EXHIBIT M

FINANCIAL ANALYSIS
OAR 345-021-0010(1)(m)

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M.1 INTRODUCTION

OAR 345-021-0010(1)(m) *Information about the Applicant's financial capability, providing evidence to support a finding by the Council as required by OAR 345-022-0050(2). Nothing in this subsection shall require the disclosure of information or records protected from public disclosure by any provision of state or federal law. The Applicant shall include:*

M.2 OPINION OF LEGAL COUNSEL

OAR 345-021-0010(1)(m)(A) *An opinion or opinions from legal counsel stating that, to counsel's best knowledge, the Applicant has the legal authority to construct and operate the facility without violating its bond indenture provisions, articles of incorporation, common stock covenants, or similar agreements;*

Response: The legal opinion is attached as M-1.

M.3 BOND, SECURITY, OR OTHER FINANCIAL INSTRUMENT

OAR 345-021-0010(1)(m)(B) *The type and amount of the Applicant's proposed bond or letter of credit to meet the requirements of OAR 345-022-0050; and*

Response: The Applicant proposes to, prior to construction of the Facility; obtain a letter of credit in an amount up to $9,000,000 to meet the required financial security instrument.

M.4 EVIDENCE OF REASONABLE LIKELIHOOD OF OBTAINING SECURITY

OAR 345-021-0010(1)(m)(C) *Evidence that the Applicant has a reasonable likelihood of obtaining the proposed bond or letter of credit in the amount proposed in paragraph (B), before beginning construction of the facility.*

Response: A comfort letter from the Bank of America is attached; it expresses interest in providing a letter of credit in the amount of up to $9,000,000, subject to their due diligence requirements.

ATTACHMENT M-1
LEGAL OPINION

BALL JANIK LLP

ATTORNEYS

101 SOUTHWEST MAIN STREET, SUITE 1100
PORTLAND, OREGON 97204-3219

www.balljanik.com

TELEPHONE 503-228-2525
FACSIMILE 503-295-1058

September 28, 2009

Oregon Department of Energy
625 Marion Street NE
Salem, OR 97310

Re: Application of LotusWorks-Summit Ridge I, LLC to EFSC for Site Certificate (the "Application")

Ladies and Gentlemen:

We are counsel to LotusWorks-Summit Ridge I, LLC, an Oregon limited liability company (the "Applicant"), in connection with the Project described in the Application. In that connection, we have examined the organizational books and records of the Applicant as those books and records may bear on the Application and such other documents, records, certificates of public officials and other instruments regarding the Applicant as we have deemed necessary and appropriate for the purposes of this opinion. In rendering the opinion expressed below, we have assumed (1) the authenticity of all documents submitted to us as originals and (2) the conformity to original documents of all documents submitted to us as copies. As to factual matters, we have relied upon, to the extent we deemed proper, statements and certifications of the Applicant's President.

Based on the foregoing, to our current actual knowledge, we are of the opinion that, subject to the Applicant meeting all applicable federal, state and local laws (including all rules and regulations promulgated thereunder), the Applicant has the legal authority to construct and operate the Project without violating the Applicant's Articles of Organization, Operating Agreement, bond indenture provisions, membership interest covenants, or similar agreements.

This opinion is based on and limited to the laws of the State of Oregon as in effect on the date hereof. The foregoing opinion is limited solely to whether the Applicant has the authority to construct and operate the Project. We express no opinion as to the applicability of any federal, state or local laws (including all rules and regulations promulgated thereunder) to such construction and operation or as to the effect of the foregoing laws on such construction and operation.

Very truly yours,

Richard A. Ull

Ball Janik LLP

CERTIFICATE OF LOTUSWORKS-SUMMIT RIDGE I, LLC

This Certificate of LotusWorks-Summit Ridge I, LLC is made the 28TH day of SEPTEMBER, 2009, by LotusWorks-Summit Ridge I, LLC, an Oregon limited liability company (the "LotusWorks") for reliance upon by Ball Janik LLP ("Ball Janik") in connection with the issuance of an opinion letter dated of even date herewith (the "Opinion Letter") by Ball Janik as part of LotusWorks' application to EFSC for a Site Certificate relating to a wind facility proposed in Wasco County, Oregon (the "Project"). In connection with the Opinion Letter, LotusWorks hereby certifies to Ball Janik for its reliance, the truth, accuracy and completeness of the following matters:

1. The Operating Agreement of LotusWorks dated August 4, 2008 and the Articles of Organization of LotusWorks dated August 4, 2008 are the only documents creating or governing the internal affairs of LotusWorks or authorizing LotusWorks' construction and operation of the Project and the Operating Agreement and Articles of Organization have not been amended or modified.

2. LotusWorks is not subject to any bond indenture provisions or membership interest covenants.

IN WITNESS WHEREOF, LotusWorks has executed this Certificate of LotusWorks-Summit Ridge I, LLC effective as of the date set forth above.

LOTUSWORKS:

LOTUSWORKS-SUMMIT RIDGE, I, LLC,
an Oregon limited liability company

By: _____
Steven A. Ostrowski, Jr., President

ATTACHMENT M-2
LETTER FROM BANK OF AMERICA

Bank of America

March 30, 2010

Oregon Department of Energy
625 Marion Street NE
Salem, OR 97301-3737

Re: Summit Ridge Wind Farm

Ladies and Gentlemen:

Lotus Works ("Company") has advised us that it has submitted a permit application (the "Application") to the Oregon Department of Energy to build the Summit Ridge wind farm project (the "Project"). Our understanding is that in connection with this project, the State of Oregon (together with its agencies and instrumentalities as any level, the "State") may elect to require as security for performance by the Company under the Application, a letter of credit in a maximum face amount of $9,000,000.00, prior to the start of construction.

We have discussed with the Company its proposal for the Project and have expressed an interest in providing a letter of credit as security for the Company's performance under the Application. Our letters of credit typically have a term of up to one year, with automatic renewals unless we advise the letter of credit applicant and the beneficiary that we elect not to renew the letter of credit. We have not provided a commitment for a letter of credit and the issuance of a letter of credit in favor of the State would be subject to due diligence and credit approval by Bank of America, N.A.

We are providing this letter in connection with the Application. Please note that the information set forth in this letter is subject to change without notice, and is provided in strict confidence, without any responsibility or liability on the part of Bank of America, N.A., its affiliates or any of its or its affiliates' directors, officers or employees. Bank of America, N.A. undertakes no responsibility to update the information set forth in this letter.

Very truly yours,

BANK OF AMERICA, N.A.

Timothy S. Nelson
Vice President

1276815v1/wbo/mar10

EXHIBIT O

WATER RESOURCES

OAR 345-021-0010(1)(o)

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O-1 Letter from the City of The Dalles

O.1 INTRODUCTION

OAR 345-021-0010(1)(o) *Information about water use during construction and operation of the proposed facility. The Applicant shall include:*

O.2 USE OF WATER

OAR 345-021-0010(1)(o)(A) *A description of the use of water during construction and operation of the proposed facility.*

Response: During construction, water will be used for dust control and preparing concrete. During operations, water will be used in the O&M building for drinking, kitchen use, showers, and toilets.

O.3 SOURCES OF WATER

OAR 345-021-0010(1)(o)(B) *A description of each source of water and the Applicant's estimate of the amount of water the facility will need during construction and during operation from each source under annual average and worst-case conditions.*

Response: The City of The Dalles will sell approximately 12 to 15 million gallons of water to the Applicant for use in construction (see Attachment O-1). Approximately 10 to 12 million gallons of this will be used for dust control, and approximately 2 to 3 million gallons will be used to prepare concrete for turbine foundations. The water to be used for dust control will be contained in tanker trucks with the appropriate spray-distribution equipment. When not in use, these trucks may be parked on the site in a suitable location until needed. The water to be used for preparing concrete will be stored in a 12,000 gallon storage tank that is a part of the temporary self-contained portable concrete batch plant to be used during construction.

During operations, less than 5000 gallons per day will be obtained from an exempt well for use in the O&M building.

O.4 WATER LOSSES

OAR 345-021-0010(1)(o)(C) *A description of each avenue of water loss or output from the facility site for the uses described in (A), the Applicant's estimate of the amount of water in each avenue under annual average and worst-case conditions and the final disposition of all wastewater.*

Response: Water for dust control will evaporate into the atmosphere. Water used in preparing concrete will stay within the turbine foundations. Water obtained from the exempt well for the O&M building will be discharged to the on-site system drainfield.

O.5 WATER BALANCE DIAGRAM

OAR 345-021-0010(1)(o)(D) *For thermal power plants, a water balance diagram, including the source of cooling water and the estimated consumptive use of cooling water during operation, based on annual average*

conditions.

Response: Not applicable.

O.6 PERMITS OR TRANSFERS REQUIRED

OAR 345-021-0010(1)(o)(E) *If the proposed facility would need a groundwater permit, a surface water permit or a water right transfer, an explanation of why no such permit or transfer is required for the construction and operation of the proposed facility.*

Response: No new water right, water transfer, or groundwater permit will be required for construction or operation of the facility.

O.7 EVIDENCE IN SUPPORT OF PERMITS OR TRANSFERS

OAR 345-021-0010(1)(o)(F) *If the proposed facility would need a groundwater permit, a surface water permit or a water right transfer, information to support a determination by the Council that the Water Resources Department should issue the permit or transfer of a water use, including information in the form required by the Water Resources Department under OAR Chapter 690, divisions 310 and 380.*

Response: Not applicable.

O.8 OTHER MITIGATION MEASURES

OAR 345-021-0010(1)(o)(G) *A description of proposed actions to mitigate the adverse impacts of water use on affected resources.*

Response: No adverse impacts from water use during construction are anticipated, because the City of The Dalles has adequate water to maintain its city water supply obligations and supply water to the Facility. The anticipated water use at the O&M building is expected to be far less than 5000 gallons per day; use of such a small quantity of water is exempt from water right permit requirements because it is not expected to result in any impacts to groundwater.

ATTACHMENT O-1

LETTER FROM THE CITY OF THE DALLES

City of The Dalles
Public Works
1215 W 1st h Street
The Dalles, OR 97056

Ray Johnson, Water Division
Water Distribution Manager
Ph. 541-296-5401-2012
Fax: 541-296-4346
e-mail rjohnson@ci.the-dalles.or.us

July 22, 2010

To:
Steven A. Ostrowski, Jr.
President
CM Division – LotusWorks
9611 NE 117th Ave
Suite 2840
Vancouver, WA 98662
P 360.737.9692
F 360.737.9835
C 360.910.7625
sostrowski@lotusworks.com
www.lotusworks.com

The City of The Dalles has the capability and is willing to provide construction water to Lotus Works for the Lotus-Summit Ridge 1 project as detailed below. All current water usage fees will be applied at time of service request.

Project name: Lotus-Summit Ridge I
Location: Wasco County about 10 miles south of The Dalles
Construction Start:
Early start – October 2010
Late start - September 2011
Construction Complete:
December 2012
Total water needs: 12-15 million gallons (estimated)
Anticipated peak daily usage: 90,000 gallons (estimated)
Delivery method: Via tanker supplied by LotusWorks

Signed:
Ray Johnson 7/22/10
Ray Johnson

EXHIBIT P

FISH AND WILDLIFE HABITATS AND SPECIES
OAR 345-021-0010(1)(p)

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FIGURES *(located after text)*

ATTACHMENTS

P-1 Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Power Project – Consolidated Report (March 22, 2010),

P-1a. Raptor Nest Survey of the Proposed Transmission Line Corridor

P-1b. Special Status Plant Survey of the Proposed Transmission Line Corridor

P-1c. Special Status Wildlife Species Survey for the Proposed Transmission Line Corridor

P-2 Special status vertebrate wildlife species of known or potential occurrence in the Summit Ridge Wind Farm

P-3 Rare plant species with potential for occurrence in the Summit Ridge Wind Farm

P-4 Wildlife species observed during field surveys

P-5 Vascular Plant List

P-6 Summit Ridge Wind Project Habitat Mitigation Plan

P-7 Summit Ridge Wind Project Wildlife Monitoring and Mitigation Plan

P-8 ODFW Letter dated May 24, 2010

P.1 INTRODUCTION

OAR 345-021-0010(1)(p) *Information about the fish and wildlife habitat and the fish and wildlife species, other than the species addressed in subsection (q) that could be affected by the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0060, which states that the Council must find that the design, construction and operation of the facility, taking into account mitigation, are consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025 in effect as of September 1, 2000. The applicant shall include:*

Response: LotusWorks - Summit Ridge I, LLC ("Applicant") proposes to develop, construct and operate a wind generation facility in Wasco County, Oregon, with a generating capacity of approximately 200 MW, up to 87 turbine locations. The Facility will be located on private land, approximately 15 miles southeast of The Dalles, Oregon. Please refer to Exhibit C, for maps of the site vicinity, the Facility location, and the Facility components, respectively.

This exhibit describes methodology and results of studies conducted for plant, wildlife and habitat in the analysis area, which includes 400-foot corridors surrounding all project facilities, including turbine strings, access roads, meteorological towers, electrical connection system, substation, transmission lines, operations and maintenance facility, and laydown areas. Please refer to Exhibit B for more detailed description of Facility elements. Most of the information in this exhibit is summarized from the Ecological Baselines Studies and Impact Assessment for the Summit Ridge Wind Power Project Consolidated Report dated March 22, 2010 (Attachment P-1) and its three supplemental transmission corridor survey reports (all dated June 20, 2010): Raptor Nest Survey of the Proposed Transmission Line Corridor (Attachment P-1a), Special Status Plant Survey of the Proposed Transmission Line Corridor (Attachment P-1b), and Special Status Wildlife Species Survey for the Proposed Transmission Line Corridor (Attachment P-1c). Scientific names of all vertebrate wildlife species encountered during field surveys are listed in Attachment P-4. Scientific names of all plant species encountered during field surveys are listed in Attachment P-5.

P.2 DESCRIPTION OF BIOLOGICAL AND BOTANICAL SURVEYS

OAR 345-021-0010(1)(p)(A) *A description of biological and botanical surveys performed that support the information in this exhibit, including a discussion of the timing and scope of each survey.*

Response:

Review of Existing Information and Database Search

Multiple database searches have been conducted to ascertain the federal and state endangered, threatened, and special status species of wildlife and plants likely to be present in and near the analysis area. The U.S. Fish and Wildlife Service maintain lists (by County) of Endangered, Threatened, Proposed, and Candidate species and Species of Concern, and the electronic file list has been accessed for Wasco County (Appendix A in Attachment P-1). In addition, in January 2009 a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the Facility leased land boundary (as

provided to NWC as of December 2008) was requested from the Oregon Natural Heritage Information Center (ORNHIC). In December 2009, an additional list of documented occurrences of plant and wildlife observations within 5 miles of the proposed transmission line was received. Combined, all areas within 5 miles of the site boundary have been reviewed for ORNHIC species records.

The pre-field review for special status/sensitive species of plants and wildlife within the analysis area included a query of the ORNHIC and USFWS databases for documented and projected occurrences of endangered, threatened, and special status wildlife and plant species likely to be present in and near the analysis area (ORNHIC, 2008; USFWS, 2008). Existing literature and scientific data were reviewed to determine species distribution and habitat requirements. A biological protocol was prepared to define the analysis and survey areas and the species that would be included within Exhibits P and Q of this Application for Site Certification. Wildlife study protocols are described in more detail in Attachment P-1.

In addition to the database reviews, NWC staff with experience in the general area has searched for and reviewed pertinent biological information. Results of pre-construction ecological baseline studies of the nearby proposed Golden Hills Wind Facility were reviewed, as well as pre-construction and/or post-construction wildlife monitoring reports from other wind projects in Oregon including Klondike I, II, and III, Hay Canyon, Biglow Canyon, and Leaning Juniper Wind Facilities. Other Columbia Plateau Ecoregion studies were also reviewed and incorporated in the impact assessment where appropriate. Reports on bald eagle and peregrine falcon nesting in the Columbia Gorge area were reviewed for information on nesting of these species in the area.

The Oregon Natural Heritage Information Center database search for the analysis area discovered 22 records of 12 special status plant and wildlife species within the search area. The 12 species include special status species as rare species tracked by ORNHIC and include: 1 avian species, 2 fish species, 7 invertebrate species, and two plant species. The avian species noted was State Candidate Lewis's woodpecker (*Melanerpes lewis*), 1 record of 100 individuals in one location was documented. Fish records include: 2 records of Federally Threatened and State Candidate steelhead, Middle Columbia River ESU, summer run (*Oncorhynchus mykiss* pop. 28), 2 records of the Middle Columbia River ESU winter run steelhead (*Oncorhynchus mykiss* pop. 29), and one record of Federally Threatened and State Candidate bull trout (*Salvelinus confluentus* pop. 2). Invertebrate records include: 5 records of shortface lanx (giant Columbia river limpet, *Fisherola nuttalli*), 3 records of federal Species of Concern Columbia pebblesnail (*Fluminicola focus*),1 record of purple-lipped juga snail (*Juga hemphilli maupinensis*), 1 record of Shasta juga (*Juga silicula*), 1 record of Federal Species of Concern Oregon snail (Dalles sideband, *Monadenia fidelis minor*), 1 record of Dalles mountainsnail (*Oreohelix variabilis*), and 1 record of Columbia Gorge Hesperian snail (*Vespericola depressa*). Rare plant records include: 2 records of Hood River milk-vetch (*Astragalus hoodianus*), and 1 record of State Threatened Tygh Valley milk-vetch (*Astragalus tyghensis*). All fish and invertebrate records were located in the Deschutes River and do not occur within the lease area. The only ORNHIC record that does occur partially within the lease area is that of the Lewis's woodpecker.

Nine records of special status plant and wildlife species within the proposed transmission line search area were reported. These include three fish species (six records), one

invertebrate species, and one plant species (two records). Fish records include two records of Federally Threatened and State Sensitive-Critical steelhead, Middle Columbia River ESU, winter run (*Oncorhynchus mykiss* pop. 29), three records of the State Sensitive-Vulnerable Middle Columbia River ESU spring run Chinook salmon (*Oncorhynchus tshawytscha* pop. 19), and one record of Federal Species of Concern and State Sensitive-Vulnerable Southwest Washington/Columbia River ESU Coastal cutthroat trout (*Oncorhynchus clarkii* pop. 2). The invertebrate record was Columbia duskysnail (*Colligyrus* sp.). Both rare plant records were of Hood River milk-vetch.

Field Surveys

The following plant and wildlife surveys have been conducted: large-plot avian use surveys, grassland bird displacement study, aerial raptor nest survey, special status species surveys, bat inventory, and rare plant surveys. Table P-1 below describes the dates when each of these surveys were conducted.

Table P-1. Plant and Wildlife Survey Dates

Survey	Main Facility	Transmission Line Corridor
Rare Plants	June 1-2, 2009	May 28, 2010
Raptor Nests	May 4, 5 and 9, 2009 (1 aerial survey)	May 15, 2010
Avian Use Surveys (Large Plot)	December 2, 2008-March 15, 2009 (Winter) November 4-23, 2009 (Winter) April 21-May 25, 2005 (Spring) March 16-May 25, 2009 (Spring) June 1-August 9, 2005 (Summer) June 1-August 10, 2009 (Summer) August 20-October 27, 2009 (Fall)	**COMPLETE**
Grassland Displacement Study	May 21, June 1-2, and June 18, 2009	**COMPLETE**
Special Status Wildlife	June 1-2, 2009	May 28, 2010
Bat Inventory (Acoustical Monitoring)	July 17-18, August 12-13, September 6-7, and September 21-22, 2009	**COMPLETE**

Further details on the methods for each survey are provided in the consolidated biological resources report and addenda (Attachment P-1, P-1a, P-1b, and P-1c). A discussion of the grassland bird displacement study methodology including study and control transects and how they were located is provided in Section 3.5 of Attachment P-1.

P.3 IDENTIFICATION AND DESCRIPTION OF ALL HABITAT WITHIN THE ANALYSIS AREA

OAR 345-021-0010(1)(p)(B) *Identification of all fish and wildlife habitat in the analysis area, classified by the habitat categories as set forth in OAR 635-415-0025 and a description of the characteristics and condition of that habitat in the analysis area.*

Response:

P.3.1 Wildlife Habitat Mapping

Habitat mapping within the analysis area for the Facility was initiated in May 2009 and completed in August 2009. Prior to field surveys, initial habitat boundaries were delineated at a scale of 1:5,000 in a digital GIS environment using 1-meter resolution orthophotographs (image date July 27, 2005; USDA-FSA 2005). Initial boundaries were delineated based on obvious differences in vegetation, land form, and land-use and based on the biologists' extensive experience with Columbia Basin habitats. Overlay of topography, hydrology, and transportation layers aided with these delineations. Initial habitat delineations were subsequently ground-truthed during visits to the analysis area on May 28, and June 10 and 30, 2009, during the peak of the plant flowering and vegetative/wildlife nesting seasons in order to verify the habitat type designations and boundaries. Habitat delineations in the vicinity of the proposed transmission line were verified by a site visit on November 5, 2009. Any necessary boundary corrections were hand drawn on orthophoto topographic maps in the field and later transferred to the digital boundary layer. Mapping effort included reconnaissance sampling for species composition and cover in order to assess dominant, co-dominant, and common plant species within each habitat type.

Habitats were mapped by ODFW Habitat category (Figure P-1) and habitat types (Figure P-2). Broad-scale land cover/habitat types were delineated from the perspective of general wildlife use (for species assemblages, e.g., shrub-steppe obligates) and include cover types for unvegetated or highly disturbed areas without any significant wildlife use value (i.e., disturbed/developed). These general habitat types were further divided into 12 subtypes based on differences in vegetation composition and structure, where necessary, to indicate differences in wildlife use values (for individual taxa such as special status species), unique high habitat quality, or the presence of specific State listed Strategy Habitats (ODFW 2006). Habitat classifications were designated to be consistent with the six categories as defined in the Oregon State Fish and Wildlife Habitat Mitigation Policy (OAR 635-415-0025).

P.3.1.1 Habitat Categories

Habitats within the wildlife survey corridors were assigned into habitat quality types based on definitions found in Oregon Administrative Rule (OAR) 635-415-0025. This rule defines six habitat categories and establishes mitigation goals and implementation standards for each category. The six habitat categories and corresponding mitigation goals and implementation

standards are described below. Table P-2 summarizes habitat types within the analysis area. Table P-3 provides temporary and permanent impacts to habitat types and subtypes within the wildlife survey corridors by ODFW Habitat Category. Both of these tables include habitat types mapped within the proposed transmission line corridor. Figure P-1 identifies ODFW Habitat Categories within the analysis area.

Habitat Category 1 - Irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species. This habitat is limited on either a physiographic province or site-specific basis, depending on the individual species, population, or unique assemblage. The mitigation goal for Habitat Category 1 is no loss of either habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action or no authorization of the proposed development action if impacts cannot be avoided.

Habitat Category 2 - Essential habitat for a fish or wildlife species, population, or unique assemblage of species. This habitat is limited either on a physiographic province or site-specific basis depending on the individual species, population, or unique assemblage. The mitigation goal if impacts are unavoidable is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss of either pre-development habitat quantity or quality. In addition, a net benefit of habitat quantity or quality must be provided. Progress towards achieving the mitigation goals and standards will be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures will be implemented and completed either prior to or concurrent with the development action. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 3 - Essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population. The mitigation goal is no net loss of either habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and standards will be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures will be implemented and completed either prior to or concurrent with the development action. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 4 - Important habitat for fish and wildlife species. The mitigation goal is no net loss in either existing habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind or out-of-kind, in-proximity or off-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and

standards will be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures will be implemented and completed either prior to or concurrent with the development action. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 5 - Habitat for fish and wildlife having high potential to become either essential or important habitat. The mitigation goal, if impacts are unavoidable, is to provide a net benefit in habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through actions that contribute to essential or important habitat. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 6 - Habitat that has low potential to become essential or important habitat for fish and wildlife. The mitigation goal is to minimize impacts. The implementation standard recommends or requires actions that minimize direct habitat loss and avoid impacts to off-site habitat.

Table P-2. Habitat Types and Categories and Specific Habitat Descriptions for the Summit Ridge Wind Farm

General Land Cover Type	Specific Habitat Type ("subtype")	Habitat Category	Specific Habitat Type Description	Acres within Wildlife Survey Corridors	Total Acres in Lease Boundary
Developed/ Disturbed	**Dryland Wheat or Other Small Grain**	6	Agricultural fields currently in small grain production or fallow. Common species include horned lark and mourning dove in winter stubble or when fallow.	2,061.92	8,356.14
	Farmyard or Residence	6	Farmyard, residence, or outbuildings including surrounds.	3.17	103.83
	Old Field	4	Previously cultivated, currently occupied by a variety of common non-native and native vegetation plants (rabbitbrush shrubs/annual grasses and weeds). Native vegetation is a minor component. Common species: horned lark, western meadowlark foraging, may occasionally include savannah sparrow.	43.98	104.37
	Quarry	n/a*	Active or past active rock quarries that serve/have served to provide crushed basalt road material.	0.00	0.86
	Revegetated Grassland	3	Planted grassland on previously farmed or other disturbed lands that may be enrolled in the Conservation Reserve Program. Residual (not previously plowed) native vegetation patches in a few locations. Old grass stands contain rabbitbrush or other shrubs but are not dominant. May support white-tailed jackrabbits. Common species include western meadowlark and grasshopper sparrow where grassland is mature.	614.43	2,104.11
	Road	6	Paved or graveled public and private roads and pullouts.	38.64	80.30
Exposed Rock	**Escarpment**	n/a	Linear Columbia River Basalt outcroppings from approximately 3 to 15 meters (10–50 feet) in height, which bound canyon edges and shoulders. Plant diversity and cover is very low on escarpments. Provides critical nesting substrate and perching sites for raptors and crevices for bats. Provides shade and thermal cover for deer in summer and also serve as good windbreaks. May also provide home sites for wood-rats and marmots.	0.00	28.73
	Talus	n/a	Narrow strips at the base of escarpments or as narrow unstable "stone stripes" parallel to slope aspect in locations where highly fractured basalt outcrops are just below the surface. Generally poorly vegetated, these areas can present a suite of sparsely distributed shrubs that include basin big sagebrush and occasionally rubber rabbitbrush.	0.00	22.35

General Land Cover Type	Specific Habitat Type ("subtype")	Habitat Category	Specific Habitat Type Description	Acres within Wildlife Survey Corridors	Total Acres in Lease Boundary
Grassland	**Exotic Annual Grassland**	4	Dominated by exotic annual grass and/or weeds. Common species include horned lark.	1,308.46	8,101.01
Steppe dominated by native and/or non-native grasses (<20% shrub cover)	**Native Perennial Grassland**	3	Dominated by native perennial bunchgrass. Shrubs, if present, are an inconspicuous component. Important nesting habitat for ground-nesting birds such as savannah sparrow and vesper sparrow. Common species include western meadowlark, grasshopper sparrow, and horned lark. This is an Oregon Conservation Strategy Habitat.	403.14	6,227.52
Shrub-steppe	**Big Sagebrush Shrub-steppe**	2	Dominated by basin big sagebrush. Offers high quality breeding habitat for shrub obligate species including loggerhead shrike. May also support white-tailed jackrabbit. Common species include western meadowlark. This is an Oregon Conservation Strategy Habitat.	38.12	897.45
Steppe dominated by shrubs (>20% shrub cover)	**Rabbitbrush/Buckwheat Shrub-steppe**	3	Highly variable species composition and structural diversity. Common species include horned lark and western meadowlark.	229.88	926.88
Surface Water	**Pond**	3	Man-made domestic livestock water sources in the bottoms of draws. These water sources are an important late-season resource for many wildlife species and are often key stopover locations for migrating passerines and migrating and resident bats	0.17	0.75
Woodland With >10% tree cover	**Riparian Shrubland/Woodland**	n/a	Confined to the narrow bottoms of draws usually having limited seasonal water. Common vegetation elements here are riparian shrub species such as chokecherry, blue elderberry, and willow. Closely associated with, and often intermixed with, the riparian woodland habitat type. Provide important foraging, nesting, and cover for both bats and residential and migratory birds.	0.00	121.46

General Land Cover Type	Specific Habitat Type ("subtype")	Habitat Category	Specific Habitat Type Description	Acres within Wildlife Survey Corridors	Total Acres in Lease Boundary
	Riparian Woodland	n/a	This habitat type is confined to streambeds and wet draws, and is highly variable in composition. Common trees include black cottonwood, black locust, ponderosa pine, and Oregon white oak. Black cottonwood and black locust are a more prevalent component in the north and west portions of the Facility, while pine and oak trees are more common in the draws of the south and east. Closely associated with, and often intermixed with, the riparian shrubland/woodland habitat type, and the same shrub species commonly make up the understory of this habitat type. Provides important habitats for foraging, nesting, and cover for both resident and migratory birds.	0.00	18.16
			Total Acres	4,741.91	27,093.92

*n/a = not applicable. Habitat subtypes that did not occur with wildlife survey corridors, but were within the study area, were not assigned habitat categories.

Table P-3. Project Impacts to Habitat Types and Subtypes within Wildlife Survey Corridors by Habitat Category

Habitat Category/Habitat Type – Subtype	Total Acres Within Survey Corridors	Temporary Impacts* (acres disturbed)	Permanent Impacts* (acres disturbed)
Category 1			
None Present	n/a	n/a	n/a
Category 2			
Shrub-steppe – Big Sagebrush Shrub-steppe	69.62	0.37	0.43
Total Category 2	**69.62**	**0.37**	**0.43**
Category 3			
Developed/Disturbed – Revegetated Grassland	703.23	18.00	11.08
Grassland – Native Perennial Grassland	406.13	6.69	2.96
Riparian Shrublands/Woodland	4.23	0	0
Shrub-steppe – Rabbitbrush/Buckwheat Shrub-steppe	417.60	3.34	3.39
Surface Water – Pond	0.17	0	0
Total Category 3	**1,531.36**	**28.03**	**17.43**
Category 4			
Developed/Disturbed – Old Field	57.09	0.67	0.63
Grassland – Exotic Annual Grassland	1,517.16	19.09	18.26
Total Category 4	**1,574.25**	**19.76**	**18.89**
Category 5			
None Present	n/a	n/a	n/a
Category 6			
Developed/Disturbed – Dryland Wheat or Other Small Grain	2,298.43	35.05	37.75
Developed/Disturbed – Farmyard or Residence	3.17	0	0
Developed/Disturbed – Road	38.64	16.31	5.52
Total Category 6	**2,340.24**	**51.36**	**43.27**
Total for Categories 2, 3, 4 and 6	**5,515.47**	**99.52**	**82.02**

*Based on Facility layout dated December 9, 2009.

P.3.1.2 Habitat Descriptions and Wildlife Use Values

A total of five primary types and eleven wildlife habitat subtypes were delineated within the leased boundaries (Figure P-2). Brief descriptions of composition, structure, wildlife habitat

values and conservation status for each habitat subtype are presented below and grouped by the six general land cover types. Acreages for each land cover/habitat type are presented in Tables P-2 and P-3. Habitat types that are present within wildlife survey corridors (ten subtypes) are summarized in Figure P-2 and Table P-3 by Oregon State Fish and Wildlife Habitat Mitigation Categories. Oregon Strategy Habitat statuses were attained from the Oregon Department of Fish and Wildlife (ODFW 2006).

Developed/Disturbed (5 subtypes)

Dryland Wheat or Other Small Grain

These areas of actively farmed, non-irrigated small-grain cropland consist primarily of a monoculture of wheat but also include recently cultivated fallow fields expected to reenter active crop production in the near future. Crop production rotation in this area is the typical two-year cycle (fallow one year, crop the next). Lands with this designation are by nature highly disturbed and generally do not supply significant habitat for any special status wildlife or plant taxa, now or in the foreseeable future. Nonetheless, raptors were observed hunting these fields, and horned larks forage and even nest in them, especially when in fallow or stubble condition.

Farmyard or Residence

These areas are farmsteads/ranches with associated residences, outbuildings, corrals, and ancillary adjacent pasture land. They are working landscapes that can be expected to remain in a disturbed condition. Although these areas may be less important to the grassland and shrub-steppe species that historically resided in the vicinity of the Facility, they nonetheless provide nesting, roosting, and cover for a variety of vertebrate species, including bats, American kestrels (*Falco sparverius*), great-horned owls (*Bubo virginianus*) and barn owls (*Tyto alba*), quail, swallows, Say's phoebes (*Sayornis saya*), western kingbirds (*Tyrannus verticalis*), and others.

Old Field

These are formerly cultivated areas that have since been abandoned and are now naturally revegetating. While a minor component of native species such as rubber rabbitbrush (*Ericameria nauseosa*), native buckwheats (*Eriogonum sp.*), bluebunch wheatgrass (*Pseudoroegnaria spicata*) and Sandberg's bluegrass (*Poa secunda*) may exist, these areas are primarily comprised of invasive species such as cheatgrass (*Bromus tectorum)*, bulbous bluegrass (*Poa bulbosa*), prickly lettuce (*Lactuca serriola)*, pepperweeds (*Lepidium sp.*) and tall tumble mustard (*Sisymbrium altissimum*). These areas offer marginal foraging habitat for common species such as horned lark (*Eremophila alpestris*) and western meadowlark (*Sturnella neglecta)*, and would most likely require significant effort to be restored to native-like habitat.

