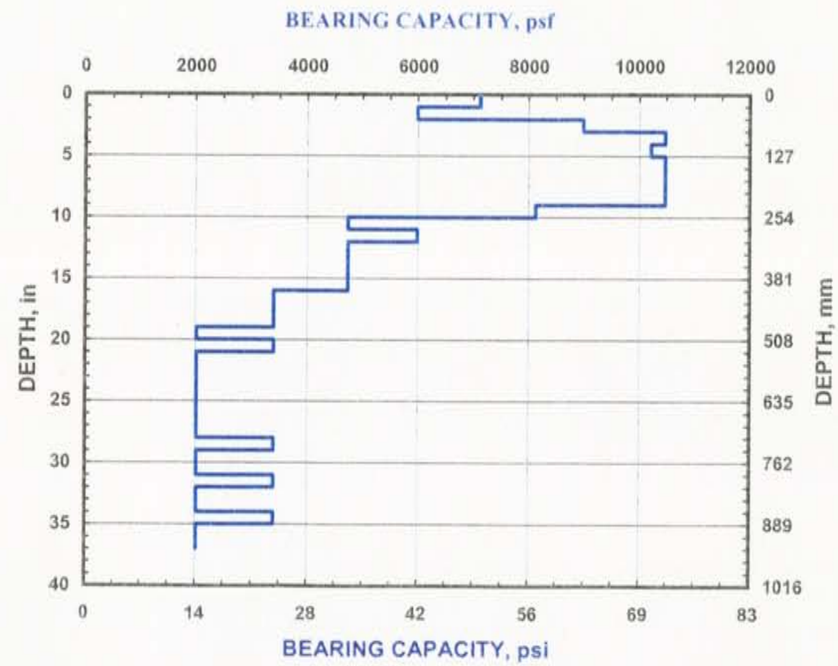
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
5	25	1	1.0
4	51	1	2.0
7	76	1	3.0
11	102	1	4.0
9	127	1	5.0
10	152	1	6.0
14	178	1	7.0
13	203	1	8.0
19	229	1	9.0
6	254	1	10.0
3	279	1	11.0
4	305	1	12.0
3	330	1	13.0
3	356	1	14.0
3	381	1	15.0
3	406	1	16.0
2	432	1	17.0
2	457	1	18.0
2	483	1	19.0
1	508	1	20.0
2	533	1	21.0
1	559	1	22.0
1	584	1	23.0
1	610	1	24.0
1	635	1	25.0
1	660	1	26.0
1	686	1	27.0
1	711	1	28.0
2	737	1	29.0
1	762	1	30.0
1	787	1	31.0
2	813	1	32.0
1	838	1	33.0
1	864	1	34.0
2	889	1	35.0
1	914	1	36.0
1	940	1	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





DCP TEST DATA

DCP-30

Project: Saddleback Windfarm
Location: White Salmon, WA

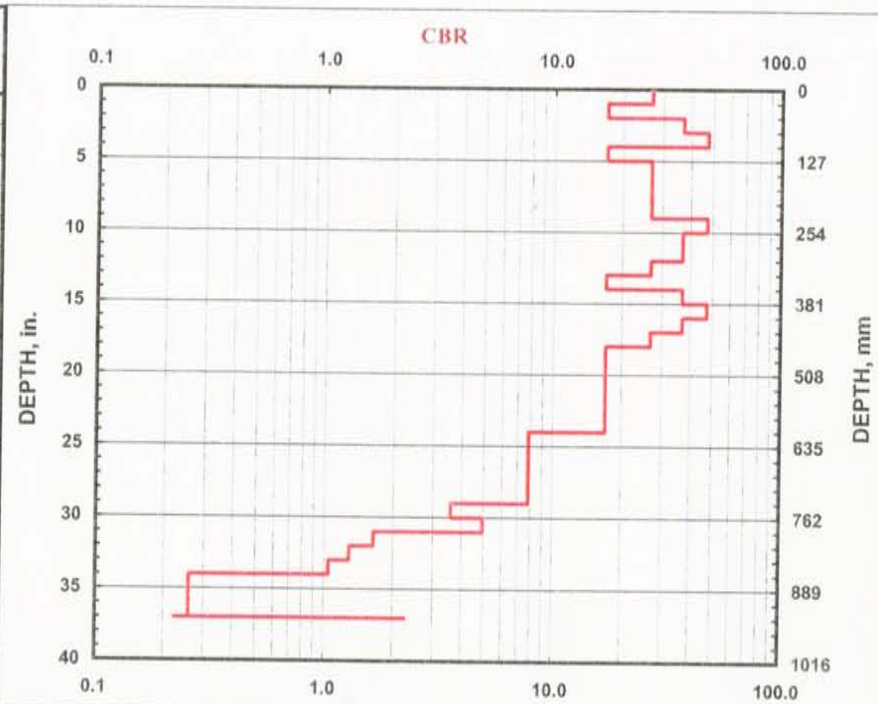
Date: 9/25/2007
Project No.: 33758687
Start: 0 feet bgs