Revegetated Grassland

Some of the lands mapped as "revegetated" are probably actively enrolled in the federal Conservation Reserve Program (CRP), an "agricultural" land use (although current CRP status not verified by NWC); fields are currently not being farmed for crops. Revegetated grasslands consist of a species mix of bluebunch wheatgrass, intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), Sandberg's bluegrass, and big bluegrass (*Poa ampla*). Sweet clover (*Melilotus officinale*) and alfalfa (*Medicago sativa*),

nitrogen-fixing perennial forbs, are also a common element in some of these revegetated plant communities. Older plantings (>10 years) may have significant cover of native species such as rubber rabbitbrush, lupine (*Lupinus sp.*) and common yarrow (*Achillea millefolium*). Invasive grasses and forbs including cheatgrass, bulbous bluegrass, prickly lettuce, and tall tumble mustard were noted on some younger, less-established plantations and in harsher areas within older plantings. Revegetated grasslands, especially older, well-established plantings with some shrub cover, can have moderate wildlife use value, offering nest, cover, and forage habitat for some grassland birds, including western meadowlark, vesper sparrow (*Pooecetes gramineus)*, grasshopper sparrow (*Ammodramus savannarum)*, savannah sparrow (*Passerculus sandwichensis),* and Brewer's sparrow (*Spizella breweri)* (Johnson and O'Neil, 2001; Schroeder and Vander Haegen, 2006) as well as year-around cover and forage for northern harrier (*Circus cyaneus)*, small mammals, and mule deer (*Odocoileus hemionus*).

Road

This habitat subtype includes paved or graveled public and private roads and pullouts. Wildlife use value of this subtype is expected to be very low.

Grassland (2 subtypes)

Exotic Annual Grassland

Exotic annual grasslands within the lease area have developed as the result of past agricultural disturbance and/or intensive domestic livestock use, which is often compounded by the effects of wildfire. These areas are colonized primarily by exotic grasses and forbs such as cheatgrass, bulbous bluegrass, prickly lettuce, pepperweeds, tall tumble mustard, and a variety of other non-native, invasive species. Significant populations of an Oregon "B List" Noxious Weed, broadleaf pepperweed (*Lepidium latifolium*), were noted along Summit Ridge Road, in the center of the lease area. Ecological disruption within these exotic-dominated communities is so severe that recovery of native plant communities is not likely to occur naturally (ecological disclimax). Wildlife use value within these areas is generally minimal, although annual invasive grasses may be of forage value early in the season.

Native Perennial Grassland

This habitat type occurs throughout the lease area on moderate to relatively steep canyon slopes. Northerly (cooler, moister) aspects, in particular, display a tendency to preserve native bunchgrass remnants even though heavy livestock grazing pressure, as evidenced by well-developed terracettes, has occurred recently. The ecological condition of these grasslands is generally poor to fair with very localized remnant patches that are in good to excellent condition.

Native perennial grasslands are characterized by relatively consistent, high cover of the taller stature bluebunch wheatgrass and shorter stature Sandberg's bluegrass. Some areas have apparently been subjected to localized and sparse supplementary seeding with the non-native species intermediate wheatgrass and crested wheatgrass.

Presently, the majority of these areas classify as plant associations in the "bluebunch wheatgrass/Sandberg's bluegrass" community (Daubenmire, 1970; Franklin and Dyrness, 1988). On the northerly aspect slopes the plant associations classify cleanly within the

"bluebunch wheatgrass/Idaho fescue" community. This is probably the climax plant community in these more mesic locations.

Common forbs in these grasslands may include longleaf phlox (*Phlox longifolia*), annual agoseris (*Agoseris heterophylla*), fiddleneck tarweed (*Amsinckia lycopsoides*), common yarrow, maiden blue-eyed Mary (*Collinsia parviflora*), slender hawksbeard (*Crepis atrabarba*), western tansymustard (*Descurainia pinnata*), desert willow-herb (*Epilobium brachycarpum*), jagged chickweed (*Holosteum umbellatum*), big-seed biscuitroot (*Lomatium macrocarpum*), Pacific popcorn flower (*Plagiobothyrs tenellus*), tall tumble mustard, sand fringepod (*Thysanocarpus curvipes*), and yellow salsify (*Tragopogon dubius*).

Native grasslands may provide important, high-quality nesting, cover, and foraging habitat for numerous bird and small mammal species, including grasshopper sparrow, vesper sparrow, savannah sparrow, and white-tailed jackrabbit (*Lepus townsendii)*. Mule deer also commonly forage in native grasslands.

Shrub-steppe (2 subtypes)

Big Sagebrush Shrub-steppe

This habitat type is characterized as having 20-70% cover of basin big sagebrush (*Artemisia tridentata ssp. tridentata*) with lesser amounts of rubber rabbitbrush sometimes present. Vegetation in the understory is largely non-native, due primarily to persistent disturbance from livestock grazing. Dominant grass species in the understory include cheatgrass, brome fescue (*Vulpia bromoides*), and Sandberg's bluegrass. Bluebunch wheatgrass, while clearly subordinate, is also usually present. Common forbs include common yarrow, fiddleneck tarweed, prickly lettuce, jagged chickweed, longleaf phlox, and tall tumble mustard.

The general high structural diversity and ecological integrity of the Facility's big sagebrush habitats provides valuable cover, nesting and foraging habitat for numerous wildlife species. The relatively intact big sagebrush shrub-steppe habitat in the northern portion of the lease area (Figure P-2) supplies the highest quality potential habitat for loggerhead shrike (*Lanius ludovicianus*), vesper sparrow, and Brewer's sparrow.

Rabbitbrush/Buckwheat Shrub-steppe

Vegetative cover, species composition and structural diversity are all highly variable in these shrubland communities. In the northern portion of the lease area, where these shrublands occur on moderately deep soils, overall vegetation cover is fairly high (50-80%), with well-developed shrub, grass, and forb layers. The most consistent dominant species in these deeper soil areas is rubber rabbitbrush, with buckwheat species representing only a minor component. In the south of the lease area, where soils are thin and rocky, these shrublands have much lower overall vegetative cover (30-60%). While shrub species still dominate here, these shrubs are nearly all buckwheats and "other sub-shrubs" less than one foot in height. Graminoid and forb layers are also highly variable throughout rabbitbrush/buckwheat shrub-steppe. This is due not only to the differences in soil conditions, but also to differences in domestic livestock grazing pressure.

In areas with deeper soils and lower impacts from grazing, the grass and forb layers are similar to those in the surrounding native grasslands. Here, there is a significant component of native bunchgrasses and forbs, including bluebunch wheatgrass, Sandberg's bluegrass, velvet lupine (*Lupinus leucophyllus*), desert lupine (*Lupinus aridus ssp. aridus*), longleaf phlox, common yarrow, and annual agoseris. In areas exposed to heavy domestic livestock grazing, the grass and forb layers are more similar to those in adjacent exotic annual grasslands, with exotic invasives such as cheatgrass, medusa-head rye (*Taeneatherum caput-medusae*), and bulbous bluegrass the dominant species. The grass and forb layers in areas with stony, shallow soils, while naturally sparse, are generally dominated by native dryland plants such as Sandberg's blue grass, squirrel-tail grass (*Elymus elymoides*), wild onion (*Allium* sp.) and a wide variety of other forb species. Ecological conditions range from poor, in disturbed areas dominated by weedy exotics, to fair or good in more intact native-dominated communities. These areas are used for foraging, cover, and nesting by horned larks, western meadowlarks, and vesper sparrows, among others.

Surface Water (1 subtype)

Pond

There are several small ponds within the lease area (Figure P-2), and all appear to have been created as domestic livestock water sources by forming earthen barriers in the bottoms of draws. While man-made, these water sources are an important late-season resource for many wildlife species and are often key stopover locations for migrating passerines and migrating and resident bats. Wetlands are more-thoroughly addressed in a separate document.

Woodland (1 subtype)

Riparian Shrubland/Woodland

These habitats have very limited extent and are confined to the narrow bottoms of draws usually having limited seasonal water. The most common vegetation elements here are riparian shrub species such as rose (*Rosa sp.*), chokecherry (*Prunus sp.*), blue elderberry (*Sambucus cerulea*), willows (*Salix sp.*), pacific serviceberry (*Amelanchier alnifolia*), and oceanspray (*Holodiscus discolor*). These habitats, while very limited in area, provide important foraging, nesting, and cover for both bats and residential and migratory birds such as yellow warbler (*Dendroica petechia*), lazuli bunting (*Passerina amoena*), song sparrow *(Melospiza melodia)*, California quail (*Callipepla californica*), and spotted towhee (*Pipilo maculates)*.

P.4 MAP OF HABITAT LOCATIONS

OAR 345-021-0010(1)(p)(C) *A map showing the locations of the habitat identified in (B).*

Response: See Figures P-1 and P-2.

P.5 IDENTIFICATION OF STATE SENSITIVE SPECIES

OAR 345-021-0010(1)(p)(D) *Based on review of appropriate literature, consultation with the Oregon Department of fish and Wildlife (ODFW) and field study, identification of all State Sensitive Species that might be present in the analysis area and a discussion of any site-specific issues of concern to ODFW.*

Response:

Based on consultation with the Oregon Natural Heritage Information Center, the U.S. Fish and Wildlife Service, ODFW, and others, a list of special status wildlife and plant species known to occur or with potential to occur in the analysis area was developed (Attachments P-2 and P-3). Notes regarding the potential or documented presence of these species in the analysis area are included in the tables. All federal and state listed or candidate species, are addressed in Exhibit Q. No federally listed, proposed or candidate species were observed during wildlife, habitat or plant surveys.

Special status wildlife species surveys resulted in detection of six special status avian species and six special status mammal species; these were bald eagle, grasshopper sparrow, long-billed curlew, loggerhead shrike, Swainson's hawk, ferruginous hawk, white-tailed jackrabbit, and five species of bats. Each of the these species is a State Threatened species, State Sensitive-Vulnerable species, State Sensitive – Critical species, or Federal Species of Concern. None are Federal Listed, Candidate, or Proposed species. All detections of these species are described in Attachment P-2. A comprehensive list of all vertebrate species detected during special status wildlife species surveys, including non-status species, is found as Attachment P-4.

Bald Eagle (State Threatened): This species was detected on four occasions, with each detection being of a single individual and all detections being of adult birds. Three detections were within an avian use study plot (Table 7 in Attachment P-1); the fourth was outside the 800-m radius of the plot (Table 4 in Attachment P-1). Two detections were during winter, whereas one was in the spring and one was during the summer survey season.

Ferruginous Hawk (State Sensitive-Critical): A single detection of one individual ferruginous hawk was recorded in the summer of 2005 (Table 4 in Attachment P-1). The individual was outside the 800-m radius of the survey plot. The Facility is outside the known nesting range of this species.

Swainson's Hawk (State Sensitive-Vulnerable): There were four detections of Swainson's hawks recorded during these surveys and while in-transit between plots. All detections occurred in 2005, one in spring and three in summer. Only one detection was within a survey plot (Table 3 in Attachment P-1); two were at distances greater than 800 m from the plot center (Table 4 in Attachment P-1), and one was while the surveyor was in-transit between plots (Table 5 in Attachment P-1).

Loggerhead Shrike (State Sensitive-Vulnerable): Four detections of loggerhead shrike were recorded within the survey plots, three in winter and one in spring. Eighteen other detections occurred while the surveyor was in-transit between survey plots and were spread more or less equally among all seasons.

Long-billed Curlew (State Sensitive-Vulnerable): One individual was observed flying on July 11, 2005 during avian use surveys. A total of two individuals have been observed in directed flight over the Facility. There has been no evidence of their nesting on the Facility.

Grasshopper Sparrow (State Sensitive-Vulnerable): Fifty-seven detections of this species were recorded within the wind farm, and some of these represent multiple individuals; including two detections of this species recorded in the transmission corridor. Grasshopper sparrows were quite common during the breeding season, were detected also during the grassland bird displacement study and avian use study, and were found singing in a variety of habitat types, including native perennial grassland, rabbitbrush/buckwheat shrub-steppe, revegetated grassland, exotic annual grassland, and old field.

Golden Eagle (Aquila chrysaetos), although not a State listed species, is of special interest due to the fact that it is protected under the Federal Eagle Protection Act as well as being a USFWS Bird of Conservation Concern (Attachment P-2). There were five detections of golden eagles within the 800 meter plots, one each in winter, spring and fall season, and two in summer season during avian use surveys (Table 3 in Attachment P-1). In addition, there were five detections outside of study plots, but observed during avian use surveys (three in winter season, one in spring and one in summer; Table 4 in Attachment P-1). There was also five observations in-transit to study plots (Table 5 in Attachment P-1).

White-tailed Jackrabbit (State Sensitive-Vulnerable): A single individual and one group of pellets attributed to this species were found. To date, none have been detected during other surveys conducted in the analysis area. Thus, while this species is present, it apparently exists in the vicinity of the Facility in extremely low numbers.

Eleven species of bats are known to reside in or migrate through Wasco County (ODFW 2008; ORNHIC 2008; USFWS 2008; Csuti et al. 2006). Of these species, nine are listed as federal species of special concern. These species include pallid bat (*Anttrozous pallidus*), spotted bat (*Euderma maculatum*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), western small-footed myotis (*Myotis ciliobarum*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumananensis*), silver-haired bat (*Lasionycteris noctivagans*), and Townsend's big eared bat (*Plecotus townsendii*). Of these 11 species, there is a high/moderate likelihood that some of them could occur within the analysis area and surrounding lands based on the presence of suitable roost habitat such as rocky canyons, trees, and buildings and foraging habitat such as water and open grasslands (Attachment P-2). Of these species, the following five were identified during the bat inventory survey:

Pallid Bat (Federal Species of Concern and State Sensitive-Vulnerable) was positively identified at a single survey station on a single night of survey.

Hoary Bat (State Sensitive-Vulnerable) was positively identified at two survey stations on a single night, and possibly detected at one of those same stations on a second survey night.

Silver-haired Bat (Federal Species of Concern and State Sensitive-Vulnerable) was positively identified at two surveys stations and on two survey nights.

Small-footed Myotis (Federal Species of Concern) was positively identified at three survey stations and on two survey nights.

Either *California Myotis* (*Myotis californicus*), no State or Federal Status) or *Yuma Myotis* (Federal Species of Concern) or both were identified at a single survey station on a single survey night. The calls of these two species are difficult to distinguish.

P.6 BASELINE SURVEY OF THE USE OF HABITAT

OAR 345-021-0010(1)(p)(E) *A baseline survey of the use of habitat in the analysis area by species identified in (D) performed according to a protocol approved by the Department and ODFW.*

Response:

P.6.1 Avian Use Surveys

Fifty-two avian species were recorded within 800 m of plot centers (Table 3 in Attachment P-1). These included 11 species of raptor. An additional raptor species, ferruginous hawk (*Buteo regalis*) was observed on a single occasion outside the 800-m radius of a survey plot (Table 4 in Attachment P-1). Two other raptor species, merlin (*Falco columbarius*) and great-horned owl, were observed while in-transit between survey plots (Table 5 in Attachment P-1).

Avian Use

Avian use (mean number of individuals within 800 m/20-min point count) is a metric that provides an index of the numbers of birds using the analysis area and, therefore, evaluates which species may be affected by the Facility. Overall mean use across all seasons was dominated by passerines, particularly horned lark (Table 6 in Attachment P-1). Passerines had their highest mean use values during summer season (11.900), followed by spring (10.911), and then fall season (9.909). The species of passerine with the highest use in all seasons was horned lark (Table 6 in Attachment P-1).

Raptor mean use values were highest during summer (1.327), when use was comprised mainly of American kestrel (0.736) and red-tailed hawk (*Buteo jamaicensis*; 0.345). Species diversity was consistent among seasons for raptors, with seven species recorded in summer and eight species each in spring, fall, and winter. Raptor mean use was lowest in fall season (0.309) followed by winter season (0.383).

Percent Composition

Percent composition (mean use for a species/total use across all species, multiplied by 100) provides an estimate of the relative use of any particular species, relative to the use by all other species. This metric is particularly useful for identifying whether any one species or group has a dominant presence in the analysis area. Passerines dominated over all other species groups throughout the year with 90.83% of all detections in spring season, 88.19% in fall, 83.32% in summer season, and 81.37% in winter season (Table 6 in Attachment P-1). Horned lark, in particular, was the passerine species that had the highest percentages in all seasons with a high of 59.67% in winter season to a low of 37.43% in summer season. Other passerine species that contributed over 5% to overall composition percentages were

European starling (*Sturnus vulgaris*; 12.54% in summer season and 9.19% in winter season), violet-green swallow (9.63% in fall season), and Brewer's blackbird (*Euphagus cyanocephalus*; 5.42% in fall season).

Percent composition of raptors varied from a high of 9.29% of all detections in summer season to a low of 2.75% in fall season (Table 6 in Attachment P-1). The only species that contributed over 5% was American kestrel (5.16% in summer season).

Frequency of Occurrence

Frequency of occurrence (percentage of 20-min point counts in which a species was detected) provides an index of how often a species occurs in the analysis area. In combination with mean use, it allows one to understand the basis of mean-use values. For example, if one large flock of Canada geese (*Branta canadensis)* is detected one time, its mean use can be high because it is based on the number of individuals, even though its frequency of occurrence is low. To understand the risks of birds near proposed structures, it is important to understand both how many birds are using the analysis area (mean use) and how frequently they are using it (frequency of occurrence).

Passerines were observed at high frequencies throughout the year, including spring (99.09%), summer (96.36%), fall (83.64%), and winter seasons (80.00%; Table 6 in Attachment P-1). Horned larks were frequently observed during all seasons, with the highest percentage in spring season (90.91%) and the lowest in fall (66.36%). Common raven (*Corvus corax)* was observed with rather equal frequency in all four seasons, ranging only from 18.18% (summer season) to 20.00% (spring and fall seasons).

Raptors were observed most frequently in summer (67.27%) followed by spring (42.73%), winter (30.29%), and fall season (23.64%). In summer, American kestrel was detected on 44.55% of counts, and red-tailed hawk was detected on 25.45% of counts. A similar pattern was observed in spring and fall, but in winter red-tailed hawk was seen most frequently (10.86%), followed by rough-legged hawk (*Buteo lagopus*; 8.00%), northern harrier (6.86%), and then American kestrel (5.14%).

Spatial Use

Mean use was relatively even among plots (Table 7 in Attachment P-1), with horned larks contributing most of the totals at any given plot and at each season. NWC reviewed flight paths and perched locations of raptors. This review did not identify any patterns of interest. The anlaysis area does not seem to be associated with any raptor migration routes, as evidenced by the lack of directed fall flight paths and the lower number of raptor detections in the fall season (Tables 3 and 6 in Attachment P-1).

P.6.2 Grassland Bird Displacement Study

Eight species of birds were detected during the grassland bird displacement study (Table 8 in Attachment P-1). Five of these eight species are considered to be primarily grassland birds: Brewer's sparrow, grasshopper sparrow, savannah sparrow, vesper sparrow, and western meadowlark. These grassland species were detected in rather low densities (Table 9 in Attachment P-1), with vesper sparrow the most common (25 individual sightings), followed

by western meadowlark (13 detections), and Brewer's sparrow (11 detections). Locations of all grassland bird displacement study transects, including control transects, are shown in Figure 4 in Attachment P-1.

Three additional species were observed that are not considered to be primarily grassland species, including dusky flycatcher (*Empidonax oberholseri*) and rock wren (*Salpinctes obsoletus*), which were only observed once, and lazuli bunting, which was detected only three times.

None of the birds identified during this study were Federal or State Listed, Candidate, or Proposed species. A single species, grasshopper sparrow, is State Sensitive-Vulnerable (see Section P.5 above).

On a per-plot basis, the highest number of detections was five (five Brewer's sparrows and five vesper sparrows were recorded at transect D2, Table 9 in Attachment P-1), and this number includes all three surveys.

P.6.3 Raptor Nest Survey

The aerial raptor nest survey covered an area of approximately 80.5 square miles, plus 5 square miles in the proposed transmission corridor. Twenty-three active nests were found within the wind farm, including:

- 16 red-tailed hawk
- 1 unidentified buteo (presumed red-tailed hawk)
- 1 prairie falcon
- 1 great-horned owl
- 1 long-eared owl
- 1 turkey vulture
- 2 common raven

In addition, 29 inactive stick nests were located. Four of these were large enough to have been built by golden eagles.

Four active nests, all of red-tailed hawks, were found along the transmission corridor.

None of the nests identified were of Federal or State Listed, Candidate, or Proposed species or of State Sensitive species.

Overall raptor nest density within the 2009 survey area was 0.24 nests per square mile (red-tailed hawk 0.20/mi^2, unidentified buteo 0.01/mi^2, prairie falcon 0.01/mi^2, great-horned owl 0.01/mi^2; Table 10 in Attachment P-1). Although a long-eared owl (*Asio otus)* nest and a turkey vulture (*Cathartes aura)* nest (nest density 0.01/mi^2 each) were found during this aerial survey, in general nests of this species as well as burrowing owl, short-eared owl, and American kestrel are difficult to find using the aerial survey method without extensive on-the-ground surveys. Therefore, for comparison with other sites, nest density of long-eared

owl and turkey vulture are not included in the total nest density. Nest density estimates also do not include common raven or inactive nests.

Locations of all nests detected, both active and inactive, are shown in Figure P-3.

P.6.4 Big Game Observations

During avian use surveys, there were 56 detections of mule deer. These detections ranged from a single individual (on four occasions) to as many as 35; mean group size was 7.1 (± 4.9 Standard Deviation). Detections occurred in all months.

Bighorn sheep were detected on four occasions, with group size ranging from four to 24. All detections were in May and June, and sheep seemed to remain in the canyons well below the survey area at other times of the year. Both sheep and mule deer were observed during the aerial raptor nest survey, particularly deep in the canyons far from the proposed Facility; their numbers were not recorded as part of that survey.

P.6.5 Rare Plant Survey

A total of 111 vascular plant taxa were identified during field surveys (Attachment P-5). None of these were Federal or State listed special status plant species. The early-June survey dates fell within the identification periods of all potentially occurring listed plant taxa as identified in the target plant list (Attachment P-3). The rare plant survey conducted along the transmission corridor resulted in no Federal or State listed special status plant species found.

P.6.6 Bat Inventory

During each of the four bat inventory sessions (July through September 2009), temperatures were relatively warm (10-15 degrees C) at the start of the sample period, and insect presence (particularly moth activity) was evident. Wind speeds varied from less than 5 to greater than 10 kph.

Table 10 in Attachment P-1 summarizes bat species detections by survey date and Table 11 in Attachment P-1 summarizes detections by survey station. As discussed above, some species were not positively distinguished from others with similar calls; these included big brown bat and hoary bat, which have call frequency overlap, as well as California myotis and Yuma myotis, which have call frequency overlap. Bat inventory survey points are displayed on Figure 7 in Attachment P-1.

Seven bat species were positively identified, and two others were tentatively identified during surveys. Only the clearest of the recorded calls were used, and calls without specific diagnostic details were not used for analysis. Results are presented below.

Survey #1: July 17-18, 2009
On the first night of inventory, one species was positively identified: big brown bat (*Eptesicus fuscus*). This detection occurred at Station D, the pond site. Points A and H were also sampled, but no calls were detected.

Survey #2: August 12-13, 2009

Three species of bat were positively identified during the second bat inventory session, of which one species was previously identified during earlier surveys. These were big brown bat, western small-footed myotis, pallid bat, Other calls indicated the presence of one or both of the following species as well: California myotis and/or Yuma myotis which share a call frequency overlap.

Survey #3: September 6-7, 2009
Five bat species were positively identified during the third session of surveys, of which one species was identified on earlier surveys. They were little brown bat (*Myotis lucifigus*), western small-footed myotis, hoary bat (*Lasiurus cinereus*), silver-haired bat and western pipistrelle (*Pipistrellus hesperus*). Also detected were the call frequencies of big brown bat and/or hoary bat which share a call frequency overlap.

Survey #4: September 21-22, 2009
One bat species was positively identified during the fourth session of surveys and was identified on previous surveys; this was the silver-haired bat. No other species were identified.

No bat species were observed during survey of the transmission lines.

P.7 DESCRIPTION OF POTENTIAL ADVERSE IMPACTS

OAR 345-021-0010(1)(p)(F) *A description of the nature, extent and duration of potential adverse impacts on the habitat identified in (B) and species identified in (D) that could result from construction, operation and retirement of the proposed facility.*

Response: This section and Table P-2 identify potential direct and indirect impacts to habitats and wildlife identified within the analysis area and survey boundaries, based on construction, operation, and retirement of the proposed Facility. To summarize:

- A documented common raven nest was located near proposed turbine 30. No other identified inactive or active raptor nests overlap the Facility.
- No Category 1 habitat will be permanently or temporarily affected by construction of the Facility.
- Less than one acre of Category 2 habitat will be temporarily (0.43 acre) and permanently (0.37 acre) affected by the Facility.
- 28.03 acres of Category 3 habitat and 19.76 acres of Category 4 habitat will be temporarily affected by the Facility.
- 17.43 acres of Category 3 habitat and 18.89 acres of Category 4 habitat will be permanently affected by the Facility.
- Approximately 52 percent (51.36 acres) of temporary impacts and 55 percent (45.27 acres) of permanent impacts will occur on Category 6 disturbed habitats.

P.7.1 Potential Impacts to Habitats

Temporary loss of habitat and disturbance to an area can occur from construction activities. Permanent loss of habitat occurs in those areas that are occupied by Facility features. Table P-2 summarizes acreage of affected habitat by type and category, fully defined for (1) the habitat analysis area, (2) temporary facilities, and (3) permanent facilities.

Direct permanent habitat loss will require compensatory mitigation. Habitat loss can increase habitat fragmentation which can, in turn, increase predation on some bird species. Mitigation proposals related to habitat are presented in section P.8 and in Attachment P-6.

Temporary impacts to habitat from Facility construction will be mitigated for on a habitat case-by-case basis. These mitigation measures, due to direct or indirect impacts, are presented in section P.8.

Based on the maximum possible area of the Facility footprint ("worst-case layout" dated December 9, 2009), most temporary and permanent impacts will occur in the Category 6 Developed/Disturbed habitats (active agricultural lands), followed by the Exotic Annual Grassland type and the Revegetated Grassland type (Table P-2). No impacts will occur to Category 1 habitat, and there was no Category 5 habitat identified within the site boundary (Table P-2).

Impacts to Category 2

A total of 0.37 acres of Category 2 habitat will be temporarily impacted and 0.43 acres will be permanently impacted. All Category 2 habitat that will be disturbed is of the Shrub-steppe—Big Sagebrush Shrub-steppe type.

Impacts to Category 3

A total of 28.03 acres of Category 3 habitat will be temporarily impacted and 17.43 acres will be permanently impacted. The Category 3 habitat types that will be disturbed temporarily in order of acreage are Revegetated Grassland (18.00 acres), Native Perennial Grassland (6.69), and Shrub-steppe—Rabbitbrush/Buckwheat Shrub-steppe (3.34). The Category 3 habitat types that will be permanently impacted include Revegetated Grassland (11.08 acres), Shrub-steppe—Rabbitbrush/Buckwheat Shrub-steppe (3.39), and Native Perennial Grassland (2.96).

Impacts to Category 4

A total of 19.76 acres of Category 4 habitat will be temporarily impacted and 18.89 acres will be permanently impacted. The Category 4 habitat types that will be disturbed temporarily in order of acreage are Exotic Annual Grassland (19.09 acres) and Old Field (0.67). The Category 4 habitat types that will be permanently impacted are Exotic Annual Grassland (18.26) and Old Field (0.63).

Impacts to Category 6

A total of 51.36 acres of Category 6 habitat will be temporarily impacted and 45.27 acres will be permanently impacted (worst-case layout). The Category 6 habitat types that will be disturbed temporarily in order of acreage are Developed—Agriculture (35.05 acres) and Developed/Disturbed—Road (16.31). The Category 6 habitat types that will be permanently impacted are Developed—Agriculture (37.75 acres), Developed—Quarry (2.00 acres) and Developed/Disturbed—Road (5.52).

P.7.2 Potential Impacts to Wildlife

Potential impacts are discussed below for birds, bats, big game, other mammals, amphibians, and reptiles. Discussion of potential impacts to special status/sensitive species is also included. To summarize:

- Overall raptor nest density within the 2009 survey area for the Summit Ridge Wind Power Facility (0.24/mi^2) is equivalent to the average of ten other wind projects in the region (0.26/mi^2). Raptor species at most risk from turbine mortality are red-tailed hawk and American kestrel, the most common raptor species in the analysis area.

- Passerine bird species most at risk include horned lark, western meadowlark, European starling, and common raven. Horned lark, due to its highest use of the Facility and history of collisions in the CPE, would be the species at greatest risk.

- Waterfowl mortality is expected to be low, based upon monitoring results of existing facilities in the region and relatively infrequent use of the lease area year-round by waterfowl and lack of aquatic habitats.

- Displacement impacts to birds in grassland and shrub-steppe habitats are anticipated to be minimal with reduced densities occurring within less than 100 meters (328 feet) of facilities located in these habitats. A small percentage of the area within 150 meters (492 feet) of the Facility is either native grassland or shrub-steppe habitats.

- Bat mortality numbers at the Facility is expected to fall within the range of fatalities at other CPE projects, which was from 0.39 to 2.47/MW/year with a mean of 1.38 and primarily involve migratory silver-haired and hoary bats.

- Little risk is expected to nonmigratory bat populations in the lease area, given the lack of habitat and fatality results of other facilities in similar habitats, and no impacts to threatened or endangered bat species are anticipated.

- No measurable impacts are anticipated to big game from Facility construction or operation.

- Facility construction will result in loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals will lose the use of the permanently affected areas; however, they are expected to repopulate the temporarily affected areas. Some small mammal fatalities can be expected from vehicle activity during operations, but impacts are expected to be very low. No evidence exists that supports the presence of Washington ground squirrels in Wasco County.

- No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation are likely to be limited to direct mortality as a result of vehicle collisions and are expected to be low.

P.7.2.1 Birds

Facility construction could affect birds through loss of habitat, potential fatalities from construction equipment, and disturbance/displacement effects from construction activities. Impacts from the retirement of the Facility are anticipated to be similar to those from construction in terms of noise, disturbance, and equipment. Potential mortality from construction equipment is expected to be very low. Equipment used in wind farm construction generally moves at slow rates (e.g., cranes) or is stationary for long periods. The risk of direct mortality from construction to avian species is most likely limited to potential destruction of a nest for ground- and shrub-nesting species. Disturbance-type impacts can be expected if construction activity occurs near an active nest or a primary foraging area. Birds displaced from these areas might move to areas with less disturbance, depending on the stage of nesting; however, breeding effort and fledging success could be affected, and foraging opportunities might be altered during the construction period.

The most probable impact to birds resulting from the operation of the Facility is direct mortality or injury caused by collisions with the turbines. Collisions could occur with resident birds foraging and flying within the lease area, or with birds migrating through the lease area. Other impacts could include abandonment of the area because of disturbance caused by the Facility, and mortality or injury caused by collisions with vehicles or other equipment.

The estimates of operational impacts to birds from wind facilities is based on the site-specific measures of bird use, bird behavior, nesting, habitat, and topography, in combination with existing information on these same metrics in other locations, in addition to direct measures of impact (e.g., mortality and displacement). Baseline and/or monitoring studies have been conducted at many other similar wind project locations, providing an existing comprehensive data source for predicting impacts to wildlife species.

Collision Overview

Substantial data on bird mortality at operating wind facilities within the Columbia Plateau Ecoregion (CPE) of the Pacific Northwest are currently available (Erickson et al., 2001; Erickson et al., 2004). These include twelve wind projects of 25 MW or greater in the CPE including: : Leaning Juniper, Vansycle, Klondike I, II, and III, Biglow Canyon, and Combine Hills in Oregon, and Big Horn, Nine Canyon, Hopkins Ridge and Wild Horse in Washington, and Stateline in both Oregon and Washington (Tables 12 and 13 in Attachment P-1). In addition, extensive pre-construction avian studies have been conducted at other nearby sites in Oregon, east of Summit in similar habitats. These include Rattlesnake Road, Hay Canyon, Wheat Field, Pebble Springs, and Golden Hills Wind Power Projects (Gritski et al., 2007; Kronner et al., 2007a; Kronner et al., 2008b; PPM, 2006; Jeffrey et al., 2008). Reports from these and other nearby wind projects were reviewed for pertinent information on species occurrence in the various habitat types.

Passerines (excluding house sparrows and European starlings) were the most common collision victims at the twelve projects described above, comprising 67 percent of the 868 fatalities documented during formal searches (Table 14 in Attachment P-1). Game birds (e.g., chukar, ring-necked pheasant, gray partridge, etc.) comprised approximately 14 percent, while raptors comprised approximately six percent of the fatalities. All bird average fatality estimates from these projects have ranged from 0.6 to 10.0 fatalities/turbine/year or 0.9 to 6.7 fatalities/MW/year (Table 13 in Attachment P-1). The only species representing more than 10 percent of the documented fatalities has been horned lark, the most commonly observed species at all of these facilities during daytime use surveys, and also one of the most frequently observed and abundant at the Summit Ridge avian use survey plots. Overall bird use within the analysis area was not unduly high relative to other open habitat project sites in the CPE, suggesting that fatality estimates observed at these twelve projects could provide a fair basis for predicting fatality impacts from the Facility, particularly for raptors.

Further discussions of potential impacts to bird groups including passerines, raptors, and waterbirds (waterfowl, shorebirds, others) as well as a discussion of indirect impacts (displacement) are described in detail below.

Raptors

Factors such as mean use, raptor nest density and existing information (pre- and post-construction avian use and fatalities) at regional wind projects were reviewed to assess potential raptor risk and species at risk for the Facility.

Wind turbine design has changed significantly since the first large wind facilities, such as those at Altamont Pass in California, were developed. For example, the mean raptor fatality estimate from eight new generation wind projects in the Midwest and west (Stateline, OR/WA; Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Buffalo Ridge, MN; Wisconsin; Buffalo Mountain, TN) was 0.04 raptor fatalities/MW/yr compared to up to approximately one raptor fatality/MW/yr (i.e., 25 times greater) at older generation wind projects such as Altamont.

Turbines are now typically installed on tubular steel towers instead of lattice towers, without open platforms at the top of the tower, eliminating perching and nesting opportunities for raptors and other birds. Raptors and ravens commonly nest on turbines within the Altamont Pass Wind Resource Area. No observations have been made of raptors perched on the new turbine types during studies at Foote Creek Rim, Wyoming (Johnson et al., 2000a), Buffalo Ridge, Minnesota (Johnson et al., 2000b), Vansycle, Oregon (Erickson et al., 2000), and Stateline, Oregon-Washington (Jeffrey per. comm), suggesting that new turbines are not a perch attractant for birds. Similarly, collisions with wires and associated electrocutions have been reduced in modern wind facilities by implementing appropriate mitigation measures, including burying overhead lines, installing anti-perching devices, etc.

Despite newer turbine technology, studies indicate a correlation between pre-construction avian use metrics and avian fatalities during post-construction surveys. For example, at the High Winds Power Project in Solano County, California, high use estimates for American kestrels and red-tailed hawks corresponded to the greatest number of avian fatalities in the two years after construction (American kestrel = 45 and red-tailed hawk = 18).

Overall raptor nest density within the 2009 survey area for the Summit Ridge Wind Power Facility (turbines plus a 2-mile buffer) was 0.24/mi^2 (not including turkey vulture and long-eared owl, 0.01/mi^2 each, for purposes of comparison), which is equivalent to the average of ten other wind projects in the region (0.26/mi^2) (Table 15 in Attachment P-1). Since red-tailed hawk nests comprised the majority of those detected, the density for this species (0.21/mi^2, assuming the unidentified *Buteo* nest was of this species) was higher than most other projects where the diversity of nesting raptors was greater.

In general, active nests identified in the Summit Ridge study area were at considerable distance from operating turbines and permanent access roads. Three active nests were within ¼ mile of proposed turbines: one each of red-tailed hawk (1,260 feet from proposed turbines), turkey vulture (1,097 feet from proposed turbines), and common raven (482 feet from proposed turbines). The four inactive, large nests that might have been constructed by golden eagles are 3,681 feet (nest in locust tree), and 10,129 feet, 4,915 feet, and 1,017 feet (cliff nests), respectively, from the nearest proposed turbines (Figure P-3).

Average annual fatality estimates for raptors (including owls) at the twelve CPE wind projects mentioned above range from 0 to 0.21 per MW/year (Table 13 in Attachment P-1). This estimated range from completed avian fatality monitoring studies in the CPE may provide a fair basis for predicting fatality impacts at the Facility, due to similarities in habitat types at Summit compared to the other CPE wind projects. Overall raptor mean use is within the range found at other CPE wind projects. Summer would be the season of highest risk to raptors, in particular American kestrel and red-tailed hawk which showed high mean use in that season (Table 6 in Attachment P-1). These two raptor species are most at risk of turbine collision at the Facility due to higher mean use estimates found during avian use surveys and the fact that they nest locally. Red-tailed hawk nests (16 within the wind farm and 4 along the transmission corridor) were observed during the aerial raptor nest survey and although American kestrel nests were not documented during surveys (due to the difficulty of locating this small falcon's nest while doing an aerial survey), this species was frequently observed using the analysis area during spring and summer avian use surveys and likely nest on-site. These two raptor species are consistently found as fatalities at other wind projects in the CPE (Table 14 in Attachment P-1). Turkey vultures are also at some risk of collision; one nest was found near the Facility (Figure P-3) and this species was recently documented as a fatality at a CPE wind energy facility (Gritski et al., 2009d).

Other diurnal raptor species at risk for collision with turbines at Summit Ridge Wind Power Facility based on their presence on the Facility and history of collision at other CPE sites include rough-legged hawk (*Buteo lagopus)*, northern harrier, prairie falcon *(Falco mexicanus)*, and Cooper's hawk *(Accipiter cooperii)*, among others (Tables 3 and 12 in Attachment P-1).

Short-eared owls, observed only once during surveys of Facility, may be found as casualties based on avian fatality monitoring results recorded at other nearby CPE wind projects (Gritski et al., 2009, Gritski et al., 2008a; Erickson, et al., 2004; NWC and WEST, 2007; Table 14 in Attachment P-1). Influencing factors that could affect potential mortality of short-eared owls include the species' year-to-year wintering population fluctuation that may be influenced by prey abundance and/or winter weather patterns (snow depth and length of time of snow cover).

Other species of owl that have been found as fatalities at regional wind projects include barn owl, great-horned owl, and long-eared owl. All aforementioned species of owl could be expected to occur at various times of the year in suitable habitats within the Facility (not throughout). One long-eared owl and one great-horned owl nest were found during 2009 surveys (within the 2-mile turbine buffer) at Summit Ridge Wind Facility.

Passerines/Songbirds

Passerines, often referred to as songbirds, have been the most abundant avian fatality at wind projects in the CPE, comprising >65% of the fatalities overall (Table 14 in Attachment P-1). Passerines include many dozens of species, which generally outnumber other groups (such as raptors), thus their collision rate may not be out of proportion to their overall relative abundance in the landscape. A review of avian fatalities at eight new generation projects in the West and Midwest (Stateline, OR/WA; Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Ponnequin, CO; Buffalo Ridge, MN; Wisconsin) showed that most fatalities are of horned lark (29.6%), followed by sparrows (13.8%), warblers (9.2%), upland game birds (8.8%), and approximately <5% for other groups of birds (Erickson et al., 2001). Overall fatality rates for birds (most presumably passerines) was approximately 3 fatalities/MW/yr in the US (Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Buffalo Ridge, MN; Wisconsin; Buffalo Mountain, TN; Mountaineer, WV; excluding older generation sites in CA; Erickson et al., 2001). One eastern US site (Buffalo Mountain, TN) had unusually high overall avian fatality rates (approximately 11 fatalities/MW/yr).

Estimates of passerine fatalities observed at some newer generation wind power projects in Washington have ranged from approximately 0.63–2.98 birds/turbine/year (Erickson et al. 2004; Erickson et al., 2007; Kronner et al., 2008a). However, at the monitored Klondike II Wind Project in Sherman County Oregon (located approximately 12 miles from Summit Ridge), the estimated number of small bird fatalities per turbine was higher at 4.46 birds/turbine/year. Golden-crowned kinglets (*Regulus satrapa)* and horned larks were the most commonly observed fatalities at Klondike II (eight and six, respectively; NWC and WEST, 2007). The cause for higher fatality rates of migrant passerines at Klondike II is not currently known. At the recently studied Leaning Juniper Project in Gilliam County Oregon, passerine fatalities were even higher with a mean estimate of 9.13 per turbine per year, or 6.09 per MW per year (Gritski et al., 2008a). The majority of passerine fatalities were breeding or wintering birds such as horned lark and European starling and approximately 26% were considered to be migrants (Gritski et al., 2008a). At the Stateline Wind Project (located further east in Umatilla County Oregon and Walla Walla County Washington), the most commonly observed avian fatalities were horned lark and golden-crowned kinglet with fatality estimates at 0.89 and 0.20 birds per turbine per year, respectively (Erickson et al., 2004). The overall fatality estimate for small birds at Stateline for the two-year study was 1.70 birds per turbine per year (Erickson et al., 2004). A smaller subset of turbines were monitored from January 2006 through December 2006 and the small bird fatalities per turbine for the year was 0.63 (Erickson et al., 2007). At Combine Hills, located near Stateline, the average fatality estimate for small birds was 1.89 fatalities per turbine per year, with horned larks the most commonly observed fatality (1.20 per turbine per year; Young et al., 2006).

Passerines were the most abundant avian group observed during studies of the Summit Ridge Wind Power Facility. Species most at risk include those with the highest use of the Facility including horned lark, western meadowlark, European starling (*Sturnus vulgaris)*, and common raven. Horned lark, due to its highest use of the Facility and history of collisions in the CPE, would be the species at greatest risk. Common ravens could have lower levels of fatalities because they appear far less susceptible to collision than would be expected based on their level of use. While ravens are usually within the top five most abundant birds observed at projects and are known to have flight heights in the turbine rotor swept area, very few have been reported as fatalities at CPE wind projects (Table 14 in Attachment P-1). Ravens are known for their relatively high intelligence levels and likely learn to avoid the new structures. Smaller numbers of migrant species (i.e. golden-crowned kinglet) and species nesting elsewhere in the region will likely also be found as fatalities at Summit Ridge Wind Facility based on trends from regional wind projects such as the recently studied Klondike II, Stateline and Big Horn wind projects.

Waterfowl and Other Waterbirds

Wind projects with year-round waterfowl use have shown the highest waterfowl fatalities, although levels of waterfowl/waterbird fatalities appear insignificant compared to use of the sites by these groups. Two Canada goose fatalities were documented at the Klondike I (OR) wind project (Johnson et al., 2003), although several Canada goose flocks were observed during pre-construction surveys (Johnson et al., 2002). They are known to forage on sprouting wheat in the extensive dryland wheat fields of the Columbia River area. Few Canada goose or other waterbird fatalities have been observed as fatalities at Stateline Wind Project (Erickson et al., 2004) or at other regional wind projects (Table 14 in Attachment P-1). One bufflehead (*Bucephala albeola)* was found at the Klondike II Wind Project (NWC and WEST, 2007). Three great-blue herons (*Ardea herodias*) have been found as fatalities at regional wind projects (Klondike III, Gritski et al., 2009; Stateline and Nine Canyon; Erickson et al., 2003; Erickson et al., 2004). Other waterbird species that have been found at regional wind projects include American coot, (*Fulica americana*), mallard (*Anas platyrhynchos*), ruddy duck *(Oxyura jamaicensis)*, western grebe *(Aechmorphorus occidentalis*), bufflehead, horned grebe (*Podiceps auritus*), and Virginia rail (*Rallus limicola*) (Table 14 in Attachment P-1).

The Top of Iowa Wind Project is located in cropland between three Wildlife Management Areas (WMAs) with historically high bird use, including migrant and resident waterfowl, shorebirds, raptors, and songbirds. During a recent study, approximately 1 million total goose-use days and 120,000 total duck-use days were recorded in the WMAs during the fall and early winter, and no waterfowl fatalities were documented during concurrent and standardized wind project fatality studies (Koford et al., 2004). Similar findings were observed at the Buffalo Ridge Wind Project in southwestern Minnesota, which is located in an area with relatively high waterfowl/waterbird use and some shorebird use. Snow geese, Canada geese and mallards were the most common waterfowl observed. A total of 55 fatalities were observed during the fatality monitoring studies and these included three species of waterfowl: two mallards, two American coots, and one blue-winged teal (Johnson et al., 2002b). One sandhill crane (*Grus canadensis tabida)* was recently found as a fatality at a wind project consisting of modern high-capacity wind turbines at the Altamont Pass Wind Resource Area, California (Altamont Pass Avian Monitoring Team, 2008).

Waterfowl observations at the Facility have included a pair of mallards, a fall flock of 30 greater white-fronted geese (*Anser albifrons*), and a winter flock of unidentified ducks (Table 4 in Attachment P-1). Aquatic habitats are limited to a few very small ponds. It is unlikely that the proposed Facility will have any significant impact on waterfowl.

Shorebirds

The only shorebirds observed during the 2005 and 2008-2009 avian use surveys were the State Sensitive-Vulnerable species long-billed curlew, killdeer (*Charadrius vociferous*), and spotted sandpiper (*Actitis macularia)* and greater yellowlegs *(Tringa melanleuca)* observed in-transit to avian surveys as well as during one bat survey. Nesting by long-billed curlews was not detected and is deemed unlikely on the Facility, given the paucity of observations.

Shorebirds as a group are rarely killed at wind projects; based on data available several years ago, of 1036 avian fatalities collected at U.S. wind projects, only one was a shorebird (a killdeer found at Buffalo Ridge, Minnesota) (Erickson *et al.,* 2001), even though shorebirds have been recorded at virtually every wind project evaluated. Only one long-billed curlew collision fatality has been found at existing wind projects (Pebble Springs, Gritski et al., 2009a) even though some wind projects have been constructed at sites where long-billed curlews were recorded during baseline avian-use studies (Kronner et al., 2005a; URS and WEST, 2001; FPLE, 2000, 2002; NWC, 2000). It is unlikely that the proposed Facility will have a negative impact on long-billed curlews. Actual fatality numbers of long-billed curlews may be higher or lower for each year during the life of the Facility. Small numbers of other shorebirds may occur as fatalities. One killdeer was found as a fatality at Leaning Juniper (Gritski et al., 2008a).

Upland Gamebirds

Some upland game bird mortality has been documented at wind projects (Erickson et al., 2001; Erickson et al., 2004). It is not clear if these mortalities were caused by striking turbine towers or blades, but there are also likely some strikes with vehicles traveling through the wind projects. Based on habitat present, results from other regional wind projects, and the presence of a few gamebirds—California quail, chukar (*Alectoris chukar*), and ring-necked pheasant (*Phasianus colchicus*)—within the Summit Ridge Wind Power Facility boundary, there is potential for mortality of some upland gamebirds to occur; however, it is expected to be infrequent.

Displacement Effects

In addition to habitat loss and direct mortality, another potential impact of the proposed Facility is displacement of wildlife using the analysis area for some portion of their life cycle. Several studies have been conducted in the United States examining the potential displacement effects on birds, usually grassland bird and raptor species (e.g., Leddy et al., 1999; Erickson et al., 2004; Osborn et al., 1998). Although displacement effects have been documented for some species/groups in the United States and Europe (e.g., mountain plovers at Foote Creek Rim in Wyoming), there is little information on whether displacement effects have any real impacts on population parameters such as population size and reproduction.

Research indicates that displacement effects were usually limited to within 100 meters (328 feet) of wind power facilities (Spaans et al. 1998; Johnson et al. 2000a) for most species. These effects have been linked primarily to direct loss of habitat from turbine foundations and access roads, as well as noise from maintenance activities (Leddy, 1996; Johnson et al., 2000a).

Preliminary results from the Stateline (Oregon-Washington) wind facility suggest a fairly small-scale impact of the wind facility on grassland nesting passerines, with a large part of the impact related to direct loss of habitat from turbine pads and roads, and temporary disturbance of habitat between turbines and road shoulders (Erickson et al., 2004). Horned larks appeared least affected, with some suggestion of displacement to grasshopper sparrows, although sample sizes were limited.

Some indirect impacts to birds in grassland and shrub-steppe habitats are anticipated. Given that only 15.5 percent of the Facility footprint is located in noncultivated or undeveloped habitats, and displacement effects have been relatively low [reduced densities less than 100 meters (328 feet) from turbines and roads] at other facilities, indirect impacts are anticipated to be minimal. A study is ongoing to document any displacement effects of grassland birds by the Summit Ridge Wind Farm. This study is being conducted by Northwest Wildlife Consultants, Inc., and will include pre- and post-construction monitoring of pre-established transects through suitable habitat. Post-construction monitoring will be conducted for five years.

P.7.2.2 Bats

Most bat species roost in structures such as buildings, caves, mines, trees, and bridges, which are rare to absent within the analysis area. Bat foraging areas such as riparian zones, shrublands, and streams and other water sources are limited in the vicinity of the Facility; therefore, the construction and decommissioning of the Facility is not anticipated to result in the loss or degradation of bat roosting and foraging habitat in the analysis area. The potential impact to bats could be from collision mortality during operation. The ability to predict impact levels, however, is much less certain than with some birds, and the discussions below do not include species-specific predictions. Available evidence indicates that susceptibility to collision correlates positively with degree of migratory behavior and foraging flight height (Arnett, 2005). Throughout the Columbia Plateau Ecoregion (CPE), fatalities have been comprised primarily of silver-haired and hoary bats, with fall being the main season of fatalities and spring and summer seasons contributing only small numbers of fatalities. Data from 12 CPE wind projects (Appendix G in Attachment P-1) show that >88% of over 464 total bat fatalities found at these CPE projects to date have been found during the period of August-October (the peak in September) and >96% of all of these bat fatalities were hoary and silver-haired bats.

Although 46 species of bats occur in the U.S., 11 species comprise all known bat fatalities at U.S. wind plants (Johnson, 2005), despite the fact that wind projects occur in several regions of the country in a variety of habitats. The three most common species of migratory bats in the U.S. (hoary, eastern red, and silver-haired bats) comprised 73% of 2,486 bat fatalities identified to species at 14 U.S. wind projects (Kunz et al., 2007).

Bat mortality numbers at the Facility is expected to fall within the range of fatalities at other CPE projects, which was from 0.39 to 2.47/MW/year with a mean of 1.38 (Table 16 in Attachment P-1). The Facility itself does not provide much foraging habitat or the types of sites used by bats for day roosting, night roosting, maternity roosting, or hibernation. Nonetheless, the Facility's proximity to the Deschutes River and the associated topographical relief and abundance of cliffs and rimrock make it likely that the incidence of bats flying over the area is highly variable and at times greater than that detected at the small number of point locations used in these surveys. As with other wind energy projects in the CPE, bat fatality rates for the Facility are expected to be lower than at many other wind projects in the United States, particularly those in the eastern U.S. where bat mortality at some projects has ranged from 28 to over 40 per turbine per year (Kerns and Kerlinger, 2004; Nicholson, 2003; Arnett et al., 2008).

Bat species composition of fatalities at the Facility will likely be similar to fatalities found at other CPE projects. Silver-haired and hoary bats (both State Sensitive-Vulnerable) comprise most of the fatalities at regional wind energy developments (Appendix G in Attachment P-1). Small numbers of other bat species, such as big brown bat (Kronner et al., 2008a), little brown bat (Erickson, et al., 2004), and other unidentified *Myotis* species, have been found at wind projects in the CPE and may also be found as fatalities at the proposed Facility.

As with other CPE projects, most bat mortality at Summit would be expected to occur from July through early fall, coinciding with the late summer dispersal/fall migration period for hoary and silver-haired bats, with the exception of a few fatalities found during May and June (Appendix G in Attachment P-1).

Unlike many species of birds, bats typically have low reproductive rates, are not long-lived, and appear to be especially vulnerable to wind turbines (BCI, 2009). Additionally, although most wind projects in the Northwest, Rocky Mountains, and upper Midwest where the habitat is open prairie and farmland have 1–3 bat fatalities/turbine/year (NWCC, 2004; Arnett, 2005; Johnson, 2005), the number of bat kills becomes more significant as the number of operating turbines increases nationwide into the thousands (Arnett, 2005). Bat Conservation International (BCI), the American Wind Energy Association (AWEA), the USFWS, and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) have initiated a research effort (the Bat Wind Energy Cooperative) to understand bat and wind turbine interactions and how bat fatalities can be prevented or minimized. Research efforts include improving pre-construction impact predictions for bat fatalities, studying the effectiveness of bat deterrent devices, and studying the effectiveness of changing turbine cut-in speed on reducing bat fatalities (Arnett et al., 2009), as well as other studies that may help to more fully understand impacts to bats from wind projects in the future.

In summary, bat fatalities at the Facility are expected to fall within the range of fatalities at other CPE wind facilities, and to consist of a similar species composition, with perhaps slightly greater species diversity than most. Predicting impacts to bats is, however, complex and uncertain, both for reasons already discussed and because Summit Ridge is relatively distant from projects in operation for which fatality monitoring has been conducted. Post-construction fatality monitoring at the Facility is expected to include the months during which bats are known to be most susceptible to collision with turbines.

P.7.2.3 Big Game

Mule deer and bighorn sheep (*Ovis canadensis*) are known to occur on or near the site. Mule deer primarily occupy grassland, shrub-steppe, and riparian habitats within the analysis area. Bighorn sheep are closely associated with the Deschutes River canyon and associated draws, and have not been observed in the turbine corridors.

During the construction period, big game in the area will likely be temporarily displaced from these habitats because of the influx of humans and heavy construction equipment and associated disturbance (e.g., blasting). Following completion of construction, disturbance levels from construction equipment and humans will diminish significantly and the primary disturbances will be associated with occasional vehicular traffic of O & M personnel, and the presence of turbines and other Facility structures.

There is limited information regarding wind project effects on big game. Observations and studies at several facilities indicate that an operating wind farm has no measurable impact on elk and pronghorn antelope use of the local habitat (Johnson et al. 2000a; Walter et al. 2004).

A study by Rost and Bailey (1979) found that wintering mule deer and elk avoided areas within 656 ft (200m) of roads in eastern portions of their Colorado study area, where presumably greater amounts of winter habitat were present. Road avoidance was greater where roads were more traveled. Only mule deer showed a clear avoidance of roads in the western portion of their study area, where winter range was assumed to be more limiting. Mule deer also showed greater avoidance of roads in shrub habitats versus more forested areas. The authors concluded that impacts of roads depended on the availability of suitable winter range away from roads, as well as the amount of traffic associated with roads.

Oregon radio-telemetry studies of elk and mule deer have been conducted in a large fenced experimental research area. Results of spring studies (April – early June) suggest that elk habitat selection may be negatively related to traffic and other human disturbance (Johnson et al. 2000c). Mule deer habitat selection appeared to be related to elk distribution, with mule deer avoiding areas used by elk. Traffic and roads did not appear to be an important factor in spring distribution of mule deer (Wisdom et al. 2002). In western Wyoming, a multi-year GPS/radio-telemetry study suggests that winter mule deer habitat selection and distribution patterns have been affected by natural gas development, specifically by road networks and well pads (Sawyer et al. 2004).

We are aware of no studies that have documented population level impacts on big game from energy projects. Most of the studies have focused on displacement of big game, but have not determined whether these displacement effects result in any significant population level effects such as decreases in survival. Due to the lack of data regarding the potential impacts of energy development on big game, it is difficult to predict with certainty the effects of the Facility on wintering mule deer and elk. While human related activity at wind turbines during regular maintenance will be dramatically less than during the construction period, it is not known if human activity associated with regular maintenance activity will exceed tolerance thresholds for wintering mule deer.

Given that the Facility is located predominantly in agricultural land and sited in open exposed environments, and that low levels of O&M activities are anticipated, no measurable impacts are anticipated to big game from Facility operations.

P.7.2.4 Small Mammals

Other mammals that are likely to or do exist within the analysis area include, badger, coyote, beaver, pocket gopher, California ground squirrel, and other small mammals such as jackrabbits, voles, and mice.

Construction of the Facility could affect small mammals through loss of habitat and direct mortality of individuals occurring in construction zones. Excavation for turbine pads, roads, or other facilities could kill individuals in underground burrows. Facility construction will result in loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals will lose the use of the permanently affected areas; however, they are expected to repopulate the temporarily affected areas. Approximately 78 percent of the Facility's permanent footprint will be on disturbed or agricultural land, minimizing the impact to small mammal habitat. Some small mammal fatalities can be expected from vehicle activity during operations, but impacts are expected to be very low.

P.7.2.5 Reptiles and Amphibians

Amphibian and aquatic reptile habitat ranges from limited to non-existent near the construction areas. Impacts to reptiles and amphibians onsite (if any) are expected through loss of habitat and direct mortality of individuals occurring in construction zones. No construction impacts to rock outcrops that might be used for hibernacula will occur. If best management practices are employed onsite in accordance with an approved erosion and sedimentation control plan, no amphibians or aquatic reptiles should be affected by construction or operation of the Facility. The level of mortality to non-aquatic reptiles onsite associated with construction will be based on the abundance of species onsite. Some mortality can be expected to reptiles that might occur onsite, such as gopher snakes and rattlesnakes. Excavation for turbine pads, roads, or other facilities could kill individuals in underground burrows.

No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation will probably be limited to some potential direct mortality caused by vehicle collisions and are expected to be very low.

P.7.2.6 Plants

Rare plants species with the potential to occur in the analysis area are listed in Attachment P-3. No special status plant species were observed during plant surveys. Thus, no impacts to special status plant species are anticipated.

P.7.3 Impacts to Special Status Wildlife Species

Bald eagle (State Threatened) is the only special status wildlife species that was detected during the avian use surveys. No other Federal or State listed, Proposed, or Candidate wildlife species have been detected during surveys conducted to date.

Special Status Raptors

Bald eagle (State Threatened) were detected on four occasions during avian use surveys, with each detection being of a single, adult individual. Three detections were within the plot (in each case a different plot; Table 7); the fourth was outside the 800-m radius of the plot (Table 4). Two detections were during winter season, whereas one was in the spring and one was during the summer survey season. This species winters along the Columbia River and is known to hunt upland for carrion and small mammals. They also have been and can be expected to pass through the site infrequently during the spring and/or fall migration, but are not expected to nest on the site or near the turbine development area. The ORNHIC database search and bald eagle reports did not identify any bald eagle nests or roosting areas within the 5 mile search area (ORNHIC, 2009; Isaacs, 2007). Bald eagles do not appear susceptible to colliding with wind turbines (unlike golden eagles), likely because of their differences in foraging habits (golden eagles are predators and move through the landscape in search of upland prey whereas bald eagles tend to feed on fish or scavenge). There have been no reported instances of a bald eagle fatality at any U.S. wind project (Erickson et al., 2001; Table 14). It seems unlikely that the Summit Ridge Wind Power Project construction or operations will have a negative effect on bald eagles.

The *golden eagle* (Eagle Protection Act) is considered at *low risk* of collision. Eleven detections of this species were made during avian use studies and while in-transit between survey points. The majority of these detections were of distant birds flying over canyons rather than the ridges where turbines are proposed. No active nests were found, though three inactive nests likely built by this species were identified.

Golden eagles are known to collide with turbines at wind projects (Erickson et al., 2001) and one was recently found as a fatality near Goodnoe Hills in Washington (Lucke, 2009). However, at the Foote Creek Rim Phase II Wind Project in Wyoming, where there is year-round golden eagle use and nesting, only one fatality was documented during a study conducted from July 1999 to December 2000 (Young et al., 2003). In addition, no golden eagle fatalities were found during a one-year carcass survey at the Condon Wind Project in Oregon (Fishman, 2003) or incidentally after the formal survey, even though 25 detections were recorded during the one-year formal pre-construction surveys and nesting occurred in the John Day River Basin within 10 to 12 miles of that project (URS and WEST, 2001). Based on relatively low use of Summit Ridge by golden eagles, and low eagle mortality at CPE operating wind projects (only 1 known), it is unlikely that the proposed Facility will have any significant impact on golden eagle populations in the area. In addition, no nesting habitat will be impacted because nesting habitat is not present within the development corridors.

Ferruginous hawk (State Sensitive-Critical) would be considered at *very low risk* of collision. Only a single individual of this species was observed during these studies, and no nests were identified. Summit Ridge lies outside the known nesting range of this species, and the ground squirrels that make breeding possible in other parts of the Columbia Basin are absent from northern Wasco County. This species does have a history of known collision at other wind projects in the CPE (Table 14 in Attachment P-1).

Swainson's hawk (State Sensitive-Vulnerable) is considered at *low risk* of collision. Only four detections of this species were made throughout these studies (all in 2005), and no nests were found. This species does have a history of known collision at other wind projects in the CPE (Table 14 in Attachment P-1).

Special Status Passerines

Grasshopper sparrow (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines due to low level flight characteristics of this species. Grasshopper sparrows were observed during spring 2009 special status wildlife surveys throughout native and disturbed habitats within the survey corridors and are presumed to breed onsite. Grasshopper sparrows were also observed at two locations along the transmission corridor. This species occurs throughout much of the CPE on and near wind project sites, but only one has been documented as a fatality at a wind project in the CPE (Table 14 in Attachment P-1). The main concern to grasshopper sparrows is the impact of habitat loss and potential displacement. Stateline Wind Project (Oregon and Washington) and South Dakota Wind Energy Center displacement study data suggest that grasshopper sparrows are displaced during their season of use (nesting season) near turbines, though it may be a temporary effect due to construction disturbance (NWC and WEST, 2007; Johnson and Shaffer, 2008;). The grassland bird displacement study initiated this year at Summit Ridge may contribute to our understanding of displacement effects on this species.

Loggerhead shrike (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines due to apparent low susceptibility to turbine collision. This species occurs throughout the U.S. where wind projects have been built, yet only two loggerhead shrikes (both in California) have been reported as fatalities at wind power facilities (Erickson et al., 2001). This species was documented near survey corridors at Summit Ridge, and suitable nesting habitat (mature sagebrush) exists in the draws between proposed turbine strings. Though no nests were documented during these studies, this species very likely breeds within the leased land of the Facility boundary.

Special Status Shorebirds

Long-billed curlew (State Sensitive-Vulnerable) appears to be at *very low risk* of collision with turbines due to its rarity on the Facility (one detection in summer and two in the spring) and the fact that only one has been found as a fatality at regional wind projects (Gritski et al. 2009b).

Special Status Mammals

White-tailed jackrabbit (State Sensitive-Vulnerable). A single individual of this species was recorded during the special status wildlife survey; it was not otherwise observed in the general area during any studies, and is deemed to be present but uncommon. Temporary and permanent loss of open shrub cover and grassland will not adversely impact this species because this habitat type is extensive where additional jackrabbits may be present.

Special Status Bats

Pallid Bat (Federal Species of Concern, State Sensitive-Vulnerable). This species was positively identified during bat inventory surveys. It is largely non-migratory, however, and its typical foraging flight height is below that of turbine rotors. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G in Attachment P-1).

Silver-haired Bat (Federal Species of Concern, State Sensitive-Vulnerable). This species was positively identified at two survey stations and on two survey nights. Its flight height and migratory nature make it susceptible to turbine strikes; this is somewhat allayed by the relative lack of suitable foraging and roosting habitat on and near the Facility.

Hoary Bat (State Sensitive-Vulnerable) was documented at two survey stations in a single survey night and was possibly detected at one of those same stations on a second survey night. This highly migratory species flies at heights that make it susceptible to collisions, and it comprises (with silver-haired bat) the majority of bat fatalities at Pacific Northwest wind energy facilities (Appendix G in Attachment P-1).

Western Small-footed Myotis (Federal Species of Concern). This species was positively identified during bat inventory surveys, but its foraging behavior generally keeps it below turbine height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G in Attachment P-1).

California Myotis (no State or Federal status) and *Yuma Myotis* (Federal Species of Concern). Calls belonging to one of these species were detected at one survey station and on one survey night. Both species are, however, non-migratory, and forage below rotor height. To date, neither of these species has been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G in Attachment P-1).

Townsend's Western Big-eared Bat (Federal Species of Concern, State Sensitive-Critical). This species was not detected during bat inventory studies at Summit Ridge. A Biological Assessment recently was prepared to address the potential for a wind project in West Virginia to impact the federally endangered Virginia big-eared bat, a subspecies of Townsend's big-eared bat (Johnson and Strickland, 2003). The Biological Assessment concluded that the collision risk to that subspecies is very low because the species is nonmigratory and forages well below the space occupied by turbine blades. Not much is known about the species' daily and seasonal activity patterns in Wasco County. A roost of 102 Townsend's big-eared bats was found in Rock Creek drainage in Klickitat County, Washington (across the Columbia River, approximately 30 miles from Summit site), and a maternity site and foraging by this species have also been documented in the general area, within Klickitat County (Kronner et al., 2005a; Kronner and Gritski, 2007). To date, using available public data, more than 464 bat fatalities have been recorded and identified at CPE wind projects and Townsend's big-eared bat has not been found and reported as a fatality at any CPE project.

Fringed Myotis (Federal Species of Concern, State Sensitive-Vulnerable). This species was not detected during bat inventory surveys at Summit Ridge; there are no records of it for the CPE, and its foraging behavior is expected to keep it generally below turbine rotors.

Spotted Bat (Federal Species of Concern). This species was not detected during bat inventory surveys. It is considered rare in Oregon, but ranges quite far on a nightly basis. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G in Attachment P-1).

Long-legged Myotis (Federal Species of Concern, State Sensitive-Vulnerable). This species was not detected during bat inventory surveys. It generally forages below rotor height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G in Attachment P-1).