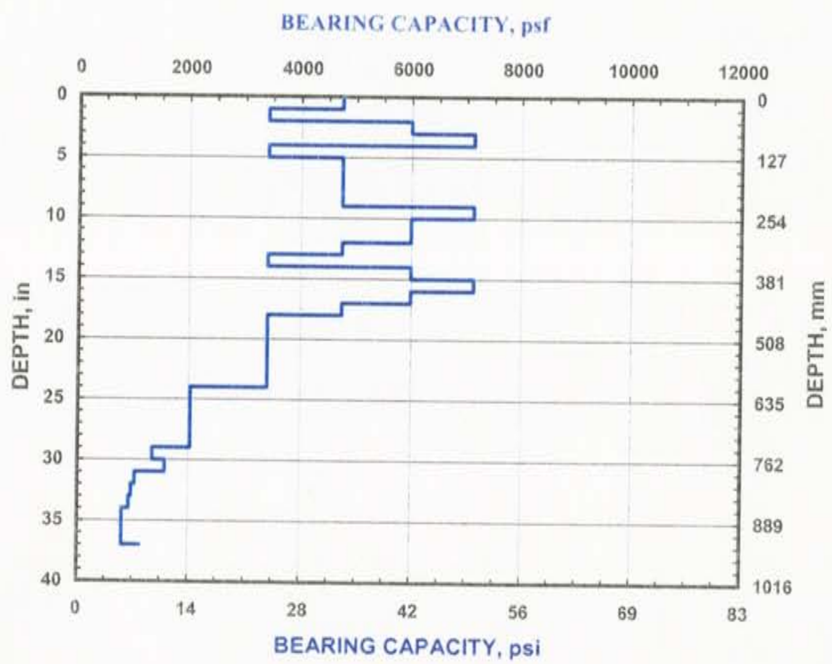
Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer	Scale Reading (in)
			0.0
3	25	1	1.0
2	51	1	2.0
4	76	1	3.0
5	102	1	4.0
2	127	1	5.0
3	152	1	6.0
3	178	1	7.0
3	203	1	8.0
3	229	1	9.0
5	254	1	10.0
4	279	1	11.0
4	305	1	12.0
3	330	1	13.0
2	356	1	14.0
4	381	1	15.0
5	406	1	16.0
4	432	1	17.0
3	457	1	18.0
2	483	1	19.0
2	508	1	20.0
2	533	1	21.0
2	559	1	22.0
2	584	1	23.0
2	610	1	24.0
1	635	1	25.0
1	660	1	26.0
1	686	1	27.0
1	711	1	28.0
1	737	2	29.0
1	762	3	30.0
2	787	4	31.0
1	813	5	32.0
1	838	6	33.0
1	864	7	34.0
1	940	8	37.0

Bearing Capacity based on correlations of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)





APPENDIX D
LANDSLIDE HAZARDS

LANDSLIDE HAZARDS REPORT

Pursuant to Skamania County Code, Title 21A, Chapter 21A.06 - Landslide Hazard Areas, URS has conducted a preliminary landslide hazard evaluation of the proposed Saddleback Wind Energy (SWE) project wind turbine site. The project location is shown on Figure C-1.

Landslide Hazard Report Methodology

A URS Licensed Engineering Geologist conducted a site specific landslide hazard investigation. The investigation consisted of:

- Review of Sections of the County Code that address Geologically Hazardous Areas;
- Review of existing available topographic, geologic and soils literature and maps;
- Analysis of project-specific stereo aerial photographs;
- Review of project test pit logs and soil samples;
- A one day site reconnaissance.

According to the County Code, the primary criteria for landslide hazard designations are: presence of pre-existing, known mappable landslides; slope angle; and/or composition of the near-surface soils or rock.

URS has created a color-coded map of the study area using an existing USGS 10 meter digital terrain model (DTM) to segregate slopes into three categories: slopes less than 20%; slopes between 20% and 30%; and slopes greater than 30%. We then superimposed the United States Department of Agriculture, National Resources Conservation Services (NRCS) soil survey map onto the slope map to provide soil type information. The resulting Landslide Hazard Map is presented herein as Figure C-1.