Long-eared Myotis (Federal Species of Concern). This species was not detected during bat inventory surveys. It generally forages below rotor height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G in Attachment P-1).

No bats were observed along the transmission corridor.

Other Special Status Wildlife

No special status reptiles or amphibians were encountered during these studies; no adverse impacts are anticipated from the proposed Facility.

P.8 MEASURES TO AVOID, REDUCE OR MITIGATE IMPACTS

OAR 345-021-0010(1)(p)(G) *A description of any measures proposed by the applicant to avoid, reduce or mitigate the potential adverse impacts described in (F) in accordance with the ODFW mitigation goals described in OAR 635-415-0025 and a discussion of how the proposed measures would achieve those goals.*

Response:

A separate Revegetation and Weed Control Plan (Exhibit I, Attachment I-2), a Wildlife Monitoring and Mitigation Plan (Attachment P-7), and a Habitat Mitigation Plan (Attachment P-6) have been prepared in association with this application for the Facility. A brief outline of implemented and proposed measures for monitoring and mitigation is provided below.

P.8.1 Avoidance and Minimization of Impacts

The following avoidance and minimization measures will be undertaken:

- Permanent meteorological towers will not have guy wires.
- An Erosion and Sediment Control Plan will be developed in an effort to minimize impacts to habitat on the Facility.

- Where appropriate, sensitive habitats will be identified near planned construction. A biological monitor will mark areas that should not be impacted during construction, and instruct the contractor to work outside these boundaries. For sensitive species nests, the monitor will flag the nest trees or nest site (nest plus appropriate buffer) and work with the Applicant and the construction contractor to minimize work in these areas to the extent feasible.
- All construction personnel will be required to attend an environmental training course that provides information on sensitive habitats and species present on site.
- No work will be permitted outside delineated construction limits.
- An on site construction compliance manager will be on-call at all times. Periodic visits will be accomplished by a qualified biologist to ensure permit compliance.
- The Applicant will survey the status of known raptor nests in the vicinity of proposed ground-disturbing construction activities (i.e., within .5 mile) before ground-disturbing construction activities begin. If an active nest is found, and ground-disturbing construction activities are scheduled to begin before the end of the sensitive nesting and breeding season (i.e., mid-April to mid-August), the Applicant will not engage in ground-disturbing construction activities within a .25-mile buffer around the nest until the nest fledges young or the nest fails (e.g., is abandoned), unless ODFW approves an alternative plan. If ground-disturbing construction activities continue into the sensitive nesting and breeding season for the following year, the Applicant will not engage in ground-disturbing construction activities within the .25-mile buffer, if the nest site is found to be active, until the nest fledges young or the nests fails (e.g., is abandoned), unless ODFW approves an alternative plan.
- The Applicant has prepared a Revegetation and Weed Control Plan (Exhibit I, Attachment I-2). The objectives of this plan are to promote recovery of disturbed areas, re-establish native plant communities in non-cultivated areas and re-establish regular farming practices in cultivated areas, control the introduction and spread of undesirable plants, protect the site from erosion, and support existing wildlife habitat. In order to reestablish native plant communities of most value to wildlife, the appropriate native grass and other native plant species will be planted in nonagricultural areas to the maximum extent possible. This plan was developed in consultation with the Wasco County Weed Department. Reclamation success will be monitored to determine if habitats temporarily affected during construction have been restored. Approximately 0.4 acre of Category 2 habitat (big sagebrush dominated shrub-steppe), 28 acres of Category 3 habitat (including revegetated grassland, native perennial grassland and rabbitbrush-dominated shrub-steppe) and 20 acres of Category 4 habitat (including old fields and exotic annual dominated grassland) are expected to be temporarily disturbed.

P.8.2 Compensatory Mitigation

Permanent direct habitat impacts from the Facility footprint that cannot be avoided or minimized will be mitigated by the use of standards and methods that are in compliance with ODFW's Fish and Wildlife Habitat Mitigation Policy. Permanent facilities will directly impact 0.43 acre of Category 2 habitat, 17.43 acres of Category 3 habitat and 18.89 acres of

Category 4. Two proposed mitigation parcel sites were reviewed on site with two members of ODFW staff and representatives of Northwest Wildlife Consultants and the Applicant on Tuesday, May 4, 2010. These sites are identified as site no. 2 and site no. 4 in Figure 1 of the Summit Ridge Habitat Mitigation Plan (Attachment P-6). These parcels were reviewed as conservation, habitat restoration, and enhancement sites to offset the direct temporary (where needed) and permanent habitat impacts resulting from the Facility's installation in order to meet or exceed the Oregon Habitat Standards. These potential site opportunities were offered by an interested project landowner. As a result of that site visit, ODFW responded with their evaluation of the sites in a letter dated May 24, 2010 (Attachment P-8). Applicant is in agreement with the recommendations of this letter, and will undertake the improvements identified in establishing these as mitigation sites. Applicant intends to enter into a Conservation Easement with the landowner of these sites for the duration of the Facility.

Permanent impacts to 45.27 acres and temporary impacts to 51.36 acres of Category 6 habitat (agricultural) will be mitigated by:

- Noxious weed control in construction areas, as described previously
- Use of best management practices (BMPs) to minimize topsoil loss, and compliance with an erosion and sedimentation control plan approved by DEQ as part of the NPDES program in areas adjacent to drainage features
- Consulting with Wasco County Weed Department for proper procedures for restoring agricultural quality to its original condition

P.9 MONITORING PROGRAM

OAR 345-021-0010(1)(p)(H) *A description of the applicant's proposed monitoring plans to evaluate the success of the measures described in (G).*

Response:

The Applicant has developed and will implement a Wildlife Monitoring and Mitigation Plan (WMMP) (Attachment P-7) for the operational phase of the Facility to evaluate both direct and indirect impacts of the Facility on wildlife and habitat. Aspects and objectives of the monitoring proposal include avian and bat standardized fatality monitoring (casualty searches and associated study components - trials, etc.), raptor nest monitoring and training of Facility personnel on emergency response for discovered injured animals, tracking and reporting of incidental finds (whether reported by Facility employees or the monitoring contractor).

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FIGURES

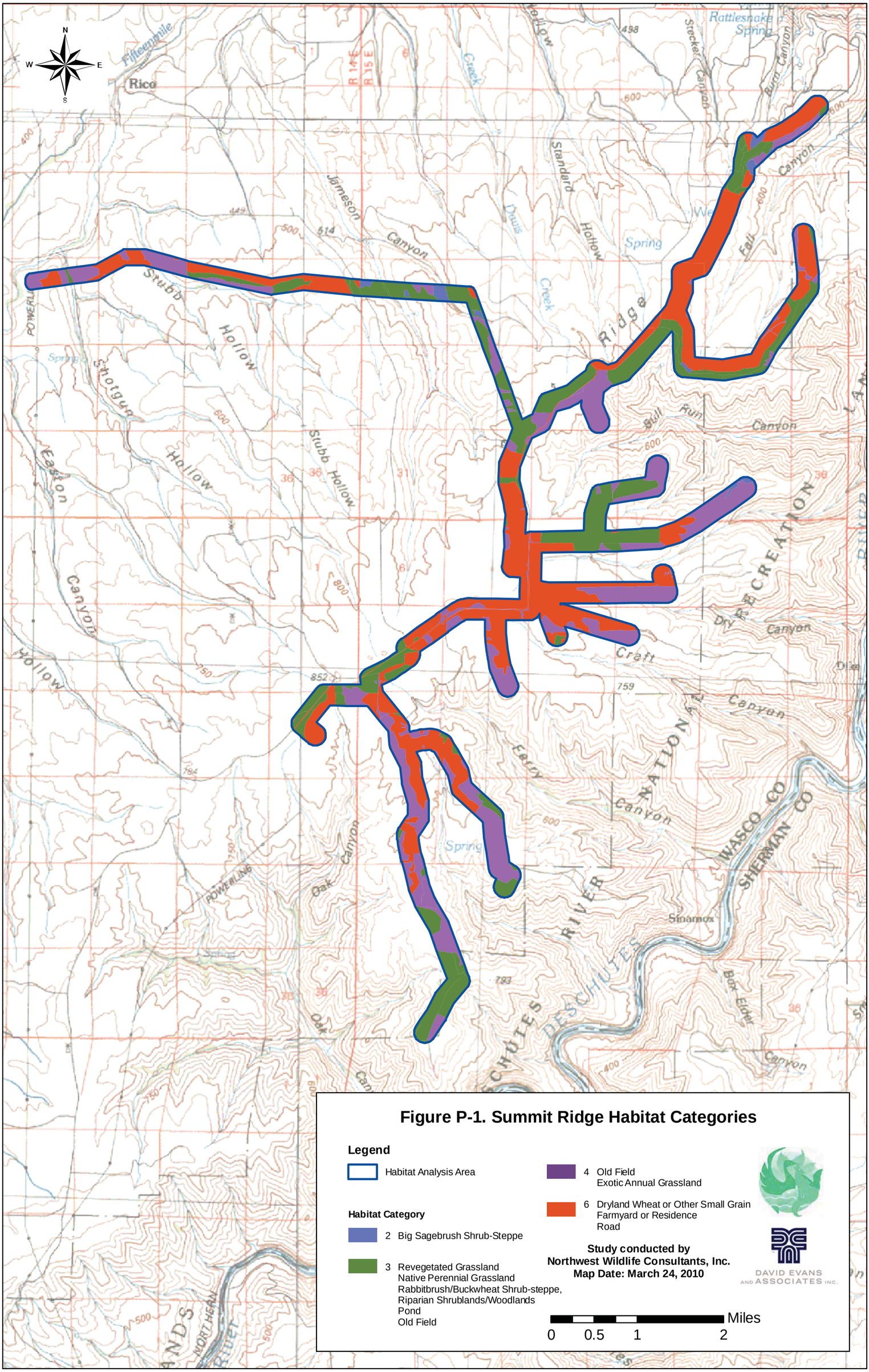

Figure P-1. Summit Ridge Habitat Categories

Legend

Habitat Analysis Area

Habitat Category

2 Big Sagebrush Shrub-Steppe

3 Revegetated Grassland
Native Perennial Grassland
Rabbitbrush/Buckwheat Shrub-steppe,
Riparian Shrublands/Woodlands
Pond
Old Field

4 Old Field
Exotic Annual Grassland

6 Dryland Wheat or Other Small Grain
Farmyard or Residence
Road

Study conducted by
Northwest Wildlife Consultants, Inc.
Map Date: March 24, 2010

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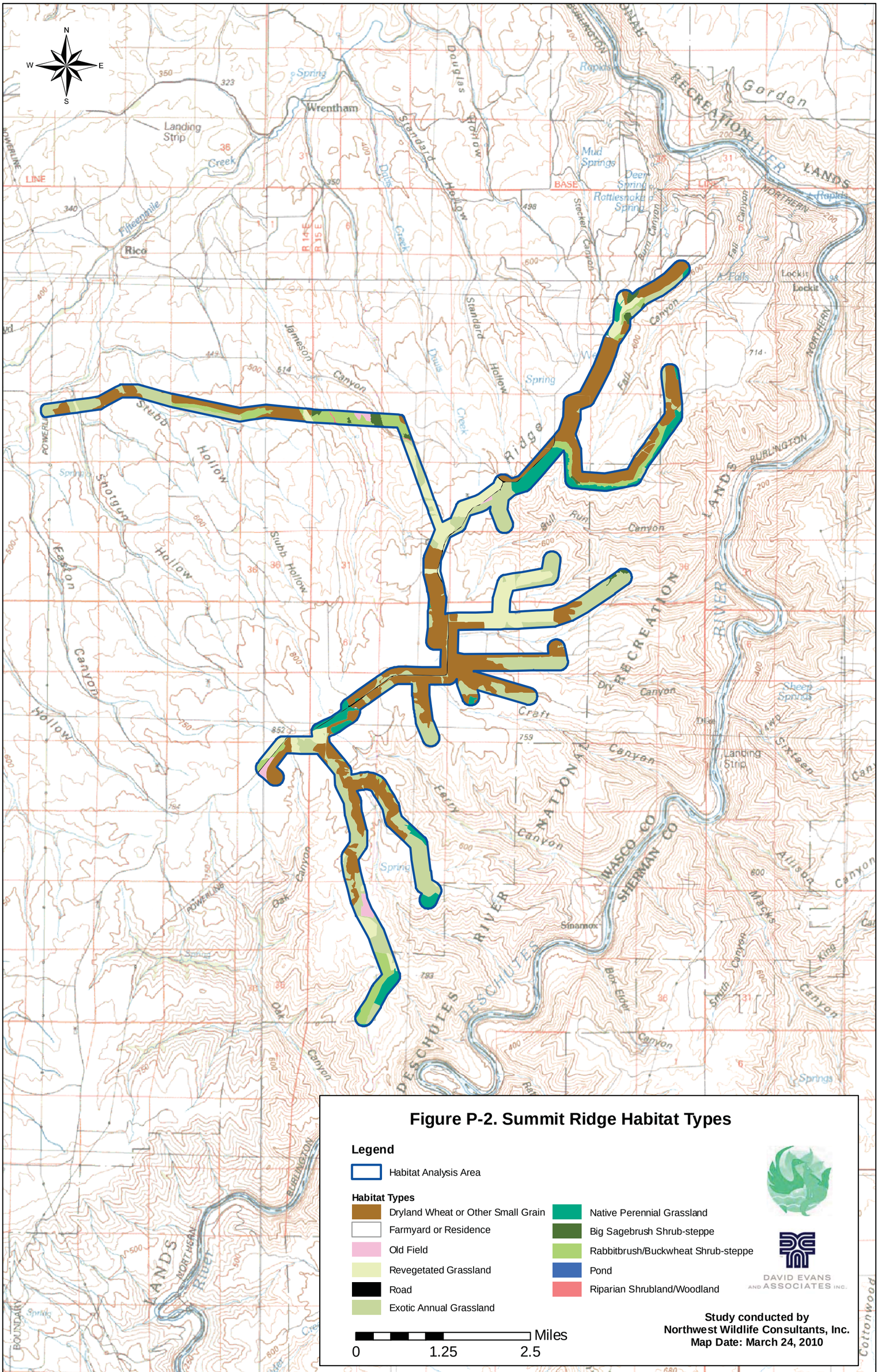

Figure P-2. Summit Ridge Habitat Types

Legend

Habitat Analysis Area

Habitat Types

- Dryland Wheat or Other Small Grain
- Farmyard or Residence
- Old Field
- Revegetated Grassland
- Road
- Exotic Annual Grassland
- Native Perennial Grassland
- Big Sagebrush Shrub-steppe
- Rabbitbrush/Buckwheat Shrub-steppe
- Pond
- Riparian Shrubland/Woodland

Miles
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DAVID EVANS AND ASSOCIATES INC.

Study conducted by
Northwest Wildlife Consultants, Inc.
Map Date: March 24, 2010

Printing Date: Monday, March 29, 2010
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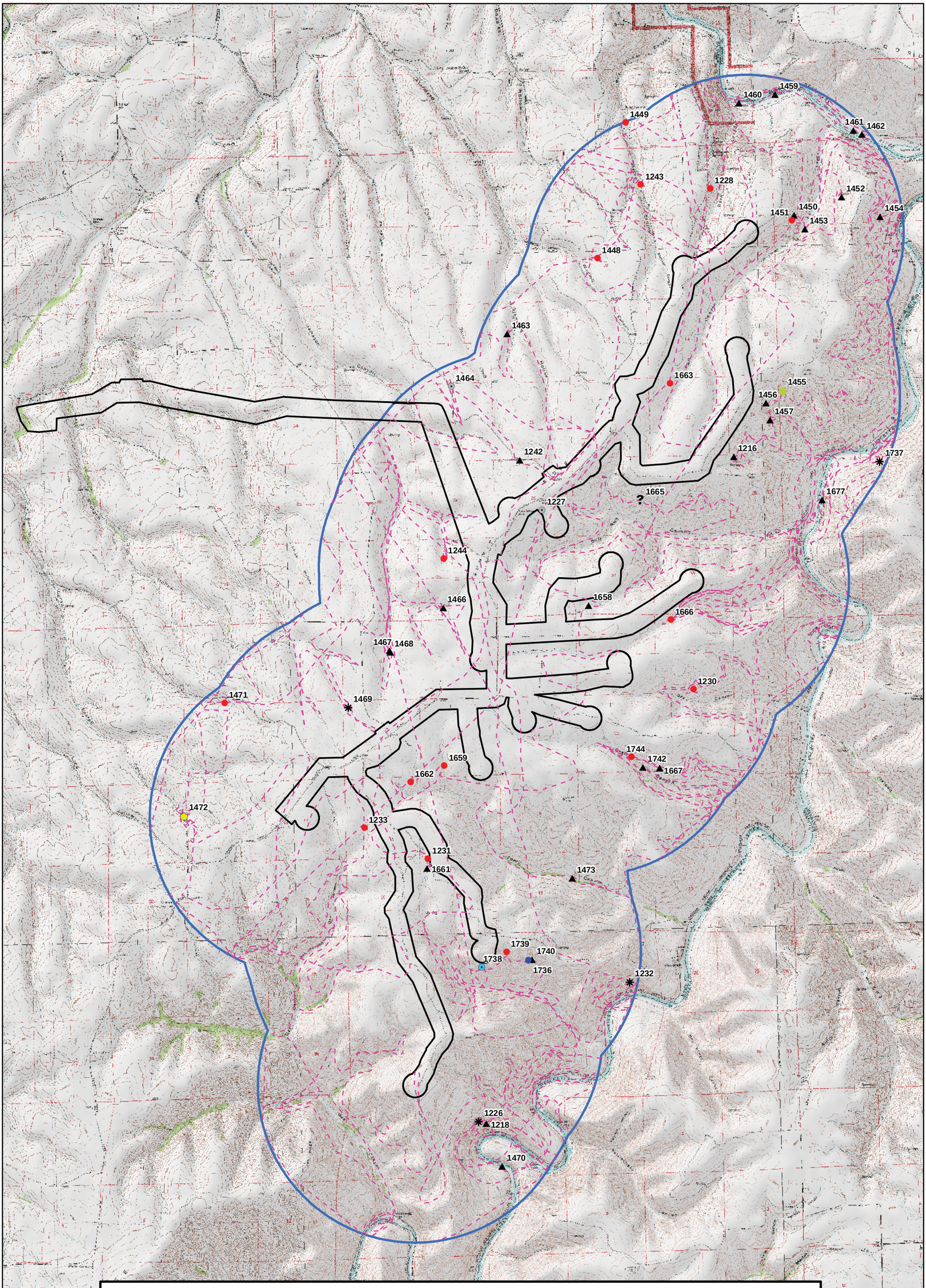

P-3. Summit Ridge Wind Project 2009 Raptor and Other Large Bird Nests

Legend

- Site Boundary
- Raptor Nest Survey Extent
- Nest Flight Track

Raptor Nests or Other Large Bird Nest

- Inactive
- Inactive - Large Stick Nest
- Common Raven
- Great Horned Owl
- Long-eared Owl
- Prairie Falcon
- Red-tailed Hawk
- Turkey Vulture
- ? Unknown Buteo

N W E S

Study Conducted by
Northwest Wildlife Consultants, Inc.
Map Date: March 24, 2010

Miles
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ATTACHMENTS

ATTACHMENT P-1

Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Farm

Consolidated Report

P-1a. Raptor Nest Survey of the Proposed Transmission Line Corridor

P-1b. Special Status Plant Survey of the Proposed Transmission Line Corridor

P-1c. Special Status Wildlife Species Survey for the Proposed Transmission Line Corridor

Ecological Baseline Studies
and
Impact Assessment
for the
Summit Ridge Wind Power Project

Wasco County, Oregon

Consolidated Report

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March 22, 2010

Final

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1.0 Introduction

This report is a consolidation of two reports that Northwest Wildlife Consultants, Inc. (NWC) developed for LotusWorks for the Summit Ridge Wind Power Project (Project) located in Wasco County, Oregon. This consolidation was made at the request of the Oregon Department of Energy during the review process for the Project's Application for Site Certificate.

The two previously issued reports for the Summit Ridge Wind Power Project are:

1. Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon, Interim Report, Draft, dated September 22, 2009 ("interim report")
2. Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon, Addendum, Final, dated December 28, 2009 ("addendum report")

The interim report summarized methods and results of reviews and site-specific surveys conducted by NWC of the Project design as of April 24, 2009, and provided an interim impact assessment and mitigation and monitoring section. The addendum report summarized the methods and results of reviews and site-specific surveys conducted by NWC of the Project design as of December 9, 2009 within the site boundary which was defined in that report as inclusive of the proposed transmission line, as well as an impact assessment and mitigation and monitoring section.

As of the December 9, 2009 layout, Summit Ridge Wind Power Project will consist of 87 2.3 megawatt (MW) turbines. The Project is expected to have a generating capacity of 200 megawatts. Other associated facilities include turbine pads, maintenance roads, overhead and underground electrical cables, an operations and maintenance building, a gravel quarry, a batch plant, and one 230-kilovolt overhead transmission line.

For this consolidated report, the most current (December 9, 2009) Project layout is discussed in the text and shown in appropriate figures, and corresponding information from the interim report using this layout has been transferred to this consolidated report. Figures and text referring to the April 24, 2009 Project design in the interim report have been omitted from this consolidated report as that information has been superseded by the more current layout. No new impact analysis is presented; all prior analysis or discussion text remains the same as in the addendum report (dated December 28, 2009).

Terminology used in this consolidated report is described below:

- Site Boundary: as defined in the addendum report, the site boundary, also called the project boundary, is inclusive of the proposed turbines and the area surrounding them as well as the proposed transmission line and surrounding area as shown on Figure 1. This differs from terminology used in the interim report which defined Project boundary as the leased land area and did not include the proposed transmission line.
- Wind Farm: For this consolidated report, the portion of the site boundary surrounding proposed turbines will be referred to as the wind farm.

- Transmission Line: For this consolidated report, the portion of the site boundary along and around the proposed transmission line will be referred to as the transmission line.

Although content of methods, results, impacts assessment, the mitigation and monitoring recommendation, and all tables, appendices, and figures within this consolidated report have not been changed from the most current and comprehensive information previously presented, the section numbering, sub-heading titles, appropriate terminology, table appendix, and figure numbers have been adjusted as necessary. While some redundancy of methods is present in this report, in several sections of the addendum report a comprehensive and updated (to the December 9, 2009 Project design) version of the methods and results were presented as transferred from the addendum report. This information superseded preliminary results for incomplete surveys presented in the interim report. The sections where only the text, tables, and figures from the addendum report were brought forward to this consolidated report included: habitat mapping and quality assessment, avian use surveys, and impact assessment, and corresponding tables, appendices, and figures.

While the addendum report included updates to regional avian and bat fatality information in the impacts assessment, fatality information in this consolidated report includes the original text from the addendum report and no further updates have been made. Any publically available information brought to the attention of the authors after the original submittal date of the addendum report (December 28, 2009) has not been included within this March 22, 2010 consolidated report for the Summit Ridge Wind Power Project in order to simplify the review process.

In summary, only text, tables, appendices, and figures from the interim report that have been superseded by more comprehensive versions (from the addendum report) have been omitted from this report, so that only final data and assessments are present in this consolidated report. Additionally, no new information or updates (after December 28, 2009 addendum report) have been added to this consolidated report. The contents of this consolidated report are summarized below.

Methods, results, and assessments presented in this consolidated report:

- Information review and database search: Methods and results of initial review and database search in January 2009 for the wind farm (and 5-mile buffer) presented in the interim report, and subsequent auxiliary database search for the proposed transmission line (and 5-mile buffer) in December 2009 as presented in the addendum report. Updated comprehensive versions of associated appendices of species with potential or documented occurrence are from the addendum report.
- Habitat mapping and quality assessment: Methods and final comprehensive results for the site boundary (inclusive of the transmission line). Comprehensive results included were as presented in the addendum report including updated tables and figures from the addendum report.
- Rare plant surveys: Final methods and results of surveys (including associated tables, appendices, and figures) which were conducted for the wind farm area as presented in the interim report.
- Avian use surveys: Comprehensive methods and final results (including updated tables and appendices) of all four seasons of study as presented in the addendum report.

- Grassland bird displacement study: Final methods and results (and associated tables) which were presented in the interim report.
- Special status wildlife species surveys: Final methods and results which were presented in the interim report.
- Preliminary, out-of-season special status wildlife species assessment of proposed transmission line: Methods and results as presented in the addendum report.
- Raptor nest survey: Final methods and results of the raptor nest survey conducted for the wind farm and corresponding 2-mile buffer area as presented in the interim report.
- Inventory of bat species: Final methods and results as presented within the addendum report.
- Big game observations: As presented in the interim report. No further updates were reported in the addendum report; however, data were reviewed for updates to the impact assessment.
- Impact assessment: The comprehensive and updated impact assessment and corresponding tables as presented in the addendum report.
- Mitigation and monitoring: This section is as presented in the addendum report.

Fish were not surveyed as part of these studies and are not addressed in this report. The nature of the wind Project developments (on gentle ridgelines or plateaus lacking perennial stream channels) precludes the presence of any fish species of concern (listed or nonlisted) or their habitats within or adjacent to the proposed developments.

1.1 Summary of Outstanding Surveys – Proposed Transmission Line Area

The surveys and reports required to complete the assessment of potential impacts of the transmission line corridor are:

- Raptor nest survey (Proposed transmission line and ½-mile buffer, excluding area already surveyed): To be conducted within first two weeks of May 2010, with report submitted by June 30, 2010.
- Special status vertebrate wildlife species survey (Proposed transmission line and 200-ft buffer): To be conducted during last two weeks of May, 2010, with report submitted by June 30, 2010.
- Special status plant survey (Proposed transmission line and 200-ft buffer): To be conducted during last two weeks of May, 2010, with report submitted by June 30, 2010.

2.0 Study Area and Habitat

The Summit Ridge Wind Power Project area lies entirely within Wasco County, Oregon, between the Deschutes River to the west and Highway 127 and the town of Dufur to the east (Figure 1). Elevation ranges from approximately 1,800 feet to about 2,800 feet (548–853 meters). As currently proposed (as of December 9, 2009) the Project site boundary consists of approximately 5,516 acres (8.6 miles^2 or 22.3 kilometers^2). The Project boundary (also referred to as the site boundary) is inclusive of both the wind farm area surrounding proposed turbines as well as the proposed transmission line. For this report, the site boundary is considered to be the same area as the wildlife survey corridors. The Project is located within the Columbia Plateau Ecoregion. For this report, the Columbia Plateau Ecoregion (CPE) is defined as the physiographic area with similar biological features reflecting broad ecological patterns in Oregon and Washington; these watersheds drain into the Columbia River.

The habitat is primarily used for agricultural purposes. Habitat types in the general Project area include dryland wheat or other small grain, exotic annual grassland, native perennial grassland, and revegetated grassland. Other habitat types present include rabbitbrush/buckwheat shrub-steppe, big sagebrush shrub-steppe, farmyard or residence, old field, road, quarry, riparian shrubland/woodland, and pond.

3.0 Study Methods

Detailed methods on each review or survey type can be found in the following sections (3.1 through 3.9) listed as follows:

- Information Review and Database search, Agency briefings
- Habitat mapping and quality assessment
- Rare plant surveys
- Avian use surveys
- Grassland bird displacement study
- Special status wildlife species surveys
- Preliminary, out-of-season special status wildlife species assessment of proposed transmission line
- Raptor nest survey
- Inventory of bat species
- Big game observations

3.1 Review of Existing Information and Database Search, Agency Briefings

3.1.1 Wind Farm

An initial database search was conducted in early 2009 to ascertain the Federal and State Endangered, Threatened, and special status species of wildlife and plants likely to be present in and near the Project area. The U.S. Fish and Wildlife Service maintains lists (by County) of Endangered, Threatened, Proposed, and Candidate species and Species of

Concern, and the electronic file list was accessed for Wasco County (Appendix A). In addition, in January 2009 a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the Project leased land boundary (as provided to NWC as of December 2008) was requested from the Oregon Natural Heritage Information Center (Figure 1; Appendix B1).

In addition to the database reviews, NWC staff with experience in the general area has searched for and reviewed pertinent biological information. Results of pre-construction ecological baseline studies of the nearby proposed Golden Hills Wind Project (Jeffrey et al., 2008) were reviewed, as well as pre-construction and/or post-construction wildlife monitoring reports from other wind projects in Oregon including Klondike I, II, and III, Hay Canyon, Biglow Canyon, and Leaning Juniper wind projects (Gritski, et al., 2007; Gritski, et al., 2008a; Gritski et al., 2009; Johnson et al., 2002; Johnson et al., 2003; NWC and WEST, 2007; Mabee et al., 2005; Jeffrey et al., 2008; BPA, 2006; WEST, 2005; Kronner et al., 2005a). Other Columbia Plateau Ecoregion studies were also reviewed and incorporated in the impact assessment where appropriate. Reports on bald eagle and peregrine falcon nesting in the Columbia Gorge area were reviewed for information on nesting of these species in the area (Isaacs, 2008; Isaacs and Anthony, 2007).

A biological study plan was prepared and distributed to appropriate Oregon Department of Fish and Wildlife (ODFW) and United States Fish and Wildlife Service (USFWS) staff for comment as well as others. A meeting of agency and Project team personnel was held on April 16, 2009. Comments by agency staff were incorporated into the survey methods for 2009 including initiation of a grassland bird displacement study and an increase in width of special status wildlife survey corridors.

3.1.2 Transmission Line

In early December 2009, a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species was requested from the Oregon Natural Heritage Information Center (ORNHIC) for lands within 5 miles of the proposed transmission line. A reply was received from ORNHIC on December 15, 2009 (Appendix B2). Combined, all areas within 5-miles of the site boundary (which includes the proposed transmission line) have been reviewed for ORNHIC species records, and this search area is shown on Figure 1.

3.2 Wildlife Habitat Mapping and Categorization

3.2.1 Wildlife Habitat Mapping

3.2.1.1 Wind Farm

Habitat mapping within the wind farm area of the Summit Ridge Wind Power Project was initiated in May 2009 and completed in August 2009 (Figures 2a and 2b). Prior to field surveys, initial habitat boundaries were delineated at a scale of 1:5,000 in a digital GIS environment using 1-meter resolution orthophotographs (image date July 27, 2005; USDA-FSA 2005). Initial boundaries were delineated based on obvious differences in vegetation, land form, and land-use and based on the biologists' extensive experience with Columbia Basin habitats. Overlay of topography, hydrology, and transportation layers aided with these delineations. Initial habitat delineations were subsequently ground-truthed during visits to the Project site on May 28, and June 10 and 30, 2009, during the peak of the vegetative/wildlife nesting season in order to verify the habitat type designations and boundaries. Any necessary boundary corrections were hand drawn on orthophoto topographic maps in the field and later transferred to the digital boundary layer. Mapping effort included reconnaissance sampling for species composition and cover in order to assess dominant, co-dominant, and common plant species within each habitat type.

This habitat mapping effort characterized land cover within the Project area at two scales; with broad-scale land cover/habitat types and finer-scale habitat subtypes (Table 1). Broad-scale land cover/habitat types were delineated from the perspective of general wildlife use (for species assemblages, e.g., shrub-steppe obligates) and include cover types for unvegetated or highly disturbed areas without any significant wildlife use value (i.e., disturbed/developed). These general habitat types were further divided into subtypes based on differences in vegetation composition and structure, where necessary, to indicate differences in wildlife use values (for individual taxa such as special status species), unique high habitat quality, or the presence of specific State listed Strategy Habitats (ODFW 2005). Habitat classifications were designated to be consistent with the six categories as defined in the Oregon State Fish and Wildlife Habitat Mitigation Policy (OAR 635-415-0025).

3.2.1.2 Transmission Line

Habitat mapping of the proposed transmission line was completed in late 2009. Prior to field surveys, initial habitat boundaries were delineated at a scale of 1:5,000 in a digital GIS environment using 1-meter resolution orthophotographs (image date July 27, 2005; USDA-FSA, 2005). Initial boundaries were delineated based on obvious differences in vegetation, land form, and land-use and based on the biologists' extensive experience with Columbia Basin habitats. Overlay of topography, hydrology, and transportation layers aided with these delineations. Habitat delineations were subsequently ground-truthed during a visit to the proposed transmission line site on November 5, 2009.

This habitat mapping effort characterized land cover within the Project area at two scales; with broad-scale land cover/habitat types and finer-scale habitat subtypes (Table 1). Broad-scale land cover/habitat types were delineated from the perspective of general wildlife use (for species assemblages, e.g., shrub-steppe obligates) and include cover types for unvegetated or highly disturbed areas without any significant wildlife use value (i.e., disturbed/developed). These general habitat types were further divided into subtypes based on differences in vegetation composition and structure, where necessary, to indicate differences in wildlife use values (for individual taxa such as special status species), unique high habitat quality, or the presence of specific State listed Strategy Habitats (ODFW, 2006). Habitat classifications were designated to be consistent with the six categories as defined in the Oregon State Fish and Wildlife Habitat Mitigation Policy (OAR 635-415-0025).

Habitat types, subtypes, and acreages of the entire site boundary presented in the Results section and in Table 1 are inclusive of both the originally mapped Project areas within the December 9, 2009 site boundary and the proposed transmission line area. Results of habitat mapping of the proposed transmission line are shown on Figure 2c of this report.

3.2.2 Habitat Categories

Habitats within the site boundary were assigned into habitat quality types based on definitions found in Oregon Administrative Rule (OAR) 635-415-0025. This rule defines six habitat categories and establishes mitigation goals and implementation standards for each category (further addressed in the Project Site Certificate Application—the SCA). Table 2 summarizes habitat types within the site boundary by habitat category for the entire Project (not just the transmission line), and Figures 3a and 3b shows the habitat in the wind farm area and Figure 3c shows the habitat categories comprising the proposed transmission line. The six habitat categories and corresponding mitigation goals and implementation standards are described below.

Habitat Category 1 - Irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species. This habitat is limited on either a physiographic province or site-specific basis, depending on the individual species, population, or unique

assemblage. The mitigation goal for Habitat Category 1 is no loss of either habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action or no authorization of the proposed development action if impacts cannot be avoided.

Habitat Category 2 - Essential habitat for a fish or wildlife species, population, or unique assemblage of species. This habitat is limited either on a physiographic province or site-specific basis depending on the individual species, population, or unique assemblage. The mitigation goal if impacts are unavoidable is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss of either pre-development habitat quantity or quality. In addition, a net benefit of habitat quantity or quality must be provided. Progress towards achieving the mitigation goals and standards will be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures will be implemented and completed either prior to or concurrent with the development action. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 3 - Essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population. The mitigation goal is no net loss of either habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and standards will be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures will be implemented and completed either prior to or concurrent with the development action. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 4 - Important habitat for fish and wildlife species. The mitigation goal is no net loss in either existing habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind or out-of-kind, in-proximity or off-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and standards will be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures will be implemented and completed either prior to or concurrent with the development action. If neither avoidance of impacts nor mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 5 - Habitat for fish and wildlife having high potential to become either essential or important habitat. The mitigation goal, if impacts are unavoidable, is to provide a net benefit in habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through actions that contribute to essential or important habitat. If neither avoidance of impacts nor

mitigation can be achieved, ODFW will recommend against or will not authorize the proposed development action.

Habitat Category 6 - Habitat that has low potential to become essential or important habitat for fish and wildlife. The mitigation goal is to minimize impacts. The implementation standard recommends or requires actions that minimize direct habitat loss and avoid impacts to off-site habitat.

3.3 Rare Plant Surveys

3.3.1 Target Species and Pre-field Review

Prior to the beginning of field surveys, NWC staff compiled a list of target rare plant taxa with potential for occurrence at the Project site (Appendix C). This list was developed by first including all rare taxa known to occur in the vicinity of the Project area from existing Oregon Natural Heritage Information Program data (Appendices B1 and B2). Several additional taxa were then added to this list after reviewing the distributions and habitats associated with other listed plant taxa known to occur in eastern Wasco and western Sherman Counties (ORNHIC, 2009; USFWS, 2008). Through this process, 19 listed plant taxa were identified as potentially occurring on the Project site and rated with low, moderate, or high likelihood of presence (Appendix C). While efforts were made to search for and identify all unique vascular plant taxa, this approach helped guide and prioritize survey efforts through specific knowledge of the vegetative associates and habitats for rare taxa likely to be encountered.

3.3.2 Field Survey of the Wind Farm

The special status plant field survey was conducted along the proposed turbine strings on June 1-2, 2009. Searches were conducted using an intuitively controlled survey method commonly used for rare plant surveys (USDA BLM/USFS, 1998; Elzinga et al., 1998). Sensitive plant searches were conducted throughout all survey corridors but with most efforts focused on areas dominated by native plant communities considered more likely to support rare plants, based on habitat associations for the rare taxa identified in the pre-field review (Appendix C). Areas with low native plant cover, such as agricultural and CRP, were surveyed less intensely, mainly to ensure that no high-potential native habitats were missed. In order to maximize the likelihood of detecting and accurately identifying rare plant species, the survey date was scheduled to coincide with known identification periods for as many "moderate" to "high" likelihood focal rare plant taxa as possible (Appendix C). All plant surveys were conducted by qualified botanists familiar with the Columbia Plateau flora in general and with specific pre-field experience and species identification training to enable accurate identification of all focal rare plant taxa. Surveys were confined to a buffer area extending 200 feet outwards from proposed turbine string center lines and access roads for a minimum total of 400-foot wide survey corridors.

During surveys, field crews were equipped with reference literature, pre-field review data, orthophotos, and handheld GPS units, to ensure adequate survey coverage and to record the locations of any listed species encountered. All vascular plant species encountered during surveys were identified to species, where possible. Potential rare taxa were definitively identified on site or, if necessary, collected and pressed for later identification in the office or through comparison to documented herbarium specimens. For plant identification, the technical keys of Hitchcock and Cronquist (1973) were used, the accepted standard reference for vascular plants of the Pacific Northwest, with frequent reference to the five-volume flora upon which this single volume is based (Hitchcock et al., 1955-1969). Currently accepted taxonomic nomenclature was obtained from the PLANTS database

(USDA, 2009). A comprehensive list of plants found during surveys can be found in Appendix E.

3.3.3 Transmission Line

Special status plant species surveys were not conducted for the proposed transmission line, but will be done in spring 2010.

3.4 Avian Use Surveys

Ten 800 meter (m) radius, non-overlapping study plots (A–J) were delineated on the Project (in the wind farm area; Figure 4). Plot placement was designed to maximize viewing and provide excellent coverage of the proposed turbine strings (2005 and December 2008 layout). Data from surveys conducted in spring and summer seasons 2005 using six of these plots (A–F) was used along with supplemental results from 2009 avian points that were not surveyed in 2005. Winter season surveys were conducted from December 2, 2008–March 15, 2009 and November 4–November 23, 2009; in all, 175 plot surveys were conducted. Some plots were missed during winter season due to weather-related inaccessibility. Spring season surveys were conducted April 21–May 25, 2005 and March 16–May 25, 2009; 11 visits were made to the 10 plots for a total of 110 plot surveys. Summer season surveys were conducted June 1–August 9, 2005 and June 1–August 10, 2009; 11 visits were made to 10 plots for a total of 110 surveys. Fall season surveys were conducted from August 20, 2009 through October 27, 2009; a total of 110 plot surveys were conducted. Thus, four full seasons of weekly surveys are analyzed and discussed in this report.

Surveys followed a variable circular-plot method (Reynolds et al., 1980) to determine species composition and relative abundance of birds using the Project and flight altitudes associated with avian use of this area. Survey protocol was similar to that used in the Columbia Basin of Oregon and Washington including the Leaning Juniper Phase I and Phase II Wind Projects (Kronner et al., 2005a), Klondike I Wind Power Project (Johnson et al., 2002), and Klondike III Wind Power Project (Mabee et al., 2005) as well as others in the region (Gritski et al., 2007; Kronner et. al, 2005; Kronner et al., 2007a and b; Kronner et al., 2008a and b). An experienced avian ecologist was positioned at the center of the plot and collected data on all wildlife seen or heard during a 20-minute observation period. This included observations both within and outside the 800-meter radius (though several analyses may use only the within-plot data). A full set of surveys (10 plots in 2008–2009 or 6 plots in 2005) was completed on the same survey day, and plots were surveyed equally during different times of day (morning, mid-day, and afternoon), to the extent feasible, to reduce temporal bias.

General data recorded included date, time, weather, and wildlife observed. Data collected on birds detected included species, number of individuals, habitat association, and behavior, including flight height and direction. All species observed and their scientific names are included in Appendix D. In addition, flight paths of raptors and other species of interest were hand-plotted in the field at the time of observation. These were plotted on individual plot maps (topographic maps with study plot boundary delineation). These maps were reviewed for discernible patterns. Whenever special status species and species of interest (including raptors) were observed while in-transit near the study plots, within the general Project area, these observations were also recorded.

3.4.1 Avian Use Data Analysis

Although a variety of data was collected on distance, flight heights, and behaviors of flying birds, only a subset of measurements in these analyses was used. The distance when a bird

was first observed was selected, unless it was > 800 m of the observer, at which point the closest distance was used, as long as it was within 800 m. The height that a bird was observed crossing the ridge was used (when possible); otherwise the height when it was first observed was used. The behavior of the bird when it was first observed flying was used, even if it had initially been perched.

The same avian-use metrics found in other studies in the region were used for this analysis (Kronner et al., 2005a and b; Mabee and Cooper, 2004; Mabee, et al. 2005 and 2007; Young et al., 2002). Standardized metrics were computed for avian species or species-groups on mean use, percent composition, and frequency of occurrence.

- *Mean use* for a species equals the mean number of individuals/20-min point count for each species and provides an index of avian relative abundance per survey point. This index does not describe density, however, because individuals may have been observed at multiple points (particularly raptors) and data were not corrected for differences in detectability.
- *Percent composition* equals the mean use for a species/total use for all species, multiplied by 100, and provides an estimate of the relative use of a particular species compared with the use of all other species.
- *Frequency of occurrence* equals the percentage of 20-min point counts in which a species is observed and it provides an index of how often a species occurs in the Project area. Mean use and frequency of occurrence reflect different aspects of abundance, in that mean use is based on the number of individuals (i.e., large flocks can produce high estimates), whereas frequency of occurrence is based on the number of flocks (i.e., it is not influenced by flock size). Together, these two estimates help one to discern the importance of high mean use values.

3.5 Grassland Bird Displacement Study

A grassland bird displacement study was conducted during the breeding season of 2009 at the request of the ODFW to potentially be used for assessing operating turbine's influences on native birds during the breeding season. Five 300-meter transects (designated 1-5 in Figure 4) were established perpendicular to and with one end beginning at a proposed turbine string. The experienced avian biologist placed these in the best existing native habitat (with preference given to native perennial grassland and shrub-steppe) that intersected the proposed turbine strings. Five control transects (designated C1-C5 in Figure 4) were established in similar habitat on the Project but as far from proposed turbines as possible (and in every case at least 800 m from the nearest proposed turbine). All transects were established far enough from one another as to avoid double counting any birds.

Each pre-established transect was surveyed on May 21, June 1-2, and June 18, 2009, during the morning hours of peak grassland bird activities. The surveyor walked each transect—beginning (for the experimental transects) at the end where turbines are proposed—recording every individual bird (with the exception of horned larks, *Eremophila alpestris*) seen or heard within 50 m of the transect. The researcher recorded each bird's distance from the observer and behavior (perched or flying, calling or singing) and the observer's distance along the transect. The distance of the bird from the proposed turbine string was later calculated from this data.

The 2009 season's surveys will serve as the baseline data for a before/after study (Morrison et al., 2001), for which any number of years of post-construction surveys can be performed (using the same transects). The difference between grassland bird use during the pre-construction and post-construction periods will be calculated for each 50 m segment away

from turbines following similar protocol of other wind energy studies (Erickson et al., 2007). The averages of these differences for each 50 m segment will be compared using t-tests and 95% confidence intervals. This study is meant to begin to assess whether grassland birds are displaced by construction and operation of wind generation facilities.

3.6 Special Status Wildlife Species Surveys

3.6.1 Wind Farm

Special status terrestrial vertebrate wildlife species surveys were conducted June 1–2, 2009 in the wind farm area. The method employed was the walking transect method through habitats in the established micro-siting corridors. Special status wildlife species that may occur in the Project area include State Endangered, Threatened, Candidate, Sensitive status species, and/or Federal "Species of Concern" (USFWS, 2008; Appendix D). Also included in the list are species that the Oregon Department of Fish and Wildlife lists as having special status ("Threatened,", "Endangered," or "Critical") (ODFW, 2008) and the U.S. Fish and Wildlife Service (USFWS) lists as "Birds of Conservation Concern" (USFWS, 2002; Appendix D). Based upon ODFW, USFWS, and ORNHIC lists and a habitat review of the area utilizing aerial photos, 19 species of birds, 12 species of mammals, and one species of reptile were determined as possibly occurring during all or part of the year within the anticipated development areas of the Summit Ridge Wind Power Project during the proposed survey period (Appendix D). These do not include numerous species of fish, turtles, amphibians, or invertebrates (snails) for which there is no suitable riverine habitat on the Project area. The surveys were conducted during the breeding or rearing season for most of the vertebrate wildlife species with potential for occurrence on the Project.

Special status wildlife surveys were conducted by experienced biologists and technicians using standard, agency-acceptable protocols, conducting walking surveys with corridors representing a 500-foot buffer of all Project facilities. General data recorded included date, time, and weather variables. Locations of species detections were recorded using hand-held Global Positioning System (GPS) units; data recorded in association with these locations include species and number, age and sex, behavior and habitat. GIS-generated maps were prepared (Figures 5a and 5b) showing locations of individuals or groups of individuals for all special status wildlife species. Species encountered in-transit while on site between survey corridors were also recorded. A comprehensive list of all avian, mammalian, reptile, and amphibian species (and their scientific names) observed during these ground transect surveys can be found in Appendix F.

3.6.2 Transmission Line

A special status wildlife species survey will be conducted for the transmission line in spring 2010 following methods described for the wind farm. In the interim, an assessment was made on November 5, 2009 of the potential for occurrence of special status wildlife species within 500 feet of the transmission line. This assessment was based on the review of existing information (Section 3.1 above) and the results of special status wildlife species surveys and other surveys conducted in the wind farm area surrounding the turbines (Section 4.6.1; Appendix D).

3.7 Raptor Nest Survey

3.7.1 Wind Farm

The objective of the raptor nest survey is to obtain information that will help predict potential impacts of the Project to nesting raptors and for micrositing project facilities during the planning stage to minimize potential direct and indirect impacts. Potential impacts include those that might occur during construction or operation of the Project and might

involve disturbance during nesting, direct loss of nest structure, or death of nesting birds or fledglings through collision with turbines. Information gained from this study is expected to be useful for avoiding, minimizing and/or mitigating impacts and for designing the post-construction monitoring program.

One aerial survey of the area was conducted over three separate days (May 4, 5 and 9, 2009) via helicopter, using an experienced biologist and a helicopter pilot experienced at this type of survey. The surveyor identified all raptor and raven nests, both active and inactive, in the wind farm area and within a two-mile buffer of the turbine strings (Figure 6). Raptors not included in this survey type were the ground-nesting owls and northern harrier (*Circus cyaneus*) and small cavity-nesters like American kestrel (*Falco sparverius*). All potential nesting areas—trees, transmission lines, and rock formations—were flown to provide complete coverage of this area. Unsafe areas such and narrow canyons and residences were not flown but were scanned from a distance. Flights were also conducted in a way that avoided disturbance to calving areas of bighorn sheep.

All raptor nests were documented and their locations recorded with a hand-held Global Positioning System (GPS) unit (Figure 6). This included all confirmed and potential nests regardless of their activity status. To determine whether a nest was active or inactive, the biologist relied on clues that included behavior of adults and presence of eggs, young, or whitewash. Attempts were made to identify the species of raptor associated with each active nest. Ground-based confirmation of nests and status were accomplished during the course of other studies (avian use surveys and special status wildlife surveys) for all nests located within the Project area. Stick nests built by common ravens (*Corvus corax*) or black-billed magpies (*Pica hudsonia*) were recorded, since these could be used by raptors in subsequent breeding seasons.

3.7.2 Transmission Line

A raptor nest survey (proposed transmission line and ½-mile buffer, excluding area already surveyed) is to be conducted within the first two weeks of May 2010, with report submitted by 30 June, 2010.

3.8 Inventory of Bat Species

The specific objectives of the bat investigation were to:

- Detect via acoustical monitoring as many bat species using the wind farm area as possible during a few nights of the warm season.
- Determine whether the wind farm area is used by two species known to be directly impacted by wind turbine projects in the Columbia Plateau during the fall migration period. These two species are silver-haired bat (*Lasionycteris noctivagans)* and hoary bat (*Lasiurus cinereus).*

Field investigations, using acoustical monitoring devices for detecting and recording bat echolocation, were conducted July 17-18, August 12-13, September 6-7 and September 21-22, 2009. These dates were all within the period of the year during which bats are known to collide with turbines in the Pacific Northwest and other regions (NWCC, 2004).

This baseline species diversity information will be used during post-construction bat fatality monitoring to determine correlation to species found as fatalities due to turbine collision vs. species documented using the general area prior to construction.

A bat habitat field review was conducted to determine which species might occur in the general vicinity of the Summit Ridge Wind Power Project area. This process involved an initial site visit in June 2009 to determine what components of bat habitat are present.

The non-invasive investigation method selected was the use of acoustical surveys with bat detectors placed at specific ground-level stations throughout the Project area. An echolocation detector (Pettersson) that recorded calls to an I-River MP3 recorder was used to sample habitats likely to be used by bats. Pettersson detectors—with time-expansion capabilities—and laptop computers equipped with analysis software were used for this investigation. Each of the surveys was conducted from sunset on the set-up date to sunrise on the take-out date.

Several locations were selected for conducting bat inventories determined by the previous bat habitat field review (Figure 7). The locations were chosen because they contained one or more of the habitat components needed by bats—food, water, and/or roosting structures—so encountering bats would be more likely than in open arid wheat fields. A combination of such habitat components is limited within the Project development area; nonetheless, water sources (pond), abandoned buildings and cliff edges were expected to have some bat activity associated with them.

Recorded (and time-expanded) call files were analyzed with SonoBat™ analysis software. Calls were sorted by quality of recording. Calls without sufficient diagnostic characteristics were not analyzed further, and the remaining calls were compared with previously recorded calls from bats of known species at other sites (library files within SonoBat™ or personal NWC library). Interpretation of bat detector calls can sometimes result in error due to call overlap among some myotis species (e.g., California myotis and Yuma myotis) and among three other species (big brown, silver-haired, and hoary bats). A conservative approach—one that used only complete calls that showed a consistent minimum frequency—was taken for identifying bats to the species level.

This method does not allow one to distinguish number of individuals of a given species; ten calls of one species may be made by ten different individuals (on the one extreme) or may represent ten calls by the same individual (on the other). What can be determined from the data is species composition at the different sites and a characterization of species diversity in the general Project area.

3.9 Big Game Observations

Because the Project may provide year-round range for deer and bighorn sheep, observations were recorded during all ground surveys and while in-transit to survey locations. No surveys were conducted specifically for big game, but their presence and numbers were documented for assessing the importance of the Project habitat to these game species. Big game observations were not recorded during the aerial raptor nest survey. Presence—and even calving areas—of bighorn sheep are well-documented in the canyons adjacent to the Project area; ODFW biologists did not suggest that the aerial nest surveys include big game counts, and requested that the helicopter avoid close approach to calving areas. Data on big game observations derived from avian use surveys were presented in the interim report (data as of September 2009). For the remaining seasons of survey, any additional big game observed were not reported in the addendum report, but were taken into account for the impacts assessment for big game (as presented in this consolidated report; Section 5.6).

4.0 Results

4.1 Review of Existing Information and Database Search

4.1.1 Wind Farm

An initial database search was conducted in early 2009 to ascertain the Federal and State Endangered, Threatened, and special status species of wildlife and plants likely to be present in and near the Project area. The U.S. Fish and Wildlife Service maintains lists (by County) of Endangered, Threatened, Proposed, and Candidate species and Species of Concern, and the electronic file list was accessed for Wasco County (Appendix A).

In addition, in January 2009 a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the Project leased land boundary surrounding the wind farm (as provided to NWC as of December 2008) was requested from the Oregon Natural Heritage Information Center (ORNHIC; Appendix B1).

The Oregon Natural Heritage Information Center database search of the wind farm boundary and surrounding 5 miles discovered 22 records of special status plant and wildlife species within the search area (Appendix B). The 22 species include special status species as rare species tracked by ORNHIC and include: one avian species, two fish species, seven invertebrate species, and two plant species. The avian species noted was State Candidate Lewis's woodpecker (*Melanerpes lewis*); one record of 100 individuals in one location was documented. Fish records include: two records of Federally Threatened and State Candidate steelhead, Middle Columbia River ESU, summer run (*Oncorhynchus mykiss* pop. 28), two records of the Middle Columbia River ESU winter run steelhead (*Oncorhynchus mykiss* pop. 29), and one record of Federally Threatened and State Candidate bull trout (*Salvelinus confluentus* pop.2). Invertebrate records include: five records of shortface lanx (giant Columbia river limpet, *Fisherola nuttalli*), three records of Federal Species of Concern Columbia pebblesnail (*Fluminicola focus*), one record of purple-lipped juga snail (*Juga hemphilli maupinensis*), one record of Shasta juga (*Juga silicula*), one record of Federal Species of Concern Oregon snail (Dalles sideband, *Monadenia fidelis minor*), one record of Dalles mountainsnail (*Oreohelix variabilis*), and one record of Columbia Gorge Hesperian snail (*Vespericola depressa*). Rare plant records include: two records of Hood River milk-vetch (*Astragalus hoodianus*), and one record of State Threatened Tygh Valley milk-vetch (*Astragalus tyghensis*). All fish and invertebrate ORNHIC records were located in the Deschutes River and do not occur within the Project boundary. The only ORNHIC record that does occur partially within the Project boundary is that of the Lewis's woodpecker (a small portion of the buffer of the record as provided by ORNHIC intersects with the southern portion of the Project).

Information collected from the ORNHIC database search, the USFWS Wasco County list of Endangered, Threatened, Proposed, and Candidate species and Species of Concern (Appendix A), were combined with general knowledge about habitat preferences and species ranges, information from biological reports for nearby wind projects, and agency inquiries, and the plant and vertebrate wildlife species with potential for occurrence within the Project area are listed in Appendices C and D.

4.1.2 Transmission Line

On December 15, 2009, a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the proposed transmission line was received from ORNHIC (Appendix B2). Their database search discovered nine records of special status plant and wildlife species within the search area. The nine records include three fish species (six records), one invertebrate species, and one plant species (two

records). Fish records include two records of Federally Threatened and State Sensitive-Critical steelhead, Middle Columbia River ESU, winter run (*Oncorhynchus mykiss* pop. 29), three records of the State Sensitive-Vulnerable Middle Columbia River ESU spring run chinook salmon (*O. tshawytscha* pop. 19), and one record of Federal Species of Concern and State Sensitive-Vulnerable Southwest Washington/Columbia River ESU Coastal cutthroat trout (*O. clarkii* pop.2). The invertebrate record was Columbia duskysnail (*Colligyrus* sp.). Both rare plant records were of Hood River milk-vetch (*Astragalus hoodianus*).

The U.S. Fish and Wildlife Service maintains lists (by County) of Endangered, Threatened, Proposed, and Candidate species and Species of Concern, and the electronic file list was accessed again for Wasco County (Appendix A). Information from this list and from the ORNHIC database search were combined with general knowledge about habitat preferences and species ranges, information from biological reports for nearby wind projects, and agency inquiries to update the list of vertebrate wildlife species with potential for occurrence within the Project area, including the transmission line (Appendix D).

4.2 Wildlife Habitat Mapping and Categorization

4.2.1 Habitat Descriptions and Wildlife Use Values

Results of wildlife habitat mapping within the entire site boundary, (inclusive of both the original Project area near proposed turbines as well as the proposed transmission line) are presented together in this report. A total of five primary types and 12 wildlife habitat subtypes were delineated within the entire site boundary and presented with acreages in Table 1 and Figures 2a and 2b. Within just the portion of the site boundary surrounding the proposed transmission line there are a total of four primary habitat types and eight subtypes (Table 1 and Figure 2c). Brief descriptions of composition, structure, wildlife habitat values and conservation status for each habitat subtype are presented below and grouped by the five general land cover types. Habitat types that are present within the entire site boundary (12 subtypes) are summarized by Oregon State Fish and Wildlife Habitat Mitigation Categories in Table 2 and Figures 3a, 3b, and 3c. Oregon Strategy Habitat statuses were attained from the Oregon Department of Fish and Wildlife (ODFW, 2006).

Developed/Disturbed *(6 subtypes)*

Dryland Wheat or Other Small Grain

These areas of actively farmed, non-irrigated small-grain cropland consist primarily of a monoculture of wheat but also include recently cultivated fallow fields expected to reenter active crop production in the near future. Crop production rotation in this area is the typical two-year cycle (fallow one year, crop the next). Lands with this designation are by nature highly disturbed and generally do not supply significant habitat for any special status wildlife or plant taxa, now or in the foreseeable future. Nonetheless, raptors were observed hunting these fields, and horned larks (*Eremophila alpestris*) forage and even nest in them, especially when in fallow or stubble condition. Some raptors occasionally hunt wheat stubble fields as well.

Farmyard or Residence

These areas are farmsteads/ranches with associated residences, outbuildings, corrals, and ancillary adjacent pasture land. They are working landscapes that can be expected to remain in a disturbed condition. Although these areas may be less important to the grassland and shrub-steppes species that historically resided in the Project area, they nonetheless provide nesting, roosting, and cover for a variety of vertebrate species, including bats, American kestrels (*Falco sparverius)*, great-horned owls (*Bubo*

virginianus) and barn owls (*Tyto alba*), quail, swallows, Say's phoebes (*Sayornis saya*), western kingbirds (*Tyrannus verticalis*), and others. This habitat type is not present within the portion of the site boundary surrounding the proposed transmission line (Figure 2c).

Old Field

These are formerly cultivated areas that have since been abandoned and are now naturally revegetating. While a minor component of native species such as rubber rabbitbrush (*Ericameria nauseosa*), native buckwheats (*Eriogonum sp.*), bluebunch wheatgrass (*Pseudoroegnaria spicata*) and Sandberg's bluegrass (*Poa secunda*) may exist, these areas are primarily comprised of invasive species such as cheatgrass (*Bromus tectorum)*, bulbous bluegrass (*Poa bulbosa*), prickly lettuce (*Lactuca serriola)*, pepperweeds (*Lepidium sp.*) and tall tumble mustard (S*isymbrium altissimum*). These areas offer marginal foraging habitat for common species such as horned lark and western meadowlark (*Sturnella neglecta)*, and would most likely require significant effort to be restored to native-like habitat.

Revegetated Grassland

Some of the lands mapped as "revegetated" are probably actively enrolled in the federal Conservation Reserve Program (CRP), an "agricultural" land use (although current CRP contract status not verified by NWC); fields are currently not being farmed for crops. Revegetated grasslands consist of a species mix of bluebunch wheatgrass, intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), Sandberg's bluegrass, and big bluegrass (*Poa ampla*). Sweet clover (*Melilotus officinale*) and alfalfa (*Medicago sativa*), nitrogen-fixing perennial forbs, are also a common element in some of these revegetated plant communities. Older plantings (>10 years) may have significant cover of native species such as rubber rabbitbrush, lupine (*Lupinus sp.*) and common yarrow (*Achillea millefolium*). Invasive grasses and forbs including cheatgrass*,* bulbous bluegrass, prickly lettuce, and tall tumble mustard were noted on some younger, less-established plantations and in harsher areas within older plantings. Revegetated grasslands, especially older, well-established plantings with some shrub cover, can have moderate wildlife use value, offering nest, cover, and forage habitat for some grassland birds, including western meadowlark, vesper sparrow (*Pooecetes gramineus)*, grasshopper sparrow (*Ammodramus savannarum)*, savannah sparrow (*Passerculus sandwichensis),* and Brewer's sparrow (*Spizella breweri)* (Johnson and O'Neil, 2001; Schroeder and Vander Haegen, 2006) as well as year-around cover and forage for northern harrier (*Circus cyaneus)*, small mammals, and mule deer (*Odocoileus hemionus*).

Road

This habitat subtype includes paved or graveled public and private roads and pullouts. Wildlife use value of this subtype is expected to be very low.

Grassland *(2 subtypes)*

Exotic Annual Grassland

Exotic annual grasslands within the Project area have developed as the result of past agricultural disturbance and/or intensive domestic livestock use, often compounded by the effects of wildfire. These areas are colonized primarily by exotic grasses and forbs such as cheatgrass, bulbous bluegrass, prickly lettuce, pepperweeds, tall tumble mustard, and a variety of other non-native, invasive species. Significant populations of an Oregon "B List" Noxious Weed, broadleaf pepperweed (*Lepidium latifolium*), were noted along Summit Ridge Road, in the center of the Project area. Ecological disruption

within these exotic-dominated communities is so severe that recovery of native plant communities is not likely to occur naturally (ecological disclimax). Wildlife use value within these areas is generally minimal, although annual invasive grasses may be of forage value early in the season.

Native Perennial Grassland

This habitat type occurs throughout the Project area on moderate to relatively steep canyon slopes. Northerly (cooler, moister) aspects, in particular, display a tendency to preserve native bunchgrass remnants even though heavy livestock grazing pressure, as evidenced by well-developed terracettes, has occurred recently. The ecological condition of these grasslands is generally poor to fair with very localized remnant patches that are in good to excellent condition.

Native perennial grasslands are characterized by relatively consistent, high cover of the taller stature bluebunch wheatgrass and shorter stature Sandberg's bluegrass. Some areas have apparently been subjected to localized and sparse supplementary seeding with the non-native species intermediate wheatgrass and crested wheatgrass. Presently, the majority of these areas classify as plant associations in the "bluebunch wheatgrass/Sandberg's bluegrass" community (Daubenmire, 1970; Franklin and Dyrness, 1988). On the northerly aspect slopes the plant associations classify cleanly within the "bluebunch wheatgrass/Idaho fescue" community. This is most probably the relatively stable long-term plant community to be expected in these more mesic locations.

Common forbs in these grasslands may include longleaf phlox (*Phlox longifolia*), annual agoseris (*Agoseris heterophylla*), fiddleneck tarweed (*Amsinckia lycopsoides*), common yarrow, maiden blue-eyed Mary (*Collinsia parviflora*), slender hawksbeard (*Crepis atrabarba*), western tansymustard (*Descurainia pinnata*), desert willow-herb (*Epilobium brachycarpum*), jagged chickweed (*Holosteum umbellatum*), big-seed biscuitroot (*Lomatium macrocarpum*), Pacific popcorn flower (*Plagiobothyrs tenellus*), tall tumble mustard, sand fringepod (*Thysanocarpus curvipes*), and yellow salsify (*Tragopogon dubius*).

Native grasslands may provide important, high-quality nesting, cover, and foraging habitat for numerous bird and small mammal species, including grasshopper sparrow, vesper sparrow, savannah sparrow, and white-tailed jackrabbit (*Lepus townsendii)*. Mule deer also commonly forage in native grasslands.

Shrub-steppe *(2 subtypes)*

Big Sagebrush Shrub-steppe

This habitat type is characterized as having 20-70% cover of basin big sagebrush (*Artemisia tridentata ssp. tridentata*) with lesser amounts of rubber rabbitbrush sometimes present. Vegetation in the understory is largely non-native, due primarily to persistent disturbance from livestock grazing. Dominant grass species in the understory include cheatgrass, brome fescue (*Vulpia bromoides*), and Sandberg's bluegrass. Bluebunch wheatgrass, while clearly subordinate, is also usually present. Common forbs include common yarrow, fiddleneck tarweed, prickly lettuce, jagged chickweed, longleaf phlox, and tall tumble mustard.

The general high structural diversity and ecological integrity of the Project's big sagebrush habitats provides valuable cover, nesting and foraging habitat for numerous wildlife species. The relatively intact big sagebrush shrub-steppe habitat near the

northern portion of the Project (Figure 2a) supplies the highest quality potential habitat for loggerhead shrike (*Lanius ludovicianus*), vesper sparrow, and Brewer's sparrow.

Rabbitbrush/Buckwheat Shrub-steppe

Vegetative cover, species composition and structural diversity are all highly variable in these shrubland communities. In the northern portion of the Project area, where these shrublands occur on moderately deep soils, overall vegetation cover is fairly high (50-80%), with well-developed shrub, grass, and forb layers. The most consistent dominant species in these deeper soil areas is rubber rabbitbrush, with buckwheat species representing only a minor component. In the south of the Project area, where soils are thin and rocky, these shrublands have much lower overall vegetative cover (30-60%). While shrub species still dominate here, these shrubs are nearly all buckwheats and "other sub-shrubs" less than one foot in height. Graminoid and forb layers are also highly variable throughout rabbitbrush/buckwheat shrub-steppe. This is due not only to the differences in soil conditions, but also to differences in domestic livestock grazing pressure.

In areas with deeper soils and lower impacts from grazing, the grass and forb layers are similar to those in the surrounding native grasslands. Here, there is a significant component of native bunchgrasses and forbs, including bluebunch wheatgrass, Sandberg's bluegrass, velvet lupine (*Lupinus leucophyllus*), desert lupine (*Lupinus aridus ssp. aridus*), longleaf phlox, common yarrow, and annual agoseris. In areas exposed to heavy domestic livestock grazing, the grass and forb layers are more similar to those in adjacent exotic annual grasslands, with exotic invasives such as cheatgrass, medusa-head rye (*Taeneatherum caput-medusae*), and bulbous bluegrass the dominant species. The grass and forb layers in areas with stony, shallow soils, while naturally sparse, are generally dominated by native dryland plants such as Sandberg's blue grass, squirrel-tail grass (*Elymus elymoides*), wild onion (*Allium* sp.) and a wide variety of other forb species. Ecological conditions range from poor, in disturbed areas dominated by weedy exotics, to fair or good in more intact native-dominated communities. These areas are used for foraging, cover, and nesting by horned larks, western meadowlarks, and vesper sparrows, among others.