Landslide Hazard Area Delineation

Skamania County recognizes three classes of landslide hazard areas (LHAs). Class I (Severe) LHAs are considered to present a severe landslide hazard and are distinguished as areas of known mappable landslide deposits which have been designated landslide hazard areas by the local legislative body. Class II (High) LHAs are areas with slopes between twenty and thirty percent that are underlain by soils that consist largely of silt, clay or bedrock, and all areas with slopes greater than thirty percent. Class III (Moderate) LHAs are areas with slopes between twenty percent and thirty percent not included in Class II.

URS reviewed available geologic and soils literature to develop a landslide hazard classification for the proposed SWE project. An existing published regional geologic map (partially recreated in Figure 3 of the main text of this report) indicates a large landslide in the northeast corner of the study area underlying Tower Line 'C'. Review of stereo photographs of the area where the landslide deposits are mapped, coupled with a site reconnaissance, indicate that there is little geomorphic evidence for landslide activity such as obvious scarps, hummocky or benched terrain, lobate toe areas, or redirected watercourses. No deep subsurface investigations have been carried out at the site to date, but future explorations in support of design for the turbine tower foundations will provide subsurface information that will provide information regarding the presence, or lack of, landslide deposits in the area. Based on our preliminary investigation, there does not appear to be any area of the site that meets Skamania County's criteria for a (Class I) LHA.

Class II LHAs are shown in red on Figure C-1. The Class II LHAs at the site are predominantly associated with the steep slopes to the west of proposed Tower Lines 'A' and 'B'. There are also steep slopes to the east of the 7 southernmost 'A' Line towers, and on both sides of Tower Line 'C'.

Although none of the proposed turbines are located within Class II LHAs, several of the towers along the western side of the project site (Tower Lines 'A' and 'B') are located along ridgelines with descending slopes that are locally greater than 35 degrees (70%). The heads of some of the drainages along these slopes are arcuate indicating possible mass-wasting activity such as landslides, debris flows, and / or earthflows.

Based on aerial photo and field observations, the primary mass wasting process below the ridgelines appears to be debris flows and soil creep. No evidence for deep-seated, block failure type landslides was observed. Local surficial creep of near-surface soils is indicated by the presence of pistol-butted trees on some of the slopes, primarily on the descending slope west of the northern portion of Tower Line 'A'. Other slopes have mature conifer stands that indicated little or no soil creep. Further subsurface investigation in support of final tower foundation design will help determine if there are weak rock or soil layers that could contribute to more deep-seated failure of the ridges and provide information on the quality of the rock mass underlying the ridgelines.