Surface Water *(1 subtype)*

Pond

There are several small ponds within the Project area. Ponds within the Project area all appear to have been created as domestic livestock water sources by forming earthen barriers in the bottoms of draws. While man-made, these water sources are an important late-season resource for many wildlife species and are often key stopover locations for migrating passerines, shorebirds and migrating and resident bats. Wetlands are more-thoroughly addressed in a separate document. There are no ponds within portion of the site boundary surrounding the proposed transmission line (Figure 2c).

Woodland *(1 subtype)*

Riparian Shrubland/Woodland

These habitats have very limited extent and are confined to the narrow bottoms of draws usually having limited seasonal water. The most common vegetation elements here are riparian shrub species such as rose (*Rosa sp.*), chokecherry (*Prunus sp.*), blue elderberry (*Sambucus cerulea*), willows (*Salix sp*.), pacific serviceberry (*Amelanchier alnifolia*), and oceanspray (*Holodiscus discolor*). This type is closely associated with, and often intermixed with, the riparian woodland habitat type. These habitats, while very

limited in area, provide important foraging, nesting, and cover for both bats and residential and migratory birds such as yellow warbler (*Dendroica petechia*), lazuli bunting (*Passerina amoena*), song sparrow *(Melospiza melodia)*, California quail (*Callipepla californica*), and spotted towhee (*Pipilo maculates).* A small amount of this habitat subtype is found within the portion of the site boundary surrounding the proposed transmission line.

4.3 Rare Plant Surveys

A total of 111 vascular plant taxa were identified within designated survey corridors (Figures 5a and 5b) at the Summit Ridge Project site (Appendix E). None of these were Federal or State listed special status plant species. The early-June survey dates fell within the identification periods of all potentially occurring listed plant taxa as identified in the target plant list (Appendix C).

4.4 Avian Use Surveys

Fifty-two avian species were recorded within 800 m of plot centers (Table 3). These included 11 species of raptor. An additional raptor species, ferruginous hawk (*Buteo regalis*) was observed on a single occasion outside the 800-m radius of a survey plot (Table 4). Two other raptor species, merlin (*Falco columbarius*) and great-horned owl were observed while in-transit between survey plots (Table 5).

Avian Use

Avian use (mean number of individuals within 800 m/20-min point count) is a metric that provides an index of the numbers of birds using the Project area and, therefore, evaluates which species may be affected by the Project. Overall mean use across all seasons was dominated by passerines, particularly horned lark (Table 6). Passerines had their highest mean use values during summer season (11.900), followed by spring (10.911), and then fall season (9.909). The species of passerine with the highest use in all seasons was horned lark (Table 6).

Raptor mean use values were highest during summer (1.327), when use was comprised mainly of American kestrel (0.736) and red-tailed hawk (*Buteo jamaicensis*; 0.345). Species diversity was consistent among seasons for raptors, with seven species recorded in summer and eight species each in spring, fall, and winter. Raptor mean use was lowest in fall season (0.309) followed by winter season (0.383).

Percent Composition

Percent composition (mean use for a species/total use across all species, multiplied by 100) provides an estimate of the relative use of any particular species, relative to the use by all other species. This metric is particularly useful for identifying whether any one species or group has a dominant presence in the Project area. Passerines dominated over all other species groups throughout the year with 90.83% of all detections in spring season, 88.19% in fall, 83.32% in summer season, and 81.37% in winter season (Table 6). Horned lark, in particular, was the passerine species that had the highest percentages in all seasons with a high of 59.67% in winter season to a low of 37.43% in summer season. Other passerine species that contributed over 5% to overall composition percentages were European starling (*Sturnus vulgaris*; 12.54% in summer season and 9.19% in winter season), violet-green swallow (9.63% in fall season), and Brewer's blackbird (*Euphagus cyanocephalus*; 5.42% in fall season).

Percent composition of raptors varied from a high of 9.29% of all detections in summer season to a low of 2.75% in fall season (Table 6). The only species that contributed over 5% was American kestrel (5.16% in summer season).

Frequency of Occurrence

Frequency of occurrence (percentage of 20-min point counts in which a species was detected) provides an index of how often a species occurs in the Project area. In combination with mean use, it allows one to understand the basis of mean-use values. For example, if one large flock of Canada geese (*Branta canadensis)* is detected one time, its mean use can be high because it is based on the number of individuals, even though its frequency of occurrence is low. To understand the risks of birds near proposed structures, it is important to understand both how many birds are using the Project area (mean use) and how frequently they are using it (frequency of occurrence).

Passerines were observed at high frequencies throughout the year, including spring (99.09%), summer (96.36%), fall (83.64%), and winter seasons (80.00%; Table 6). Horned larks were frequently observed during all seasons, with the highest percentage in spring season (90.91%) and the lowest in fall (66.36%). Common raven (*Corvus corax)* was observed with rather equal frequency in all four seasons, ranging only from 18.18% (summer season) to 20.00% (spring and fall seasons).

Raptors were observed most frequently in summer (67.27%) followed by spring (42.73%), winter (30.29%), and fall season (23.64%). In summer, American kestrel was detected on 44.55% of counts, and red-tailed hawk was detected on 25.45% of counts. A similar pattern was observed in spring and fall, but in winter red-tailed hawk was seen most frequently (10.86%), followed by rough-legged hawk (*Buteo lagopus*; 8.00%), northern harrier (6.86%), and then American kestrel (5.14%).

Spatial Use

Mean use was relatively even among plots (Table 7), with horned larks contributing most of the totals at any given plot and at each season. NWC reviewed flight paths and perched locations of raptors. This review did not identify any patterns of interest. The Project area does not seem to be associated with any raptor migration routes, as evidenced by the lack of directed fall flight paths and the lower number of raptor detections in the fall season (Tables 3 and 6).

4.4.1 Special Status Species

None of the birds identified during avian use surveys were Federal Listed, Candidate, or Proposed species. A single State Threatened species, bald eagle (*Haliaeetus leucocephalus*), was detected. A single State Sensitive-Critical species, ferruginous hawk, and four State Sensitive-Vulnerable species, grasshopper sparrow, loggerhead shrike, long-billed curlew (*Numenius americanus)* and Swainson's hawk (*Buteo swainsoni)*, were detected during these surveys. Detections of special status species during other types of surveys such as ground transect, displacement surveys, or raptor nest surveys are detailed in the relevant section in this report and summarized in Appendix D.

Bald Eagle (State Threatened): This species was detected on four occasions, with each detection being of a single individual and all detections being of adult birds. Three detections were within the plot (in each case a different plot; Table 7); the fourth was outside the 800-m radius of the plot (Table 4). Two detections were during winter season, whereas one was in the spring and one was during the summer survey season.

Ferruginous Hawk (State Sensitive-Critical): A single detection of one individual ferruginous hawk was recorded in the summer season of 2005 (Table 4). The individual was outside the 800-m radius of the survey plot.

Swainson's hawk (State Sensitive-Vulnerable): There were four detections of Swainson's hawks recorded during these surveys and while in-transit between plots. All detections occurred in 2005, one in spring and three in summer season. One detection was within a survey plot (Table 3); two were at distances greater than 800 m from the plot center (Table 4), and one was while the surveyor was in-transit between plots (Table 5).

Loggerhead Shrike (State Sensitive-Vulnerable): Four detections of loggerhead shrike were recorded within the 800-m radius of survey plots (Figure 4), three in winter and one in spring. Eighteen other detections occurred while the surveyor was in-transit between survey plots. The latter were spread rather equally among all seasons.

Long-billed Curlew (State Sensitive-Vulnerable): One individual was observed flying on July 11, 2005 during avian use surveys.

Grasshopper Sparrow (State Sensitive-Vulnerable): There were four detections during spring season and six detections during summer season during avian use surveys.

Golden Eagle (Aquila chrysaetos): Although not a State listed species, is of special interest due to the fact that it is protected under the Federal Eagle Protection Act as well as being a USFWS Bird of Conservation Concern (Appendix D). There were five detections of golden eagles within the 800 meter plots, two in summer season and one each in fall, winter, and spring seasons (Table 3). In addition, there were five detections outside of study plots but during avian use surveys (three in winter season, one in spring and one in summer; Table 4). There were also five observations while in-transit to study plots (Table 5), three in winter, one in spring, and one in summer.

4.5 Grassland Bird Displacement Study

Eight species of birds were detected during the grassland bird displacement study (Table 8). Five of these eight species are considered to be primarily grassland birds: Brewer's sparrow, grasshopper sparrow, savannah sparrow, vesper sparrow, and western meadowlark. These grassland species were detected in rather low densities (Table 9), with vesper sparrow the most common (25 individual sightings), followed by western meadowlark (13 detections), and Brewer's sparrow (11 detections).

Three additional species were observed that are not considered to be primarily grassland species, including dusky flycatcher (*Empidonax oberholseri*) and rock wren (*Salpinctes obsoletus*), which were only observed once, and lazuli bunting, which was detected only three times.

None of the birds identified during this study were Federal or State Listed, Candidate, or Proposed species. A single species, grasshopper sparrow, is State Sensitive-Vulnerable (see below in Section 4.6, Special Status Wildlife Species Surveys).

On a per-transect basis, the highest number of detections was five (five Brewer's sparrows and five vesper sparrows were recorded at transect D2, Table 9), and this number includes all three surveys.

4.6 Special Status Wildlife Species Surveys

4.6.1 Wind Farm

Special status terrestrial vertebrate wildlife species surveys resulted in detection of two special status avian species and one special status mammal species; these were grasshopper sparrow, long-billed curlew, and white-tailed jackrabbit. Each of the three species is a State Sensitive-Vulnerable species and none are Federal Listed, Candidate, or Proposed species. All detections of these species are mapped on Figures 5a and 5b. A comprehensive list of all vertebrate species detected during special status wildlife species surveys, including non-status species, is found in Appendix F.

Grasshopper Sparrow (State Sensitive-Vulnerable): Fifty-five detections of this species were recorded, and some of the recorded detections were two or three individuals. Grasshopper sparrows were quite common during the breeding season, and were found singing in a variety of habitat types, including native perennial grassland, rabbitbrush/buckwheat shrub-steppe, revegetated grassland, exotic annual grassland, and old field.

Long-billed Curlew (State Sensitive-Vulnerable): Two individuals were observed in directed flight over the Project. There has been no evidence (during the year and more of study) of their nesting on the Project.

White-tailed Jackrabbit (State Sensitive-Vulnerable): A single individual and one group of pellets attributed to this species were found. To date, none have been detected during other surveys conducted on the Project. Thus, while this species is present, it apparently exists in the Project vicinity in extremely low numbers.

4.6.2 Transmission Line

On November 5, 2009, surveyors walked the survey corridor centered on the proposed transmission line, assessing the likelihood of occurrence there of special status wildlife species. The habitat is similar in the range of types and quality to that found in the original Project area (surrounding proposed turbines). Included is habitat that will likely support State Sensitive-Vulnerable grasshopper sparrows during the breeding season. In addition, some patches of sagebrush occur, and these may be sufficient in size and age to provide for nesting by State sensitive-Vulnerable loggerhead shrikes.

A single new species—one not previously detected during Project surveys—was documented during this assessment; this was a short-eared owl (*Asio flammeus*). This species has no special status, but this detection increases the number of raptor species known to use the Project at least seasonally. It is likely the species nests in the grassland habitat types nearby.

A complete special status wildlife species survey of the proposed transmission line will be conducted in spring 2010.

4.7 Raptor Nest Survey

The aerial raptor nest survey covered an area of approximately 80.5 square miles. Twenty-three active nests were found, including:

- 16 red-tailed hawk
- 1 unidentified buteo (presumed red-tailed hawk)
- 1 prairie falcon
- 1 great-horned owl

- 1 long-eared owl
- 1 turkey vulture
- 2 common raven

In addition, 29 inactive stick nests were located. Four of these were large enough to have been built by golden eagles.

None of the nests identified were of Federal or State Listed, Candidate, or Proposed species or of State Sensitive species.

Overall raptor nest density within the 2009 survey area was 0.24 nests per square mile (red-tailed hawk 0.20/mi^2, unidentified buteo 0.01/mi^2, prairie falcon *(Falco mexicanus)* 0.01/mi^2, great-horned owl 0.01/mi^2; Table 15). Although a long-eared owl (*Asio otus)* nest and a turkey vulture (*Cathartes aura)* nest (nest density 0.01/mi^2 each) were found during this aerial survey, in general nests of this species as well as burrowing owl, short-eared owl, and American kestrel are difficult to find using the aerial survey method without extensive on-the-ground surveys. Therefore, for comparison with other sites, nest density of long-eared owl and turkey vulture are not included in the total nest density or in Table 15. Nest density estimates also do not include common raven or inactive nests.

Locations of all nests detected, both active and inactive, are shown in Figure 6. Scientific names of all species are listed in Appendix F.

4.8 Inventory of Bat Species

During each of the four bat inventory sessions (July through September 2009), temperatures were relatively warm (10-15 degrees C) at the start of the sample period, and insect presence (particularly moth activity) was evident. Wind speeds varied from less than 5 to greater than 10 kph.

Seven bat species were positively identified, and two others were tentatively identified during surveys. Only the clearest of the recorded calls were used, and calls without specific diagnostic details were not used for analysis. Results are presented below.

Survey #1: July 17-18, 2009

On the first night of inventory, one species was positively identified: big brown bat (*Eptesicus fuscus*). This detection occurred at Station D, the pond site. Points A and H were also sampled, but no calls were detected.

Survey #2: August 12-13, 2009

Three species of bat were positively identified during the second bat inventory session, of which one species was previously identified during earlier surveys. These were big brown bat, small-footed myotis (*Myotis ciliolabrum*), pallid bat (*Anttrozous Pallidus*). Other calls indicated the presence of one or both of the following species as well: California myotis (*M. californicus*) and/or *Yuma myotis* (*M. yumanensis*) which share a call frequency overlap.

Survey #3: September 6-7, 2009

Five bat species were positively identified during the third session of surveys, of which one species was identified on earlier surveys. They were little brown bat (*M. lucifigus*), small-footed myotis, hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*) and western *pipistrelle* (*Pipistrellus hesperus*). Also detected were the call frequencies of big brown bat and/or hoary bat which share a call frequency overlap.

Survey #4: September 21-22, 2009
One bat species was positively identified during the fourth session of surveys and was identified on previous surveys; this was silver-haired bat. No other species were identified.

Table 10 summarizes bat species detections by survey date and Table 11 summarizes detections by survey station. As discussed above, some species were not positively distinguished from others with similar calls; these included big brown bat and hoary bat, which have call frequency overlap, as well as California myotis and Yuma myotis, which have call frequency overlap. Brief descriptions of survey station habitats can be found in Tables 10 and 11. The following describes the detections of special status bat species.

Pallid Bat (Federal Species of Concern and State Sensitive-Vulnerable) was positively identified at a single survey station on a single night of survey.

Hoary Bat (State Sensitive-Vulnerable) was positively identified at two survey stations on a single night, and possibly detected at one of those same stations on a second survey night.

Silver-haired Bat (Federal Species of Concern and State Sensitive-Vulnerable) was positively identified at two surveys stations and on two survey nights.

Small-footed Myotis (Federal Species of Concern) was positively identified at three survey stations and on two survey nights.

Either *California Myotis* (no State or Federal Status) or *Yuma Myotis* (Federal Species of Concern) or both were identified at a single survey station on a single survey night. The calls of these two species are difficult to distinguish.

4.9 Big Game Observations

During avian use surveys, there were 56 detections of mule deer (as presented in the September 22, 2009 interim report). These detections ranged from a single individual (on four occasions) to as many as 35; mean group size was 7.1 (± 4.9 Standard Deviation). Detections occurred in all months.

Bighorn sheep (*Ovis canadensis californiana*) were detected during four avian use surveys, with group size ranging from four to 24. All detections were in May and June, and sheep seemed to remain in the canyons well below the survey area at other times of the year. Both sheep and mule deer were observed during aerial raptor nest survey, particularly deep in the canyons far from the proposed Project; their numbers were not recorded as part of that survey (as described in the methods section).

5.0 Impact Assessment

5.1 Impacts to Wildlife Habitat Types and Categories

Based on the maximum possible area of Project impact ("worst-case layout" dated December 9, 2009), most temporary and permanent impacts will occur in the Category 6 Developed/Disturbed habitats (active agricultural lands), followed by the Exotic Annual Grassland type and the Revegetated Grassland type (Table 2). No impacts will occur to Category 1 habitat, and there was no Category 5 habitat identified within the site boundary (Table 2).

Impacts to Category 2

A total of 0.37 acres of Category 2 habitat will be temporarily impacted and 0.43 acres will be permanently impacted. All Category 2 habitat that will be disturbed is of the Shrub-steppe—Big Sagebrush Shrub-steppe type.

Impacts to Category 3

A total of 28.03 acres of Category 3 habitat will be temporarily impacted and 17.43 acres will be permanently impacted. The Category 3 habitat types that will be disturbed temporarily in order of acreage are Revegetated Grassland (18.00 acres), Native Perennial Grassland (6.69), and Shrub-steppe—Rabbitbrush/Buckwheat Shrub-steppe (3.34). The Category 3 habitat types that will be permanently impacted include Revegetated Grassland (11.08 acres), Shrub-steppe—Rabbitbrush/Buckwheat Shrub-steppe (3.39), and Native Perennial Grassland (2.96).

Impacts to Category 4

A total of 19.76 acres of Category 4 habitat will be temporarily impacted and 18.89 acres will be permanently impacted. The Category 4 habitat types that will be disturbed temporarily in order of acreage are Exotic Annual Grassland (19.09 acres) and Old Field (0.67). The Category 4 habitat types that will be permanently impacted are Exotic Annual Grassland (18.26) and Old Field (0.63).

Impacts to Category 6

A total of 51.36 acres of Category 6 habitat will be temporarily impacted and 45.27 acres will be permanently impacted (worst-case layout). The Category 6 habitat types that will be disturbed temporarily in order of acreage are Developed—Agriculture (35.05 acres) and Developed/Disturbed—Road (16.31). The Category 6 habitat types that will be permanently impacted are Developed—Agriculture (37.75 acres), Developed—Quarry (2.00 acres) and Developed/Disturbed—Road (5.52).

5.2 Impacts to Threatened and Endangered Plant and Wildlife Species

Plants

There were no Federal or State Listed, Proposed, or Candidate plant species documented. Thus, there are no impacts to Threatened or Endangered plant species anticipated in association with this Project.

Mammals

There were no Federal or State Listed, Proposed, or Candidate mammal species detected; the proposed Project is expected to have no impact to Endangered or Threatened mammals.

Birds

No birds classified as Threatened or Endangered by the U.S. Fish and Wildlife Service were detected. One State Threatened species, bald eagle, was detected on four occasions during avian use surveys, with each detection being of a single, adult individual. Three detections were within the plot (in each case a different plot; Table 7); the fourth was outside the 800-m radius of the plot (Table 4). Two detections were during winter season, whereas one was in the spring and one was during the summer survey season. This species winters along the Columbia River and is known to hunt upland for carrion and small mammals. They also have been and can be expected to pass through the site infrequently during the spring and/or fall migration, but are not expected to nest on the site or near the turbine development area. The ORNHIC database search and bald eagle reports did not identify any bald eagle nests or roosting areas within the 5 mile search area (ORNHIC, 2009; Isaacs, 2007). Bald eagles do not appear susceptible to colliding with wind turbines (unlike golden eagles), likely because

of their differences in foraging habits (golden eagles are predators and move through the landscape in search of upland prey whereas bald eagles tend to feed on fish or scavenge). There have been no reported instances of a bald eagle fatality at any U.S. wind project (Erickson et al*.,* 2001; Table 14). It seems unlikely that the Summit Ridge Wind Power Project construction or operations will have a negative effect on bald eagles.

5.3 Impacts to Special Status (non-listed) Plant Species

No special status plant species were detected within the studied portions of the site boundary; the Project is not expected to have any impact on special status plant species.

5.4 Impact Assessment for Avian Species

This section focuses primarily on impacts to birds from the operating turbines. The most probable impact to birds resulting from the proposed Project is direct mortality or injury due to collisions with the turbines. Collisions may occur with resident birds foraging and flying within the area, or with birds migrating through the area. Other potential, but infrequent, direct impacts could occur such as bird strikes with facility operations vehicles traveling roads away from turbine areas, but these are not discussed here.

The Summit Ridge Wind Power Project is located within the Columbia Plateau Ecoregion (CPE) of the Pacific Northwest, a region where many wind projects have been developed and studied. Pre-construction studies and fatality monitoring have been conducted at twelve wind projects of 25 MW or greater in the CPE including: Leaning Juniper, Vansycle, Klondike I, II, and III, Biglow Canyon, and Combine Hills in Oregon, and Big Horn, Nine Canyon, Hopkins Ridge and Wild Horse in Washington, and Stateline in both Oregon and Washington (Tables 12 and 13). Extensive pre-construction avian studies have been also been conducted at other nearby sites in Oregon, east of Summit in similar habitats. These include Rattlesnake Road, Hay Canyon, Wheat Field, Pebble Springs, and Golden Hills Wind Power Projects (Gritski et al., 2007; Kronner et al., 2007a; Kronner et al., 2008b; PPM, 2006; Jeffrey et al., 2008) and reports from these and other nearby wind projects have been reviewed for pertinent information on species occurrence in the various habitat types. Any publically available information or monitoring reports for regional wind projects brought to the attention of the authors after the original submittal date of the addendum report (December 28, 2009) has not been included within this March 22, 2010 consolidated report for the Summit Ridge Wind Power Project.

Project and turbine characteristics of twelve CPE wind projects where standardized fatality monitoring has been conducted are described in Table 12. All bird average fatality estimates from these projects have ranged from 0.6 to 10.0 fatalities/turbine/year or 0.9 to 6.7 fatalities/MW/year (Table 13). The only species represented by more than 10% of the observed fatalities was horned lark (Table 14), one of the most commonly observed species at all of the twelve CPE projects during daytime use surveys, and also one of the most frequently observed and abundant at the Summit Ridge avian survey plots (Table 6). Overall bird use within the Summit Ridge Project area was not unduly high relative to other open habitat project sites in the CPE, suggesting that fatality estimates observed at these twelve projects could provide a fair basis for predicting fatality impacts from the Summit Ridge Wind Power Project, particularly for raptors.

Further discussions of potential impacts to bird groups including passerines, raptors, and waterbirds (waterfowl, shorebirds, others) as well as a discussion of indirect impacts (displacement) are described in detail below.

Raptors

Factors such as mean use, raptor nest density and existing information (pre- and post-construction avian use and fatalities) at regional wind projects were reviewed to assess potential raptor risk and species at risk for the Summit Ridge Wind Power Project.

The concern for raptor collisions at wind projects arises largely from the fact that red-tailed hawks, northern harriers, golden eagles, American kestrels, prairie falcons, and turkey vultures (*Cathartes aura)* have all collided with wind turbines at Altamont, California, although most of the raptor fatalities were red-tailed hawks (Erickson et al., 2001). Comparisons with only the Altamont Pass wind project would be misleading, however, because it contains many older generation wind turbines, and many newer generation wind turbines have caused fewer raptor fatalities. For example, the mean raptor fatality estimate from eight new generation wind projects in the Midwest and west (Stateline, OR/WA; Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Buffalo Ridge, MN; Wisconsin; Buffalo Mountain, TN) was 0.04 raptor fatalities/MW/yr compared to up to approximately one raptor fatality/MW/yr (i.e., 25 times greater) at older generation wind projects such as Altamont (NWCC, 2004). At the High Winds Power Project in Solano County, California, raptor use estimates were high compared to other areas studied, particularly for American kestrels and red-tailed hawks. Corresponding to the high use by these species at the High Winds project, and despite newer turbine technology, the avian species with the greatest number of recorded fatalities in the two years after construction were American kestrel (n=45) and red-tailed hawk (n=18) (Kerlinger et al., 2006). Overall, based on regression analysis conducted by others (WEST, Inc. and others using various data sets), it appears that for raptors there is some correlation between avian use metrics from pre-construction surveys and avian fatalities during post-construction surveys (Strickland and Johnson NWCC presentation, 2006; Jeffrey et al., 2008).

Overall raptor nest density within the 2009 survey area for the Summit Ridge Wind Power Project (turbines plus a 2-mile buffer was 0.24/mi^2 (not including turkey vulture and long-eared owl (*Asio otus)*, 0.01/mi^2 each, for purposes of comparison), which is equivalent to the average of ten other wind projects in the region (0.26/mi^2; Table 15). Since red-tailed hawk nests comprised the majority of those detected, the density for this species (0.21/mi^2, assuming the unidentified *Buteo* nest was of this species) was higher than most other projects where the diversity of nesting raptors was greater.

In general, active nests identified in the Summit Ridge study area were at considerable distance from operating turbines and permanent access roads. Three active nests were within ¼ mile of proposed turbines: one each of red-tailed hawk (1,260 feet from proposed turbines), turkey vulture (1,097 feet from proposed turbines), and common raven (482 feet from proposed turbines). The four inactive, large nests that might have been constructed by golden eagles are 3,681 feet (nest in locust tree), and 10,129 feet, 4,915 feet, and 1,017 feet (cliff nests) from the nearest proposed turbines (shown on Figure 6).

Average annual fatality estimates for raptors (including owls) at the twelve CPE wind projects mentioned above range from 0 to 0.21 per MW/year (Table 13). This estimated range from completed avian fatality monitoring studies in the CPE may provide a fair basis for predicting fatality impacts at the Summit Ridge Wind Power Project, due to similarities in habitat types at Summit compared to the other CPE wind projects. Overall raptor mean use is within the range found at other CPE wind projects. Summer would be the season of highest risk to raptors, in particular American kestrel and red-tailed hawk which showed high mean use in that season (Table 6). These two raptor species are most at risk of turbine collision at the Summit Ridge Wind Power Project due to higher mean use estimates found during avian use surveys and the fact that they nest locally. Red-tailed hawk nests (16)

were observed during the aerial raptor nest survey and although American kestrel nests were not documented during surveys (due to the difficulty of locating this small falcon's nest while doing an aerial survey), this species was frequently observed using the Project area during spring and summer avian use surveys (Table 6) and likely nest on-site. These two raptor species are consistently found as fatalities at other wind projects in the CPE (Table 14). Turkey vultures are also at some risk of collision; one nest was found near the Project (Figure 6) and this species was recently documented as a fatality at a CPE wind energy facility (Gritski et al., 2009d).

Other diurnal raptor species at risk for collision with turbines at Summit Ridge Wind Power Project based on their presence on the Project and history of collision at other CPE sites include rough-legged hawk, northern harrier, prairie falcon, and Cooper's hawk *(Accipiter cooperii)*, among others (Tables 3 and 12). Risk to special status raptors is discussed in Sections 5.2 and 5.5).

Short-eared owls, observed only once during surveys of Summit Ridge Wind Project, may be found as casualties based on avian fatality monitoring results recorded at other nearby CPE wind projects (Gritski et al., 2009, Gritski et al., 2008a; Erickson, et al., 2004; NWC and WEST, 2007; Table 14). Influencing factors that could affect potential mortality of short-eared owls include the species' year-to-year wintering population fluctuation that may be influenced by prey abundance and/or winter weather patterns (snow depth and length of time of snow cover).

Other species of owl that have been found as fatalities at regional wind projects include barn owl, great-horned owl, and long-eared owl (Table 14). All aforementioned species of owl could be expected to occur at various times of the year in suitable habitats within the Project (not throughout). One long-eared owl and one great-horned owl nest were found during 2009 surveys (within the 2-mile turbine buffer) at Summit Ridge Wind Project.

Passerines

Passerines, often referred to as songbirds, have been the most abundant avian fatality at wind projects in the CPE, comprising >65% of the fatalities overall (Table 14). Passerines include many dozens of species, which generally outnumber other groups (such as raptors), thus their collision rate may not be out of proportion to their overall relative abundance in the landscape. A review of avian fatalities at eight new generation projects in the West and Midwest (Stateline, OR/WA; Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Ponnequin, CO; Buffalo Ridge, MN; Wisconsin) showed that most fatalities are of horned lark (29.6%), followed by sparrows (13.8%), warblers (9.2%), upland game birds (8.8%), and approximately <5% for other groups of birds (Erickson et al., 2001). Overall fatality rates for birds (most presumably passerines) was approximately 3 fatalities/MW/yr in the US (Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Buffalo Ridge, MN; Wisconsin; Buffalo Mountain, TN; Mountaineer, WV; excluding older generation sites in CA; Erickson et al., 2001). One eastern US site (Buffalo Mountain, TN) had unusually high overall avian fatality rates (approximately 11 fatalities/MW/yr).

Estimates of passerine fatalities observed at some newer generation wind power projects in Washington have ranged from approximately 0.63−2.98 birds/turbine/year (Erickson et al. 2004; Erickson et al., 2007; Kronner et al., 2008a). However, at the monitored Klondike II Wind Project in Sherman County Oregon (located approximately 12 miles from Summit Ridge), the estimated number of small bird fatalities per turbine was higher at 4.46 birds/turbine/year. Golden-crowned kinglets (*Regulus satrapa)* and horned larks were the most commonly observed fatalities at Klondike II (eight and six, respectively; NWC and WEST, 2007). The cause for higher fatality rates of migrant passerines at Klondike II is not

currently known. At the recently studied Leaning Juniper Project in Gilliam County Oregon (located approximately 35 miles from Summit), passerine fatalities were even higher with a mean estimate of 9.13 per turbine per year, or 6.09 per MW per year (Gritski et al., 2008a). The majority of passerine fatalities were breeding or wintering birds such as horned lark and European starling and approximately 26% were considered to be migrants (Gritski et al., 2008a). At the Stateline Wind Project (located further east in Umatilla County Oregon and Walla Walla County Washington), the most commonly observed avian fatalities were horned lark and golden-crowned kinglet with fatality estimates at 0.89 and 0.20 birds per turbine per year, respectively (Erickson et al., 2004). The overall fatality estimate for small birds at Stateline for the two-year study was 1.70 birds per turbine per year (Erickson et al., 2004). A smaller subset of turbines were monitored from January 2006 through December 2006 and the small bird fatalities per turbine for the year was 0.63 (Erickson et al., 2007). At Combine Hills, located near Stateline, the average fatality estimate for small birds was 1.89 fatalities per turbine per year, with horned larks the most commonly observed fatality (1.20 per turbine per year; Young et al., 2006).

Passerines were the most abundant avian group observed during studies of the Summit Ridge Wind Power Project. Species most at risk include those with the highest use of the Project including horned lark, western meadowlark, European starling, and common raven. Horned lark, due to its highest use of the Project (Table 6) and history of collisions in the CPE (Table 14), would be the species at greatest risk. Common ravens, could have lower levels of fatalities because they appear far less susceptible to collision than would be expected based on their level of use. While ravens are usually within the top five most abundant birds observed at projects and are known to have flight heights in the turbine rotor swept area, very few have been reported as fatalities at CPE wind projects (Table 14). Ravens are known for their relatively high intelligence levels and likely learn very fast to avoid the new structures. Smaller numbers of migrant species (i.e. golden-crowned kinglet) and species nesting elsewhere in the region will likely also be found as fatalities at Summit Ridge Wind Project based on trends from regional wind projects such as the recently studied Klondike II, Stateline I and II, and Big Horn wind projects.

Waterfowl and other Waterbirds

Wind projects with year-round waterfowl use have shown the highest waterfowl fatalities, although levels of waterfowl/waterbird fatalities appear insignificant compared to use of the sites by these groups. Two Canada goose fatalities were documented at the Klondike I (OR) wind project (Johnson et al., 2003), although several Canada goose flocks were observed during pre-construction surveys (Johnson et al., 2002). They are known to forage on sprouting wheat in the extensive dryland wheat fields of the Columbia River area. Few Canada goose or other waterbird fatalities have been observed as fatalities at Stateline Wind Project (Erickson et al., 2004) or at other regional wind projects (Table 14). One bufflehead (*Bucephala albeola)* was found at the Klondike II Wind Project (NWC and WEST, 2007). Three great-blue herons (*Ardea herodias*) have been found as fatalities at regional wind projects (Klondike III, Gritski et al., 2009; Stateline and Nine Canyon; Erickson et al., 2003; Erickson et al., 2004). Other waterbird species that have been found at regional wind projects include American coot, (*Fulica americana*), mallard (*Anas platyrhynchos*), ruddy duck *(Oxyura jamaicensis)*, western grebe *(Aechmorphorus occidentalis*), bufflehead, horned grebe (*Podiceps auritus*), and Virginia rail (*Rallus limicola*) (Table 14).

The Top of Iowa Wind Project is located in cropland between three Wildlife Management Areas (WMAs) with historically high bird use, including migrant and resident waterfowl, shorebirds, raptors, and songbirds. During a recent study, approximately 1 million total goose-use days and 120,000 total duck-use days were recorded in the WMAs during the fall and early winter, and no waterfowl fatalities were documented during concurrent and

standardized wind project fatality studies (Koford et al., 2004). Similar findings were observed at the Buffalo Ridge Wind Project in southwestern Minnesota, which is located in an area with relatively high waterfowl/waterbird use and some shorebird use. Snow geese, Canada geese and mallards were the most common waterfowl observed. A total of 55 fatalities were observed during the fatality monitoring studies and these included three species of waterfowl: two mallards, two American coots, and one blue-winged teal (Johnson et al., 2002b). One sandhill crane (*Grus canadensis tabida)* was recently found as a fatality at a wind project consisting of modern high-capacity wind turbines at the Altamont Pass Wind Resource Area, California (Altamont Pass Avian Monitoring Team, 2008).

Waterfowl observations at the Summit Ridge Wind Power Project have included a pair of mallards a fall flock of 30 greater white-fronted geese (*Anser albifrons;* Table 4), and a winter flock of unidentified ducks (Table 3). Aquatic habitats are limited to a few very small ponds. It is unlikely that the proposed Project will have any significant impact on waterfowl.

Shorebirds

The only shorebirds observed during the 2005 and 2008-2009 avian use surveys were the State Sensitive-Vulnerable species long-billed curlew and a killdeer (*Charadrius vociferous;* Table 3)*,* and spotted sandpiper (*Actitis macularia)* and greater yellowlegs *(Tringa melanleuca)* observed in-transit to avian surveys as well as during one bat survey (Appendix D)*.* Nesting by long-billed curlews was not detected and is deemed unlikely on the Project, given the paucity of observations.

Shorebirds as a group are rarely killed at wind projects; based on data available several years ago, of 1036 avian fatalities collected at U.S. wind projects, only one was a shorebird (a killdeer found at Buffalo Ridge, Minnesota) (Erickson *et al.,* 2001), even though shorebirds have been recorded at virtually every wind project evaluated. Only one long-billed curlew collision fatality has been found at existing wind projects (Pebble Springs, Gritski et al., 2009a) even though some wind projects have been constructed at sites where long-billed curlews were recorded during baseline avian-use studies (Kronner et al., 2005a; URS, 2001; FPLE, 2000, 2002a; NWC, 2000). It is unlikely that the proposed Project will have a negative impact on long-billed curlews. Actual fatality numbers of long-billed curlews may be higher or lower for each year during the life of the Project. Small numbers of other shorebirds may occur as fatalities. One killdeer was found as a fatality at Leaning Juniper (Gritski et al., 2008a).

Upland Gamebirds

Some upland game bird mortality has been documented at wind projects (Erickson et al., 2001; Erickson et al., 2004). It is not clear if these mortalities were caused by striking turbine towers or blades, but there are also likely some strikes with vehicles traveling through the wind projects. Based on habitat present, results from other regional wind projects, and the presence of a few gamebirds—California quail, chukar (*Alectoris chukar*), and ring-necked pheasant (*Phasianus colchicus*)—within the Summit Ridge Wind Power Project area, there is potential for mortality of some upland gamebirds to occur; however, it is expected to be infrequent.

5.5 Impacts to Special Status Vertebrate Wildlife Species

This section discusses potential direct and indirect impacts of the construction and operation of the Project to special status avian species and other species of vertebrate wildlife. Bats are discussed in Section 5.7.

Special Status Raptors

The *golden eagle* (Eagle Protection Act) is considered at *low risk* of collision. Twelve detections of this species were made during avian use studies and while in-transit between survey points. The majority of these detections were of distant birds flying over canyons rather than the ridges where turbines are proposed. No active nests were found, though three inactive nests likely built by this species were identified.

Golden eagles are known to collide with turbines at wind projects (Erickson et al., 2001) and one was recently found as a fatality near Goodnoe Hills in Washington (Kidder and Every, 2009). However, at the Foote Creek Rim Phase II Wind Project in Wyoming, where there is year-round golden eagle use and nesting, only one fatality was documented during a study conducted from July 1999 to December 2000 (Young et al., 2003). In addition, no golden eagle fatalities were found during a one-year carcass survey at the Condon Wind Project in Oregon (Fishman, 2003) or incidentally after the formal survey, even though 25 detections were recorded during the one-year formal pre-construction surveys and nesting occurred in the John Day River Basin within 10 to 12 miles of that project (URS and WEST, 2001). Based on relatively low use of Summit Ridge by golden eagles, and low eagle mortality at CPE operating wind projects (only 1 known), it is unlikely that the proposed Project will have any significant impact on golden eagle populations in the area. In addition, no nesting habitat will be impacted because nesting habitat is not present within the site boundary.

Ferruginous hawk (State Sensitive-Critical) would be considered at *very low risk* of collision. Only a single individual of this species was observed during these studies, and no nests were identified. Summit Ridge lies outside the known nesting range of this species, and the primary prey—ground squirrels—that make breeding possible in other parts of the Columbia Basin are absent from northern Wasco County. This species does have a history of known collision at other wind projects in the CPE (Table 14).

Swainson's hawk (State Sensitive-Vulnerable) is considered at *low risk* of collision. Only four detections of this species were made throughout these studies (all in 2005), and no nests were found. This species does have a history of known collision at other wind projects in the CPE (Table 14).

Special Status Passerines

Grasshopper sparrow (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines due to low level flight characteristics of this species. Grasshopper sparrows were observed during spring 2009 special status wildlife surveys throughout native and disturbed habitats within the wildlife survey corridors and are presumed to breed onsite. This species occurs throughout much of the CPE on and near wind project sites, but only one has been documented as a fatality at a wind project in the CPE (Table 14). The main concern to grasshopper sparrows is the impact of habitat loss and potential displacement. Stateline Wind Project (Oregon and Washington) and South Dakota Wind Energy Center displacement study data suggest that grasshopper sparrows are displaced during their season of use (nesting season) near turbines, though it may be a temporary effect due to construction impact to habitat (NWC and WEST, 2007; Johnson and Shaffer, 2008;). The grassland bird displacement study initiated in 2009 at Summit Ridge may contribute to the understanding of displacement effects on this species.

Loggerhead shrike (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines due to apparent low susceptibility to turbine collision. This species occurs throughout the U.S. where wind projects have been built, yet only two loggerhead shrikes (both in California) have been reported as fatalities at wind power facilities (Erickson et al., 2001). This species was documented near survey wildlife survey corridors at Summit Ridge,

and suitable nesting habitat (mature sagebrush) exists in the draws between proposed turbine strings. Though no nests were documented during these studies, this species very likely breeds near the Project area.

Special Status Shorebirds

Long-billed curlew (State Sensitive-Vulnerable) appears to be at *very low risk* of collision with turbines due to its rarity on the Project (one detection in summer and 2 in spring) and the fact that only one has been found as a fatality at regional wind projects (Gritski et al., 2009b).

Special Status Mammals

White-tailed jackrabbit (State Sensitive-Vulnerable) appears to be at *low risk* of impacts from the proposed Project. A single individual of this species was recorded during the special status wildlife survey; it was not otherwise observed in the general area during any studies, and is deemed to be present but uncommon. A small amount of temporary and permanent loss of open shrub cover and grassland is expected; proposed habitat conservation and enhancement is expected to adequately mitigate for such loss.

Other Special Status Wildlife

No special status reptiles or amphibians were encountered during these studies; no adverse impacts are anticipated from the proposed Project.

5.6 Other Wildlife

Potential impacts to other wildlife, including nonlisted mammals, amphibians, and reptiles are expected to be less than significant. No measurable impacts are anticipated to big game from operations. They may be temporarily displaced during construction, as has been noted at other wind projects. Construction may result in loss of foraging and breeding habitat for nonlisted small mammals, such as northern pocket gopher (*Thomomys talpoides)*, Ord's kangaroo rat (*Dipodymys ordi)*, and badger (*Taxidea taxus*). Ground-dwelling mammals will lose the use of the permanently affected areas; however, they are expected to repopulate the temporarily affected areas. Some small mammal fatalities can be expected from vehicle activity during operations, but impacts are expected to be very low. No impacts to amphibians are anticipated during operations; no aquatic habitat impacts are anticipated. Impacts to reptiles during operation are likely to be limited to direct mortality as a result of vehicle collisions and are expected to be low.

5.7 Impacts to Bats

The primary impact to bats will be turbine collision mortality. The ability to predict impact levels, however, is much less certain than with some birds, and the discussions below do not include species-specific predictions (as do discussions of other taxa in this report). Available evidence indicates that susceptibility to collision correlates positively with degree of migratory behavior and foraging flight height (Arnett, 2005). Throughout the Columbia Plateau Ecoregion (CPE), fatalities have been comprised primarily of silver-haired and hoary bats, with fall being the main season of fatalities and spring and summer seasons contributing only small numbers of fatalities (Appendix G). Data from 12 CPE wind projects (Appendix G) show that >88% of over 464 total bat fatalities found at these CPE projects to date have been found during the period of August-October (the peak in September) and >96% of all of these bat fatalities were hoary and silver-haired bats.

Although 46 species of bats occur in the U.S., 11 species comprise all known bat fatalities at U.S. wind plants (Johnson, 2005), despite the fact that wind projects occur in several regions of the country in a variety of habitats. The three most common species of migratory

bats in the U.S. (hoary, eastern red, and silver-haired bats) comprised 73% of 2,486 bat fatalities identified to species at 14 U.S. wind projects (Kunz et al., 2007).

Because the Townsend's big-eared bat (*Corynorhinus townsendii)* is a State Sensitive-Critical species, other literature was reviewed to more thoroughly understand the biology of this bat species and potential use of habitat near wind turbines. A Biological Assessment recently was prepared to address the potential for a wind project in West Virginia to impact the federally endangered Virginia big-eared bat, a subspecies of Townsend's big-eared bat (Johnson and Strickland, 2003). The Biological Assessment concluded that the collision risk to that subspecies is very low because the species is nonmigratory and forages well below the space occupied by turbine blades. Not much is known about the species' daily and seasonal activity patterns in Wasco County. A roost of 102 Townsend's big-eared bats was found in Rock Creek drainage in Klickitat County, Washington (across the Columbia River, approximately 30 miles from Summit site), and a maternity site and foraging by this species have also been documented in the general area, within Klickitat County (Kronner et al., 2005a; Kronner and Gritski, 2007). To date, using available public data, more than 464 bat fatalities have been recorded and identified at CPE wind projects and Townsend's big-eared bat has not been found and reported as a fatality at any CPE project.

Bat mortality numbers at the Summit Ridge Project is expected to fall within the range of fatalities at other CPE projects, which was from 0.39 to 2.47/MW/year with a mean of 1.38 (Table 16). The Project itself does not provide much foraging habitat or the types of sites used by bats for day roosting, night roosting, maternity roosting, or hibernation. Nonetheless, the Project's proximity to the Deschutes River and the associated topographical relief and abundance of cliffs and rimrocks make it likely that the incidence of bats flying over the area is highly variable and at times greater than that detected at the small number of point locations used in these surveys. As with other wind energy projects in the CPE, bat fatality rates for the Summit Ridge Project are expected to be lower than at many other wind projects in the United States, particularly those in the eastern U.S. where bat mortality at some projects has ranged from 28 to over 40 per turbine per year (Kerns and Kerlinger, 2004; Nicholson, 2003; Arnett et al., 2008).

Bat species composition of fatalities at the Summit Ridge Wind Power Project will likely be similar to fatalities found at other CPE projects (and fatality rates, Table 16). Silver-haired and hoary bats (both State Sensitive-Vulnerable) comprise most of the fatalities at regional wind energy developments (Appendix G). Small numbers of other bat species, such as big brown bat (Kronner et al., 2008a), little brown bat (Erickson, et al., 2004), and other unidentified *Myotis* species, have been found at wind projects in the CPE and may also be found as fatalities at the proposed Project.

As with other CPE projects, most bat mortality at Summit would be expected to occur from July through early fall, coinciding with the late summer dispersal/fall migration period for hoary and silver-haired bats, with the exception of a few fatalities found during May and June (Appendix G).

Unlike many species of birds, bats typically have low reproductive rates, are not long-lived, and appear to be especially vulnerable to wind turbines (BCI, 2009). Additionally, although most wind projects in the Northwest, Rocky Mountains, and upper Midwest where the habitat is open prairie and farmland have 1−3 bat fatalities/turbine/year (NWCC, 2004; Arnett, 2005; Johnson, 2005), the number of bat kills becomes more significant as the number of operating turbines increases nationwide into the thousands (Arnett, 2005). Bat Conservation International (BCI), the American Wind Energy Association (AWEA), the USFWS, and the U.S. Department of Energy's National Renewable Energy Laboratory

(NREL) have initiated a research effort (the Bat Wind Energy Cooperative) to understand bat and wind turbine interactions and how bat fatalities can be prevented or minimized. Research efforts include improving pre-construction impact predictions for bat fatalities, studying the effectiveness of bat deterrent devices, and studying the effectiveness of changing turbine cut-in speed on reducing bat fatalities (Arnett et al., 2009), as well as other studies that may help to more fully understand impacts to bats from wind projects in the future.

In summary, bat fatalities at Summit Ridge Wind Power Project are expected to fall within the range of fatalities at other CPE wind facilities, and to consist of a similar species composition, with perhaps slightly greater species diversity than most. Predicting impacts to bats is, however, complex and uncertain, both for reasons already discussed and because Summit Ridge is relatively distant from projects in operation for which fatality monitoring has been conducted. Post-construction fatality monitoring of this Project is expected to include the months during which bats are known to be most susceptible to collision with turbines.

Special Status Bats

Pallid Bat (Federal Species of Concern, State Sensitive-Vulnerable). This species was positively identified during bat inventory surveys. It is largely non-migratory, however, and its typical foraging flight height is below that of turbine rotors. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).

Silver-haired Bat (Federal Species of Concern, State Sensitive-Vulnerable). This species was positively identified at two survey stations and on two survey nights. Its flight height and migratory nature make it susceptible to turbine strikes; this is somewhat allayed by the relative lack of suitable foraging and roosting habitat on and near the Summit Ridge Project.

Hoary Bat (State Sensitive-Vulnerable) was documented at two survey stations in a single survey night and was possibly detected at one of those same stations on a second survey night. This highly migratory species flies at heights that make it susceptible to collisions, and it comprises (with silver-haired bat) the majority of bat fatalities at Pacific Northwest wind energy facilities (Appendix G).

Small-footed Myotis (Federal Species of Concern). This species was positively identified during bat inventory surveys, but its foraging behavior generally keeps it below turbine height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).

California Myotis (no State or Federal status) and *Yuma Myotis* (Federal Species of Concern). Calls belonging to one of these species were detected at one survey station and on one survey night. Both species are, however, non-migratory, and forage below rotor height. To date, neither of these species has been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).

Townsend's Western Big-eared Bat (Federal Species of Concern, State Sensitive-Critical). This species was not detected during bat inventory studies at Summit Ridge. It is largely unknown from the CPE, though a roost was located approximately 30 miles away in Klickitat County, Washington (Kronner et al., 2005a; Kronner and Gritski, 2007). This species has not been identified as a fatality at any wind energy projects in the CPE.

Fringed Myotis (Federal Species of Concern, State Sensitive-Vulnerable). This species was not detected during bat inventory surveys at Summit Ridge; there are no records of it for the CPE, and its foraging behavior is expected to keep it generally below turbine rotors.

Spotted Bat (Federal Species of Concern). This species was not detected during bat inventory surveys. It is considered rare in Oregon, but ranges quite far on a nightly basis. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).

Long-legged Myotis (Federal Species of Concern, State Sensitive-Vulnerable). This species was not detected during bat inventory surveys. It generally forages below rotor height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).

Long-eared Myotis (Federal Species of Concern). This species was not detected during bat inventory surveys. It generally forages below rotor height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).

6.0 Mitigation and Monitoring

A separate Revegetation Plan, a Wildlife Monitoring and Mitigation Plan, and a Habitat Mitigation Plan are being prepared in association with the application for the Summit Ridge Wind Power Project. A brief outline of implemented and proposed measures for monitoring and mitigation is provided below.

6.1 Avoidance and Minimization of Habitat Impacts

1. Planning Phase

Several measures were implemented during planning of the Project. These measures resulted in either avoidance or minimization of impacts to native habitat and special status plants and animals, where feasible. These measures were discussed with USFWS and ODFW in April 2009. The following measures were implemented:

- Habitat Reviews and Mapping: Land cover and wildlife habitats were delineated and entered into GIS databases. This information was used by Project planners when designing Project footprints. Existing disturbed habitats were selected for placement of Project footprint and related construction activities with a goal of retaining as much native habitat as feasible.
- Pre-Construction Biological Surveys: Extensive onsite field investigations were conducted in 2005 and 2008-2009 to document rare plant populations, unique habitats and vertebrate wildlife use. Wildlife surveys were conducted by experienced biologists during all seasons of the year to understand how both sensitive and common wildlife species use the Project site. Site-specific big game studies were not conducted, though big game observations were recorded during all ground surveys. Fish were not addressed by these studies as the proposed impacts are far from any fish-bearing streams.
- Project Design: LotusWorks designed the Project to avoid impacting sensitive species, riparian areas, and shrub-steppe habitat wherever feasible by utilizing existing roads to the maximum extent possible and burying collector cables underground in the temporarily disturbed road shoulder where feasible.

- Supplemental Surveys: Because not all areas have been thoroughly surveyed due to recent adjustments in Project design (proposed transmission line), supplemental surveys for sensitive wildlife species and raptor nests will be conducted in spring 2010. Results will be reviewed when planning construction zones and scheduling construction activities, to minimize impacts and disturbance during sensitive periods. Because the site has been studied extensively and since no new habitat types are present in the unsurveyed areas, no new rare plant or special status wildlife species in addition to the current potential species list are expected to occur there; surveys will confirm or refute this assumption.

2. During Construction

LotusWorks is also committed to implementing protective measures during construction, as summarized below. In addition, standard best management practices will be employed during construction.

- Erosion Control: In an effort to minimize impacts to the Project habitat, an Erosion and Sediment Control Plan will be developed.
- Flagging: Where appropriate, sensitive habitats will be identified near planned construction. A biological monitor will mark areas that should not be impacted during construction, and instruct the contractor to work outside these boundaries. For sensitive species nests, the monitor will flag the nest trees or nest site (nest plus appropriate buffer and work with LotusWorks and the construction contractor to minimize construction work in these areas to the extent feasible.
- Environmental Training: LotusWorks will develop an environmental training course for the construction contractors that provides information on the sensitive species present onsite, the exclusion flagging, permit requirements, and other environmental issues. All construction site personnel will be required to attend the environmental training in conjunction with hazard and safety training prior to working onsite.
- Limited Work Areas: Construction work will be limited to the approved and surveyed areas shown on Project constraints maps. No working or driving cross-country within the Project boundaries as shortcuts will be permitted without prior approval from the County and appropriate authorities.
- Construction Monitoring: LotusWorks will use an onsite manager and require the construction contractors to designate a representative to oversee their compliance during construction. Both will be responsible for overseeing compliance with protective measures and coordination in accordance with the county and other regulatory agencies. A qualified biologist experienced with construction monitoring will visit the site periodically before site development and during construction in order to flag sensitive resource areas, monitor nesting birds, and assist with overseeing construction and permit compliance that relate to biological resources.

3. Post-Construction (Operations Phase)

After construction is complete, LotusWorks will work to restore the habitat to pre-construction or agency-acceptable standards and monitor for wildlife impacts from Project operation. These proposed mitigation measures *may include*:

- Habitat Restoration: LotusWorks will prepare a Draft Revegetation and Weed Control Plan for the construction zones and Project facility sites. The Draft concepts will be submitted to ODFW for comment and a final plan prepared. Disturbed agricultural areas will be replanted according to the land lease agreements. In order to reestablish native plant communities of most value to wildlife, the appropriate native grass and other

native plant species will be planted in nonagricultural areas to the maximum extent possible. Reclamation success will be monitored to determine if habitats temporarily affected during construction have been restored. Revegetation monitoring will be described in a Draft Revegetation Plan.

- Avian and Bat Impact Monitoring Plan: LotusWorks will develop and implement a Wildlife Monitoring and Mitigation Plan (WMMP) for the operational phase of the Project to evaluate both direct and indirect impacts of the Facility on wildlife and habitat. Aspects and objectives of the monitoring proposal will include avian and bat standardized fatality monitoring (casualty searches and associated study components - trials, etc.), raptor nest monitoring and training of Project personnel on emergency response for discovered injured animals, tracking and reporting of incidental finds (whether reported by Project employees or the monitoring contractor).
- Wildlife Habitat Conservation Easement: A parcel of native habitat will be selected for conservation and/or habitat restoration or enhancement projects to offset the direct temporary (where needed) and permanent habitat impacts to meet or exceed the Oregon Habitat Standards. Local opportunities with interested landowners will be explored. Regional conservation areas have been initially explored for potential expansions. The Conservation Easement will be for the life of the Project. ODFW will be consulted for the site(s) being considered and will be able to comment on the final site(s) selected.

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9.0 Tables

Table 1. Habitat types and categories and specific habitat descriptions for the Summit Ridge Wind Power Project.

General Land Cover Type	Specific Habitat Type ("subtype")	Habitat Category	Specific Habitat Type Description	Acres within Site Boundary
Developed/ Disturbed	**Dryland Wheat or Other Small Grain**	6	Agricultural fields currently in small grain production or fallow. Common species include horned lark and mourning dove in winter stubble or when fallow.	2,298.43
	Farmyard or Residence	6	Farmyard, residence, or outbuildings including surrounds.	3.17
	Old Field	4	Previously cultivated, currently occupied by a variety of common non-native and native vegetation plants (rabbitbrush shrubs/annual grasses and weeds). Native vegetation is a minor component. Common species: horned lark, western meadowlark foraging, may occasionally include savannah sparrow.	57.09
	Quarry	6	Active or past active rock quarries that serve/have served to provide crushed basalt road material.	2.00
	Revegetated Grassland	3	Planted grassland on previously farmed or other disturbed lands that may be enrolled in the Conservation Reserve Program. Residual (not previously plowed) native vegetation patches in a few locations. Old grass stands contain rabbitbrush or other shrubs but are not dominant. May support white-tailed jackrabbits. Common species include western meadowlark and grasshopper sparrow where grassland is mature.	703.23
	Road	6	Paved or graveled public and private roads and pullouts.	38.64
Grassland Steppe dominated by native and/or non-native grasses (<20% shrub cover)	**Exotic Annual Grassland**	4	Dominated by exotic annual grass and/or weeds. Common species include horned lark.	1,517.16
	Native Perennial Grassland	3	Dominated by native perennial bunchgrass. Shrubs, if present, are an inconspicuous component. Important nesting habitat for ground-nesting birds such as savannah sparrow and vesper sparrow. Common species include western meadowlark, grasshopper sparrow and horned lark. This is an *Oregon Conservation Strategy Habitat*.	406.13

General Land Cover Type	Specific Habitat Type ("subtype")	Habitat Category	Specific Habitat Type Description	Acres within Site Boundary
Shrub-steppe Steppe dominated by shrubs (>20% shrub cover)	**Big Sagebrush Shrub-steppe**	2	Dominated by basin big sagebrush. Offers high quality breeding habitat for shrub obligate species including loggerhead shrike. May also support white-tailed jackrabbit. Common species include western meadowlark for nesting, migration and occasionally during winter. This is an *Oregon Conservation Strategy Habitat*.	69.62
	Rabbitbrush/Buckwheat Shrub-steppe	3	Highly variable species composition and structural diversity. Tends to support more common wildlife; buckwheat plants important for invertebrates. Common species include horned lark and western meadowlark.	415.60
Surface Water	**Pond**	3	Man-made domestic livestock water sources in the bottoms of draws. These water sources are an important late-season resource for many native and non-native wildlife species and are often key stopover locations for migrating passerines, shorebirds and migrating and resident bats.	0.17
Woodland With >10% tree cover	**Riparian Shrubland/Woodland**	3	Confined to the narrow bottoms of draws usually having limited seasonal water. Common vegetation elements here are riparian shrub species such as chokecherry, blue elderberry, and willow. Closely associated with, and often intermixed with, the riparian woodland habitat type. Provide important foraging, nesting, and cover for both bats and residential and migratory birds.	4.23
			Total Acres	**5,515.47**

Table 2. Habitat types and subtypes by habitat category at Summit Ridge Wind Power Project.

Habitat Category/Habitat Type – Subtype	Total Acres Within Site Boundary	Temporary Impacts* (acres disturbed)	Permanent Impacts* (acres disturbed)
Category 1			
None Present	n/a	n/a	n/a
Category 2			
Shrub-steppe – Big Sagebrush Shrub-steppe	69.62	0.37	0.43
Total Category 2	**69.62**	**0.37**	**0.43**
Category 3			
Developed/Disturbed – Revegetated Grassland	703.23	18.00	11.08
Grassland – Native Perennial Grassland	406.13	6.69	2.96
Riparian Shrublands/Woodland	4.23	0	0
Shrub-steppe – Rabbitbrush/Buckwheat Shrub-steppe	415.60	3.34	3.39
Surface Water – Pond	0.17	0	0
Total Category 3	**1,531.36**	**28.03**	**17.43**
Category 4			
Developed/Disturbed – Old Field	57.09	0.67	0.63
Grassland – Exotic Annual Grassland	1517.16	19.09	18.26
Total Category 4	**1,574.25**	**19.76**	**18.89**
Category 5			
None Present	n/a	n/a	n/a
Category 6			
Developed/Disturbed – Dryland Wheat or Other Small Grain	2,298.43	35.05	37.75
Developed/Disturbed – Farmyard or Residence	3.17	0	0
Developed/Disturbed – Quarry	2.00	0	2.00
Developed/Disturbed – Road	38.64	16.31	5.52
Total Category 6	**2,340.24**	**51.36**	**45.27**
Total for Categories 2, 3, 4 and 6	**5,515.47**	**99.52**	**82.02**

* based on Project layout dated December 9, 2009. Acreage computed by David Evans and Associates.

Table 3. Avian species observed within 800 meter (m) study plots in the Summit Ridge Wind Power Project avian use study during spring and summer seasons 2005, and winter, spring, and summer seasons, 2008-2009.

Species	Winter[1]		Spring [2]		Summer [3]		Fall [4]	
	# Grp	# Ind	# Grp	# Ind	# Grp	# Ind	# Grp	# Ind
Waterfowl		**100**		**0**		**0**		**0**
unidentified duck	1	100	0	0	0	0	0	0
Raptor		**67**		**77**		**146**		**34**
Accipiter		*1*		*0*		*1*		*0*
Cooper's hawk	1	1	0	0	1	1	0	0
Buteos		*35*		*37*		*38*		*9*
rough-legged hawk	15	15	5	5	0	0	1	1
red-tailed hawk	19	20	23	31	33	38	8	8
Swainson's hawk	0	0	1	1	0	0	0	0
Falcons		*16*		*28*		*81*		*15*
American kestrel	9	10	27	28	59	81	13	14
prairie falcon	6	6	0	0	0	0	1	1
Eagles		*3*		*1*		*3*		*1*
bald eagle	2	2	0	0	1	1	0	0
golden eagle	1	1	1	1	2	2	1	1
Harriers		*12*		*8*		*9*		*2*
northern harrier	12	12	8	8	9	9	2	2
Osprey	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*1*
Vultures		*0*		*2*		*14*		*6*
turkey vulture	0	0	2	2	13	14	4	6
Gamebirds		**55**		**26**		**21**		**46**
California quail	0	0	0	0	2	3	0	0
chukar	9	55	10	19	4	14	6	46
ring-necked pheasant	0	0	7	7	4	4	0	0
Shorebird		**1**		**1**		**1**		**0**
killdeer	1	1	1	1	0	0	0	0
long-billed curlew	0	0	0	0	1	1	0	0
Doves		**68**		**17**		**81**		**50**
mourning dove	0	0	0	0	3	10	1	1
rock pigeon	6	68	3	17	7	71	5	49
Goatsucker		**0**		**0**		**3**		**0**
common nighthawk	0	0	0	0	2	3	0	0
Gulls		**0**		**1**		**5**		**0**
ring-billed gull	0	0	0	0	1	1	0	0
unidentified gull	0	0	1	1	2	4	0	0
Swifts		**0**		**0**		**5**		**13**
Vaux's swift	0	0	0	0	1	5	3	13
Passerines		**1275**		**1209**		**1309**		**1090**
Songbirds		*1194*		*1155*		*1254*		*1046*
American goldfinch	0	0	1	1	1	1	5	19
American pipit	1	1	2	19	0	0	1	2
American robin	6	40	1	2	1	1	1	27
barn swallow	0	0	1	4	2	2	2	7

Species	Winter[1]		Spring [2]		Summer [3]		Fall [4]	
	# Grp	# Ind	# Grp	# Ind	# Grp	# Ind	# Grp	# Ind
Bewick's wren	0	0	1	1	0	0	0	0
Brewer's blackbird	1	20	1	1	1	1	6	67
Brewer's sparrow	0	0	5	6	1	1	0	0
bushtit	0	0	0	0	1	12	0	0
cliff swallow	0	0	4	21	7	26	0	0
dark-eyed junco	4	21	1	1	0	0	1	8
European starling	5	144	7	17	13	197	5	37
grasshopper sparrow	0	0	4	4	5	6	0	0
horned lark	131	935	121	635	159	588	80	642
house finch	5	11	3	12	1	16	6	8
lark sparrow	0	0	1	1	2	2	0	0
loggerhead shrike	3	3	1	1	0	0	0	0
mountain bluebird	2	5	7	12	5	10	3	27
northern rough-winged swallow	0	0	3	18	3	28	0	0
northern shrike	1	1	0	0	0	0	0	0
red-winged blackbird	0	0	0	0	2	2	0	0
savannah sparrow	0	0	6	7	2	2	1	1
Say's phoebe	0	0	5	5	4	5	2	2
unidentified blackbird	0	0	0	0	1	3	0	0
unidentified finch	0	0	1	1	1	1	0	0
unidentified passerine	2	3	3	39	12	56	1	1
unidentified sparrow	0	0	0	0	1	1	0	0
unidentified swallow	0	0	1	4	8	120	0	0
vesper sparrow	0	0	19	27	14	18	0	0
violet-green swallow	0	0	6	27	3	3	2	119
western kingbird	0	0	0	0	5	7	1	2
western meadowlark	7	10	103	288	70	145	30	75
white-crowned sparrow	0	0	1	1	0	0	0	0
yellow-rumped warbler	0	0	0	0	0	0	1	2
Corvids		*81*		*54*		*55*		*44*
black-billed magpie	8	19	5	7	2	14	6	15
common raven	33	62	28	47	20	41	22	29
Woodpecker		**1**		**0**		**0**		**3**
northern flicker	1	1	0	0	0	0	3	3
Totals	**292**	**1567**	**432**	**1331**	**492**	**1571**	**232**	**1236**

[1] Winter December 2, 2008 through March 15, 2009 and November 4, 2009 through November 23, 2009
[2] Spring April 21, 2005 through May 25, 2005 and March 16, 2009 through May 30, 2009
[3] Summer June 1, 2005 through Aug 09, 2005 and June 1, 2009 through Aug 15, 2009
[4] Fall August 20, 2009 through October 27, 2009

Table 4. Species observed at distances greater than 800 m in the Summit Ridge Wind Power Project avian use study during spring and summer seasons 2005, winter, spring, summer, and fall seasons, 2008-2009.

Species	Winter	Spring	Summer	Fall	Total
American kestrel	**0**	**0**	**1**	**2**	**3**
bald eagle	**0**	**1**	**0**	**0**	**1**
chukar	0	10	3	0	**13**
common raven	24	19	11	32	**86**
ferruginous hawk	**0**	**0**	**1**	**0**	**1**
golden eagle	**3**	**1**	**1**	**0**	**5**
greater white-fronted goose	0	0	0	30	**30**
horned lark	20	0	0	0	**20**
northern harrier	**1**	**0**	**2**	**0**	**3**
red-tailed hawk	**4**	**6**	**7**	**3**	**20**
ring-necked pheasant	0	1	0	0	**1**
rock pigeon	60	2	9	1	**72**
rough-legged hawk	**6**	**0**	**0**	**0**	**6**
Swainson's hawk	**0**	**0**	**2**	**0**	**2**
turkey vulture	**0**	**0**	**2**	**2**	**4**
unidentified buteo	**0**	**5**	**5**	**0**	**10**
unidentified gull	0	3	0	**0**	**3**
Total	**118**	**48**	**44**	**70**	**280**

Bolded text indicates raptors

Table 5. Avian species and number of observations recorded on-site while in-transit to avian use surveys, Summit Ridge Wind Power Project, 2008-2009.

Species*	Observed only in-transit	Winter	Spring	Summer	Fall	Total
American kestrel		8	7	21	5	41
Cooper's hawk		1	0	0	0	1
great-horned owl	X	1	0	0	1	2
golden eagle		3	0	0	2	5
loggerhead shrike		3	4	5	6	18
merlin	X	1	1	0	0	2
northern harrier		8	4	2	3	17
prairie falcon		4	0	0	0	4
rough-legged hawk		20	6	0	1	27
red-tailed hawk		7	21	2	1	31
Swainson's hawk		0	0	1	0	1
turkey vulture		0	2	0	0	2
Total		**56**	**45**	**31**	**19**	**151**

* Includes only special status species and raptors (species of interest). For all species observed in-transit or observed incidentally during all types of surveys, see Appendix D.