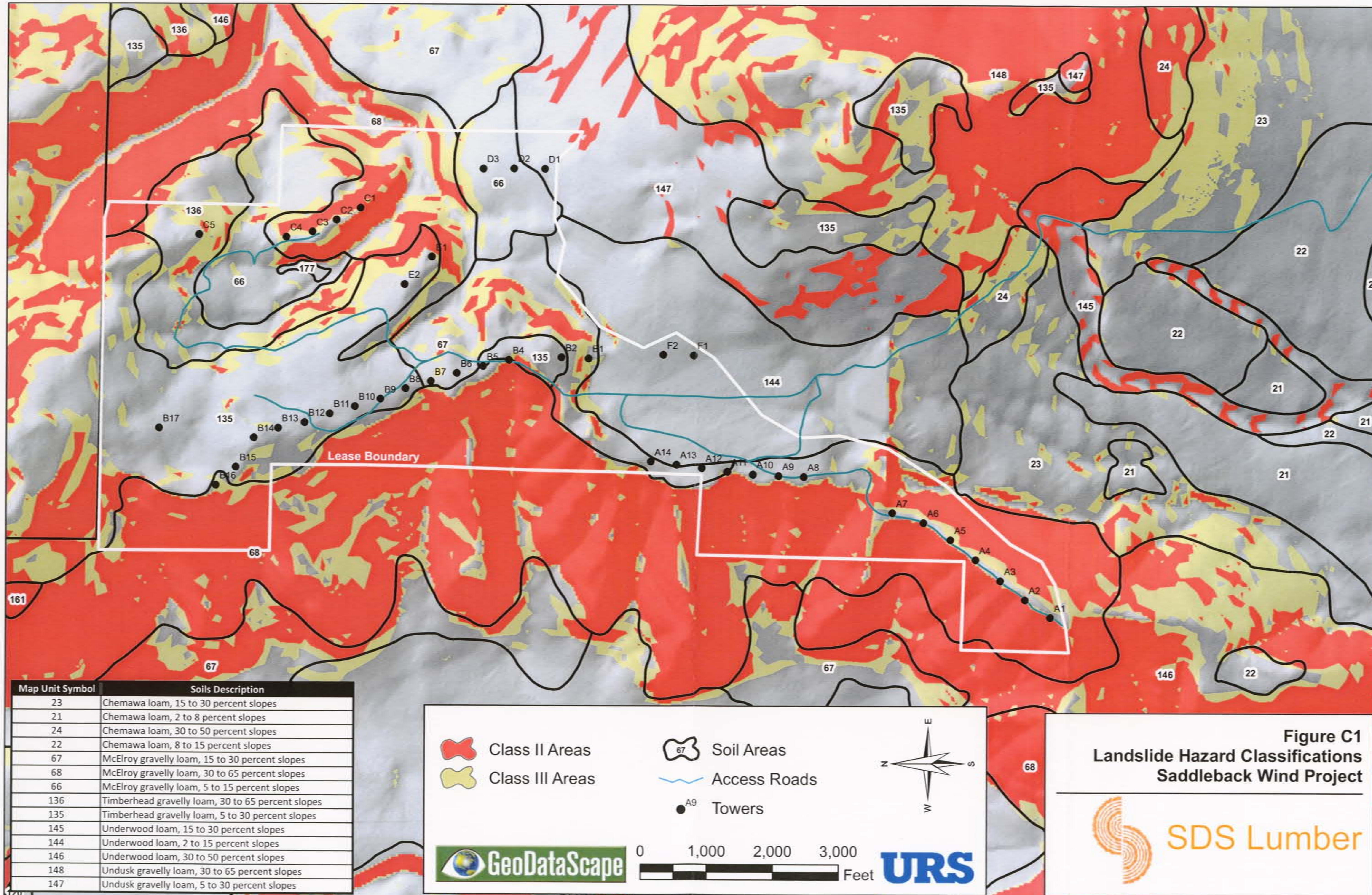
It appears that the primary concern for towers located adjacent to the Class II LHAs is the potential for headward erosion of the steep drainages by debris or earth flow processes. Erosion rates of these drainages are unknown, but no obvious recent mass wasting features were observed in the aerial photos or during the site reconnaissance.

Class III LHAs have been delineated adjacent to proposed wind turbines along the southern 'A' Line, and the 'C' Line. Class I LHAs are not anticipated to have any impact on the proposed facilities due to the robust nature of the proposed foundation designs.

Conclusions and Recommendations

URS has conducted a Landslide Hazard Evaluation for the proposed SWE wind farm project in Southeast Skamania County. The evaluation has identified several areas where the proposed wind turbine generators are located adjacent to slopes that meet Skamania County's criteria for Class II and Class III Landslide Hazard Areas. The primary hazard to the proposed towers appears to be the potential for exposure to headward erosion of steep drainages on the slopes below some of the tower locations. Exposure of the towers to headward erosion of the steep slope drainages can be minimized by providing maximum possible setbacks from the tops of the steep slopes and / or by siting the turbines along portions of the ridgelines that are above intervening spur ridges. The most critical area of exposure to Class II LHAs is the narrow ridge at the southern portion of the 'A' Line.

It is URS's opinion that the proposed SWE facilities can be constructed and operated without danger to human life or the surrounding environment due to landslide hazards.



Map Unit Symbol	Soils Description
23	Chemawa loam, 15 to 30 percent slopes
21	Chemawa loam, 2 to 8 percent slopes
24	Chemawa loam, 30 to 50 percent slopes
22	Chemawa loam, 8 to 15 percent slopes
67	McElroy gravelly loam, 15 to 30 percent slopes
68	McElroy gravelly loam, 30 to 65 percent slopes
66	McElroy gravelly loam, 5 to 15 percent slopes
136	Timberhead gravelly loam, 30 to 65 percent slopes
135	Timberhead gravelly loam, 5 to 30 percent slopes
145	Underwood loam, 15 to 30 percent slopes
144	Underwood loam, 2 to 15 percent slopes
146	Underwood loam, 30 to 50 percent slopes
148	Undusk gravelly loam, 30 to 65 percent slopes
147	Undusk gravelly loam, 5 to 30 percent slopes

Figure C1
Landslide Hazard Classifications
Saddleback Wind Project

BONNEVILLE POWER ADMINISTRATION

DOE/BP-4317 ▪ August 2011