Table 6. Mean use, percent composition, and percent frequency of occurrence for avian groups observed during avian use surveys at Summit Ridge Wind Power Project spring and summer seasons 2005, and winter, spring, summer, and fall seasons, 2008-2009.

Species	**Winter** (175 surveys)			**Spring** (110 surveys)			**Summer** (110 surveys)			**Fall** (110 surveys)		
	Mean Use[1]	**% Comp**[2]	**% Freq**[3]	**Mean Use**	**% Comp**	**% Freq**	**Mean Use**	**% Comp**	**% Freq**	**Mean Use**	**% Comp**	**% Freq**
Waterfowl	**0.571**	**6.38**	**0.57**	**0.000**	**0.00**	**0.00**	**0.000**	**0.00**	**0.00**	**0.000**	**0.00**	**0.00**
unidentified duck	0.571	6.38	0.57	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00
Raptors	**0.383**	**4.28**	**30.29**	**0.700**	**5.78**	**42.73**	**1.327**	**9.29**	**67.27**	**0.309**	**2.75**	**23.64**
Accipiter	*0.006*	*0.09*	*0.57*	*0.000*	*0.00*	*0.00*	*0.009*	*0.06*	*0.91*	*0.000*	*0.00*	*0.00*
Cooper's hawk	0.006	0.09	0.57	0.000	0.00	0.00	0.009	0.06	0.91	0.000	0.00	0.00
Buteos	*0.200*	*2.23*	*17.71*	*0.336*	*2.78*	*24.55*	*0.345*	*2.42*	*25.45*	*0.082*	*0.73*	*8.18*
rough-legged hawk	0.086	0.96	8.00	0.045	0.38	4.55	0.000	0.00	00.00	0.009	0.08	0.91
red-tailed hawk	0.114	1.28	10.86	0.282	2.33	19.09	0.345	2.42	25.45	0.073	0.65	7.27
Swainson's hawk	0.000	0.00	0.00	0.009	0.08	0.91	0.000	0.00	0.00	0.000	0.00	0.00
Falcons	*0.091*	*1.02*	*8.57*	*0.255*	*2.10*	*22.73*	*0.736*	*5.16*	*44.55*	*0.136*	*1.21*	*11.82*
American kestrel	0.057	0.64	5.14	0.255	2.10	22.73	0.736	5.16	44.55	0.127	1.13	10.91
prairie falcon	0.034	0.38	3.43	0.000	0.00	0.00	0.000	0.00	00.00	0.009	0.08	0.91
Eagles	*0.017*	*0.19*	*1.71*	*0.009*	*0.08*	*0.91*	*0.027*	*0.19*	*2.73*	*0.009*	*0.08*	*0.91*
bald eagle	0.011	0.13	1.14	0.000	0.00	0.00	0.009	0.06	0.91	0.000	0.00	0.00
golden eagle	0.006	0.06	0.57	0.009	0.08	0.91	0.018	0.13	1.82	0.009	0.08	0.91
Osprey	*0.000*	*0.00*	*0.00*	*0.009*	*0.08*	*0.91*	*0.000*	*0.00*	*0.00*	*0.009*	*0.08*	*0.91*
Harriers	*0.069*	*0.77*	*6.86*	*0.073*	*0.60*	*7.27*	*0.082*	*0.57*	*7.27*	*0.018*	*0.16*	*1.82*
northern harrier	0.069	0.77	6.86	0.073	0.60	7.27	0.082	0.57	7.27	0.018	0.16	1.82
Vultures	*0.000*	*0.00*	*0.00*	*0.018*	*0.15*	*1.82*	*0.127*	*0.89*	*11.82*	*0.055*	*0.49*	*3.64*
turkey vulture	0.000	0.00	0.00	0.018	0.15	1.82	0.127	0.89	11.82	0.055	0.49	3.64
Gamebirds	**0.314**	**3.51**	**5.14**	**0.236**	**1.95**	**15.45**	**0.191**	**1.34**	**7.27**	**0.418**	**3.72**	**4.55**
California quail	0.000	0.00	0.00	0.000	0.00	0.00	0.027	0.19	1.82	0.000	0.00	0.00
chukar	0.314	3.51	5.14	0.173	1.43	10.00	0.127	0.89	2.73	0.418	3.72	4.55
ring-necked pheasant	0.000	0.00	0.00	0.064	0.53	6.36	0.036	0.25	3.64	0.000	0.00	0.00
Shorebirds	**0.006**	**0.06**	**0.57**	**0.009**	**0.08**	**0.91**	**0.000**	**0.00**	**0.00**	**0.000**	**0.00**	**0.00**
killdeer	0.006	0.06	0.57	0.009	0.08	0.91	0.000	0.00	0.00	0.000	0.00	0.00
long-billed curlew	0.000	0.00	0.00	0.000	0.00	0.00	0.009	0.06	0.91	0.000	0.00	0.00
Gulls	**0.000**	**0.00**	**0.00**	**0.009**	**0.08**	**0.91**	**0.045**	**0.32**	**2.73**	**0.000**	**0.00**	**0.00**
ring-billed gull	0.000	0.00	0.00	0.000	0.00	0.00	0.009	0.06	0.91	0.000	0.00	0.00
unidentified gull	0.000	0.00	0.00	0.009	0.08	0.91	0.036	0.25	1.82	0.000	0.00	0.00

Species	Winter (175 surveys)			Spring (110 surveys)			Summer (110 surveys)			Fall (110 surveys)		
	Mean Use[1]	% Comp[2]	% Freq[3]	Mean Use	% Comp	% Freq	Mean Use	% Comp	% Freq	Mean Use	% Comp	% Freq
Doves	**0.389**	**4.34**	**2.86**	**0.155**	**1.28**	**2.73**	**0.736**	**5.16**	**8.18**	**0.455**	**4.05**	**5.45**
mourning dove	0.000	0.00	0.00	0.000	0.00	0.00	0.091	0.64	2.73	0.009	0.08	0.91
rock pigeon	0.389	4.34	2.86	0.155	1.28	2.73	0.645	4.52	6.36	0.445	3.96	4.55
Goatsuckers	**0.000**	**0.00**	**0.00**	**0.000**	**0.00**	**0.00**	**0.027**	**0.19**	**1.82**	**0.000**	**0.00**	**0.00**
common nighthawk	0.000	0.00	0.00	0.000	0.00	0.00	0.027	0.19	1.82	0.000	0.00	0.00
Swifts	**0.000**	**0.00**	**0.00**	**0.000**	**0.00**	**0.00**	**0.045**	**0.32**	**0.91**	**0.118**	**1.05**	**2.73**
Vaux's swift	0.000	0.00	0.00	0.000	0.00	0.00	0.045	0.32	0.91	0.118	1.05	2.73
Passerines	**7.286**	**81.37**	**80.00**	**10.991**	**90.83**	**99.09**	**11.900**	**83.32**	**96.36**	**9.909**	**88.19**	**83.64**
Songbirds	*6.823*	*76.20*	*74.29*	*10.500*	*86.78*	*99.09*	*11.400*	*79.82*	*93.64*	*9.509*	*84.63*	*80.91*
American goldfinch	0.000	0.00	0.00	0.009	0.08	0.91	0.009	0.06	0.91	0.173	1.74	4.55
American pipit	0.006	0.06	0.57	0.173	1.43	1.82	0.000	0.00	0.00	0.018	0.16	0.91
American robin	0.229	2.55	3.43	0.018	0.15	0.91	0.009	0.06	0.91	0.245	2.18	0.91
barn swallow	0.000	0.00	0.00	0.036	0.30	0.91	0.018	0.13	1.82	0.064	0.57	1.82
Bewick's wren	0.000	0.00	0.00	0.009	0.08	0.91	0.000	0.00	0.00	0.000	0.00	0.00
Brewer's blackbird	0.114	1.28	0.57	0.009	0.08	0.91	0.009	0.06	0.91	0.609	5.42	5.45
Brewer's sparrow	0.000	0.00	0.00	0.055	0.45	4.55	0.009	0.06	0.91	0.000	0.00	0.00
bushtit	0.000	0.00	0.00	0.000	0.00	0.00	0.109	0.76	0.91	0.000	0.00	0.00
cliff swallow	0.000	0.00	0.00	0.191	1.58	3.64	0.236	1.65	5.45	0.000	0.00	0.00
dark-eyed junco	0.120	1.34	1.14	0.009	0.08	0.91	0.000	0.00	0.00	0.073	0.65	0.91
European starling	0.823	9.19	2.29	0.155	1.28	6.36	1.791	12.54	10.91	0.336	2.99	3.64
grasshopper sparrow	0.000	0.00	0.00	0.036	0.30	3.64	0.055	0.38	2.73	0.000	0.00	0.00
horned lark	5.343	59.67	69.71	5.773	47.67	90.91	5.345	37.43	83.64	5.836	51.94	66.36
house finch	0.063	0.70	2.86	0.109	0.90	2.73	0.145	1.02	0.91	0.073	0.65	5.45
lark sparrow	0.000	0.00	0.00	0.000	0.00	0.00	0.018	0.13	1.82	0.000	0.00	0.00
loggerhead shrike	0.017	0.19	1.71	0.009	0.08	0.91	0.000	0.00	0.00	0.000	0.00	0.00
mountain bluebird	0.029	0.32	1.14	0.009	0.08	0.91	0.091	0.64	3.64	0.245	2.18	1.82
northern rough-winged swallow	0.000	0.00	0.00	0.109	0.90	6.36	0.255	1.78	0.91	0.000	0.00	0.00
northern shrike	0.006	0.06	0.57	0.164	1.35	1.82	0.000	0.00	0.00	0.000	0.00	0.00
red-winged blackbird	0.000	0.00	0.00	0.064	0.53	5.45	0.018	0.13	1.82	0.000	0.00	0.00
savannah sparrow	0.000	0.00	0.00	0.045	0.38	4.55	0.018	0.13	1.82	0.009	0.08	0.91
Say's phoebe	0.000	0.00	0.00	0.191	1.58	3.64	0.045	0.32	3.64	0.018	0.16	1.82
unidentified blackbird	0.000	0.00	0.00	0.000	0.00	0.00	0.060	0.74	2.00	0.000	0.00	0.00
unidentified finch	0.000	0.00	0.00	0.009	0.08	0.91	0.020	0.25	2.00	0.000	0.00	0.00

Species	Winter (175 surveys)			Spring (110 surveys)			Summer (110 surveys)			Fall (110 surveys)		
	Mean Use[1]	% Comp[2]	% Freq[3]	Mean Use	% Comp	% Freq	Mean Use	% Comp	% Freq	Mean Use	% Comp	% Freq
unidentified passerine	0.017	0.19	1.14	0.355	2.93	2.73	0.300	0.72	8.00	0.009	0.08	0.91
unidentified sparrow	0.000	0.00	0.00	0.000	0.00	0.00	0.009	0.06	0.91	0.000	0.00	0.00
unidentified swallow	0.000	0.00	0.00	0.036	0.30	0.91	1.091	7.64	7.27	0.000	0.00	0.00
vesper sparrow	0.000	0.00	0.00	0.245	2.03	15.45	0.164	1.15	12.73	0.000	0.00	0.00
violet-green swallow	0.000	0.00	0.00	0.245	2.03	5.45	0.027	0.19	1.82	1.082	9.63	8.18
western kingbird	0.000	0.00	0.00	0.000	0.00	0.00	0.064	0.45	4.55	0.018	0.16	0.91
western meadowlark	0.057	0.64	4.00	2.618	21.62	83.64	1.318	9.23	52.73	0.682	6.07	27.27
white-crowned sparrow	0.000	0.00	0.00	0.009	0.08	0.91	0.000	0.00	0.00	0.000	0.00	0.00
yellow-rumped warbler	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.018	0.16	0.91
Corvids	*0.463*	*5.17*	*21.71*	*0.491*	*4.06*	*23.64*	*0.500*	*3.50*	*19.09*	*0.400*	*3.56*	*24.55*
black-billed magpie	0.109	1.21	4.57	0.064	0.53	4.55	0.127	0.89	1.82	0.136	1.21	5.45
common raven	0.354	3.96	18.29	0.427	3.53	20.00	0.373	2.61	18.18	0.264	2.35	20.00
Woodpeckers	**0.006**	**0.06**	**0.57**	**0.000**	**0.00**	**0.00**	**0.000**	**0.00**	**0.00**	**0.027**	**0.24**	**2.73**
northern flicker	0.006	0.06	0.57	0.000	0.00	0.00	0.000	0.00	0.00	0.027	0.24	2.73
Totals	**8.954**		**89.14**	**12.100**		**99.09**	**14.282**		**97.27**	**11.236**		**89.09**

[1] Mean Use: mean number of individuals within 800m plot/20-minute point count for each species or group provides an index of the magnitude of avian use, but it does not describe density.

[2] Percent Composition: mean use for a species/total use across all species, multiplied by 100, providing an estimate of the relative use of any particular species, compared to the use by all other species combined.

[3] Frequency of Occurrence: percentage of surveys in which a species was observed with the survey plot providing an index of how often a species occurs in the project area.

Seasons:

Winter	December 2, 2008 through March 15, 2009 and November 4, 2009 through November 23, 2009
Spring	April 21, 2005 through May 25, 2005 and March 16, 2009 through May 30, 2009
Summer	June 1, 2005 through Aug 09, 2005 and June 1, 2009 through Aug 15, 2009
Fall	August 20, 2009 through October 27, 2009

Table 7. Species observed within 800m by plot in the Summit Ridge Wind Power study during spring and summer seasons 2005, and winter, spring, summer, and fall seasons, 2008-2009.

Species *(listed in order of abundance)*	**Plots**										**Total**
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	
Winter 2008–2009											
horned lark	211	103	110	75	143	9	69	58	102	55	935
European starling	95	7	0	2	0	40	0	0	0	0	144
unidentified duck	0	0	0	100	0	0	0	0	0	0	100
rock pigeon	48	0	0	0	0	11	9	0	0	0	68
common raven	1	9	10	12	6	3	2	15	2	2	62
chukar	0	0	0	2	2	0	6	13	0	32	55
American robin	0	0	0	0	0	20	0	15	0	5	40
dark-eyed junco	0	0	0	0	4	0	0	0	0	17	21
Brewer's blackbird	0	0	0	0	0	0	0	20	0	0	20
red-tailed hawk	1	2	1	7	1	3	2	1	0	2	20
black-billed magpie	0	0	1	9	0	1	0	3	3	2	19
rough-legged hawk	1	3	1	1	0	5	1	1	0	2	15
northern harrier	1	2	1	0	3	2	0	1	0	2	12
house finch	6	0	1	1	3	0	0	0	0	0	11
American kestrel	0	3	0	2	0	0	2	2	0	1	10
western meadowlark	4	0	0	0	0	2	1	3	0	0	10
prairie falcon	2	1	0	0	0	1	1	0	1	0	6
mountain bluebird	3	0	0	0	0	0	0	0	0	2	5
loggerhead shrike	0	0	0	0	0	1	2	0	0	0	3
unidentified passerine	0	2	0	0	0	1	0	0	0	0	3
bald eagle	0	0	0	0	1	1	0	0	0	0	2
American pipit	0	0	0	0	0	0	0	1	0	0	1
Cooper's hawk	0	0	1	0	0	0	0	0	0	0	1
golden eagle	0	1	0	0	0	0	0	0	0	0	1
killdeer	1	0	0	0	0	0	0	0	0	0	1
northern flicker	0	0	0	1	0	0	0	0	0	0	1
northern shrike	0	0	0	0	0	0	0	1	0	0	1
Total	374	133	126	212	163	100	95	134	108	122	1567
Spring 2005 and 2009											
horned lark	87	87	68	19	81	16	84	66	86	41	635
western meadowlark	20	12	30	21	34	25	35	55	41	15	288
common raven	4	6	3	8	4	5	1	12	0	4	47
unidentified passerine	18	0	0	14	7	0	0	0	0	0	39
red-tailed hawk	3	1	2	4	4	6	3	1	1	6	31
American kestrel	0	3	3	6	1	6	1	5	2	1	28
vesper sparrow	0	0	1	2	0	12	2	7	1	2	27
violet-green swallow	0	0	0	0	3	0	0	7	0	17	27
cliff swallow	0	0	5	0	0	0	0	0	0	16	21
American pipit	0	0	19	0	0	0	0	0	0	0	19
chukar	0	0	0	2	2	6	0	3	1	5	19
northern rough-winged swallow	0	0	18	0	0	0	0	0	0	0	18
European starling	0	0	5	7	0	4	1	0	0	0	17
rock pigeon	13	0	0	0	0	0	0	4	0	0	17
house finch	2	0	0	0	0	0	0	0	10	0	12

Species (listed in order of abundance)	Plots										Total
	A	B	C	D	E	F	G	H	I	J	
mountain bluebird	0	0	0	1	8	0	0	1	0	2	12
northern harrier	1	2	0	0	0	0	2	1	0	2	8
black-billed magpie	0	0	0	0	0	1	4	0	1	1	7
ring-necked pheasant	1	0	1	1	0	1	0	0	1	2	7
savannah sparrow	1	0	2	1	0	0	3	0	0	0	7
Brewer's sparrow	0	0	0	0	0	2	0	3	1	0	6
rough-legged hawk	0	0	0	0	0	1	2	1	0	1	5
Say's phoebe	0	0	0	3	0	0	0	1	0	1	5
barn swallow	0	0	4	0	0	0	0	0	0	0	4
grasshopper sparrow	2	0	0	1	0	0	1	0	0	0	4
unidentified swallow	0	0	0	0	0	4	0	0	0	0	4
American robin	0	0	0	0	0	0	0	2	0	0	2
turkey vulture	0	0	0	0	1	0	0	1	0	0	2
American goldfinch	0	0	0	0	0	0	0	0	0	1	1
Bewick's wren	0	0	0	0	0	1	0	0	0	0	1
Brewer's blackbird	0	0	0	0	0	0	0	0	0	1	1
dark-eyed junco	1	0	0	0	0	0	0	0	0	0	1
golden eagle	0	0	0	0	0	0	1	0	0	0	1
killdeer	0	0	0	0	0	0	0	1	0	0	1
lark sparrow	1	0	0	0	0	0	0	0	0	0	1
loggerhead shrike	0	1	0	0	0	0	0	0	0	0	1
osprey	1	0	0	0	0	0	0	0	0	0	1
Swainson's hawk	0	0	1	0	0	0	0	0	0	0	1
unidentified finch	0	0	0	0	0	0	0	1	0	0	1
unidentified gull	0	0	1	0	0	0	0	0	0	0	1
white-crowned sparrow	0	0	0	0	0	1	0	0	0	0	1
Total	155	112	163	90	145	91	140	172	145	118	1331

Summer 2005 and 2009

horned lark	81	94	166	20	70	19	53	32	39	14	588
European starling	171	0	8	4	6	8	0	0	0	0	197
western meadowlark	8	3	16	28	11	19	26	19	12	3	145
unidentified swallow	0	0	95	0	11	0	0	7	0	7	120
American kestrel	21	13	3	10	2	14	8	5	1	4	81
rock pigeon	47	0	0	0	2	22	0	0	0	0	71
unidentified passerine	0	2	5	11	8	15	0	10	1	4	56
common raven	13	11	1	3	1	9	0	3	0	0	41
red-tailed hawk	5	8	3	1	3	7	5	1	3	2	38
northern rough-winged swallow	0	0	0	0	0	16	0	12	0	0	28
cliff swallow	0	0	20	0	0	2	0	0	0	4	26
vesper sparrow	1	0	0	2	1	3	1	8	1	1	18
house finch	0	0	0	0	0	16	0	0	0	0	16
black-billed magpie	0	0	0	1	0	13	0	0	0	0	14
chukar	0	0	0	0	3	11	0	0	0	0	14
turkey vulture	1	2	1	1	1	0	2	1	4	1	14
bushtit	0	0	0	0	0	0	0	0	0	12	12
mountain bluebird	3	0	2	0	5	0	0	0	0	0	10
mourning dove	0	0	0	0	4	6	0	0	0	0	10
northern harrier	3	2	0	1	0	0	0	2	1	0	9
western kingbird	0	0	0	2	0	2	2	0	0	1	7

Species (listed in order of abundance)	Plots										Total
	A	B	C	D	E	F	G	H	I	J	
grasshopper sparrow	4	0	0	0	2	0	0	0	0	0	6
Say's phoebe	0	1	0	0	2	2	0	0	0	0	5
Vaux's swift	0	0	0	0	0	0	0	0	5	0	5
ring-necked pheasant	1	0	1	2	0	0	0	0	0	0	4
unidentified gull	0	0	0	0	2	2	0	0	0	0	4
California quail	1	0	0	0	0	2	0	0	0	0	3
common nighthawk	0	0	0	0	0	0	0	0	3	0	3
unidentified blackbird	0	0	0	0	0	0	0	0	3	0	3
violet-green swallow	0	0	0	0	0	0	0	1	0	2	3
barn swallow	0	0	1	0	1	0	0	0	0	0	2
golden eagle	0	0	0	0	0	0	0	0	0	2	2
lark sparrow	1	0	0	0	0	1	0	0	0	0	2
red-winged blackbird	0	0	0	1	0	0	0	0	1	0	2
savannah sparrow	0	1	0	0	0	1	0	0	0	0	2
American goldfinch	0	0	0	0	0	0	0	1	0	0	1
American robin	0	0	0	0	1	0	0	0	0	0	1
bald eagle	0	0	0	0	0	1	0	0	0	0	1
Brewer's blackbird	1	0	0	0	0	0	0	0	0	0	1
Brewer's sparrow	0	0	0	0	0	0	0	1	0	0	1
Cooper's hawk	0	0	0	0	0	0	0	0	0	1	1
long-billed curlew	0	1	0	0	0	0	0	0	0	0	1
ring-billed gull	0	0	0	0	1	0	0	0	0	0	1
unidentified finch	0	0	0	0	0	0	0	0	1	0	1
unidentified sparrow	0	0	0	1	0	0	0	0	0	0	1
Total	362	138	322	88	137	191	97	103	75	58	1571
Fall											
horned lark	241	67	103	19	51	3	37	26	47	48	642
violet-green swallow	20	40	4	1	30	5	5	0	10	4	119
western meadowlark	4	1	2	15	0	13	9	23	5	3	75
Brewer's blackbird	31	0	0	16	17	0	3	0	0	0	67
rock pigeon	29	0	0	0	0	14	2	4	0	0	49
chukar	0	0	0	0	0	4	0	1	0	41	46
European starling	2	0	0	34	0	0	0	0	1	0	37
common raven	2	3	3	2	2	6	0	1	7	3	29
American robin	0	0	27	0	0	0	0	0	0	0	27
mountain bluebird	0	0	15	0	0	12	0	0	0	0	27
American goldfinch	0	12	0	0	0	0	4	0	0	3	19
black-billed magpie	1	0	1	0	0	4	0	0	3	6	15
American kestrel	1	2	3	3	1	0	3	1	0	0	14
Vaux's swift	0	0	3	2	0	8	0	0	0	0	13
dark-eyed junco	0	0	0	0	0	0	0	0	0	8	8
house finch	0	0	1	0	0	3	0	2	1	1	8
red-tailed hawk	0	1	0	5	0	0	1	0	1	0	8
barn swallow	0	0	0	3	0	0	0	0	0	4	7
turkey vulture	3	0	2	0	0	0	1	0	0	0	6
northern flicker	0	0	0	0	1	0	0	0	1	1	3
American pipit	0	0	2	0	0	0	0	0	0	0	2
northern harrier	0	0	1	0	0	0	0	0	0	1	2
Say's phoebe	0	0	0	0	0	1	0	1	0	0	2

Species *(listed in order of abundance)*	**Plots**										**Total**
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	
western kingbird	0	0	0	0	0	0	2	0	0	0	2
yellow-rumped warbler	0	0	0	0	0	0	0	0	0	2	2
golden eagle	0	0	0	0	0	0	0	1	0	0	1
mourning dove	0	0	0	0	0	0	1	0	0	0	1
osprey	0	0	0	1	0	0	0	0	0	0	1
prairie falcon	1	0	0	0	0	0	0	0	0	0	1
rough-legged hawk	0	0	0	0	0	0	1	0	0	0	1
savannah sparrow	0	1	0	0	0	0	0	0	0	0	1
unidentified passerine	0	0	0	0	0	0	1	0	0	0	1
Total	**335**	**127**	**167**	**101**	**102**	**73**	**70**	**60**	**76**	**125**	**1236**

Table 8. Mean use, percent composition, and percent frequency of occurrence for avian species observed during grassland bird displacement transect surveys at the Summit Ridge Wind Power Project, 2009*.

Species	**# Ind**	**Mean Use**	**% Comp**	**% Freq**
Brewer's sparrow	11	0.367	15.71	23.33
dusky flycatcher	1	0.033	1.43	3.33
grasshopper sparrow	8	0.267	11.43	23.33
lazuli bunting	3	0.100	4.29	6.67
rock wren	1	0.033	1.43	3.33
savannah sparrow	8	0.267	11.43	20.00
vesper sparrow	25	0.833	35.71	63.33
western meadowlark	13	0.433	18.57	40.00
Totals	**70**	**2.333**		**93.33**

* Surveys conducted on May 21, 2009, June 1, 2009, and June 18, 2009

Table 9. Avian species observed and mean use by transect during grassland bird displacement transect surveys at Summit Ridge Wind Power Project, 2009*.

Species	C1		C2		C3		C4		C5		D1		D2		D3		D4		D5	
	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Brewer's sparrow	0	0.000	0	0.000	2	0.667	0	0.000	0	0.000	0	0.000	5	1.667	3	1.000	0	0.000	1	0.333
dusky flycatcher	0	0.000	0	0.000	0	0.000	0	0.000	1	0.333	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
grasshopper sparrow	1	0.333	1	0.333	0	0.000	2	0.667	0	0.000	2	0.667	0	0.000	0	0.000	2	0.667	0	0.000
lazuli bunting	0	0.000	0	0.000	0	0.000	0	0.000	2	0.667	0	0.000	1	0.333	0	0.000	0	0.000	0	0.000
rock wren	1	0.333	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
savannah sparrow	0	0.000	0	0.000	1	0.333	0	0.000	0	0.000	3	1.000	0	0.000	0	0.000	4	1.333	0	0.000
vesper sparrow	3	1.000	0	0.000	4	1.333	2	0.667	1	0.333	0	0.000	5	1.667	4	1.333	3	1.000	3	1.000
western meadowlark	3	1.000	1	0.333	2	0.667	1	0.333	1	0.333	0	0.000	1	0.333	1	0.333	2	0.667	1	0.333
Totals	**8**	**2.667**	**2**	**0.667**	**9**	**3.000**	**5**	**1.667**	**5**	**1.667**	**5**	**1.667**	**12**	**4.000**	**8**	**2.667**	**11**	**3.667**	**5**	**1.667**

* Surveys conducted on May 21, 2009, June 1, 2009, and June 18, 2009: C denotes control transects, D denotes displacement transects

Table 10. Bat monitoring station habitat descriptions and detections at Summit Ridge Wind Power Project

Date	Station Description	Species Detected*
July 17 -18, 2009	Station D – Pond	EPFU
	Station A- Shrub-steppe/ Canyon	No Detections
	Station H – Shrub-steppe	No Detections
August 12-13, 2009	Station D - Pond	EPFU, MYCI
	Station B – Shrub-steppe near rock outcrop	EPFU, ANPA
	Station F – Old farmstead	MYCI, MYCA/MYYU[1]
September 6-7, 2009	Station A – Shrub-steppe/ Canyon	LACI, MYLU, PIHE, LANO
	Station F – Old farmstead	EPFU/LACI[1]
	Station D - Pond	No Detections
	Station E- Shrub-steppe flat above canyon	LACI, MYCI
	Station G – Top of rocky bluff	No detections
September 21-22, 2009	Station B –Shrub-steppe near rock outcrop	No detections
	Station C- Gravel Pit	No Detections
	Station H –Shrub-steppe	LANO
	Station F –Old farmstead	No detections
	Station D - Pond	No detections

* Codes:
ANPA= *Anttrozous Pallidus* – pallid bat
EPFU=*Eptesicus fuscus* - big brown bat
LACI= *Lasiurus cinereus* - hoary bat
LANO= *Lasionycteris noctivagans* - silver-haired bat
MYCI= *Myotis ciliolabrum* - small-footed myotis
MYLU= *Myotis lucifugus* - little brown bat
MYCA/MYYU=*Myotis californicus/yumanensis* - California/Yuma myotis
PIHE=*Pipistrellus Hesperus* – western pipistrelle

[1] frequencies similar and calls are either one or both of these species.

Table 11. Bat species detected by survey station at Summit Ridge Wind Power Project, July-September, 2009.

	Station A	Station B	Station C	Station D	Station E	Station F	Station G	Station H
Bat species (abbreviation, scientific, and common name)	*Shrub-steppe /Canyon*	*Shrub-steppe near rock outcrop*	*Gravel Pit*	*Pond*	*Shrub-steppe flat above canyon*	*Old Farmstead*	*Top of rocky bluff*	*Shrub-steppe*
PIHE *Pipistrellus hesperus* western pipistrelle	X							
MYLU *Myotis lucifugus* little brown bat	X							
MYCI *Myotis ciliolabrum* small-footed myotis				X	X	X		
ANPA *Anttrozous Pallidus* pallid bat		X						
LANO *Lasionycteris noctivagans* silver-haired bat	X							X
LACI *Lasiurus cinereus* hoary bat					X	X		
EPFU *Eptesicus fuscus* big brown bat		X		X		X		
MYCA/MYYU *Myotis californicus/yumanensis* California/Yuma myotis						X		
EPFU/LACI *Eptesicus fuscus and/or Lasiurus cinerus* big brown bat and/or hoary bat	X					X		
Total Species: 8 and/or 9	**4**	**2**	**0**	**2**	**2**	**5**	**0**	**1**

Table 12. Project and turbine characteristics of regional wind energy facilities where fatality monitoring studies have been completed*.

Columbia Plateau Ecoregion Wind Project**	Project Size		Turbine Characteristics		
	# Turbines	MW	RD*** (meters)	Tip Height (max. meters)	MW
Hopkins Ridge I, WA	83	150	80	107	1.80
Wild Horse, WA	127	229	80	107	1.80
Biglow Canyon, OR (Phase I)	76	125.4	90	121	1.65
Big Horn, WA	133	199.5	77	118.5	1.50
Klondike I, OR	16	24	65	100	1.50
Klondike II, OR	50	75	77	118.5	1.50
Klondike III, OR (Phase I) (two types of turbines)	80/42	120/96.6	77/93	118.5/126.5	1.50/2.30
Leaning Juniper, OR	67	100.5	77	118.5	1.50
Nine Canyon I, WA	37	48	62	91	1.30
Combine Hills I, OR	41	41	61	84	1.00
Stateline, OR/WA	454	300	47	74	0.66
Vansycle, OR	38	25	47	74	0.66

* Similar study methods. Condon Wind Project Carcass Study omitted due to differences in study methods. Wild Horse, Biglow Canyon, and Klondike III estimates include only data for the first year of the respective 2-year studies.

** Projects are sorted by MW of turbine type.

*** RD= rotor diameter

Table 13. Annual fatality estimates on a per turbine and per MW nameplate basis for all birds and for all raptors in the Columbia Plateau Ecoregion where fatality monitoring studies have been completed.

Columbia Plateau Ecoregion Wind Project [1]	All Bird Fatality Rates		Raptor Fatality Rates [2]	
Listed in order of highest to lowest All Bird Fatality Rate per MW/Year	#/ MW	#/ Turbine	#/ MW	#/ Turbine
Leaning Juniper, OR[5]	6.7	10.0	0.21	0.32
Klondike III, OR (Phase I) [4, 5]	3.6	6.3	0.06	0.11
Klondike II, OR	3.1	4.7	0.11	0.17
Hopkins Ridge I, WA, 2008	3.0	5.4	0.07	0.12
Stateline I and II, WA/OR	2.9	1.9	0.09	0.06
Nine Canyon I[3], WA	2.8	3.6	0.05	0.07
Combine Hills, OR	2.6	2.3	0.00	0.00
Big Horn, WA[5]	2.5	3.8	0.15	0.23
Biglow Canyon, OR (Phase I)[4]	1.8	2.9	0.03	0.06
Wild Horse[4], WA	1.6	2.8	0.09	0.17
Hopkins Ridge I, WA, 2006	1.2	2.2	0.14	0.25
Vansycle, OR	1.0	0.6	0.00	0.00
Klondike I, OR	0.9	1.4	0.00	0.00
Mean	**2.59**	**3.68**	**0.08**	**0.12**

[1] References for projects: Stateline I and II-partial (Erickson et al., 2004); Vansycle (Erickson et al., 2000); Klondike I (Johnson et al., 2003); Klondike II (NWC and West, 2007); Klondike III (Gritski et al., 2009a); Combine Hills (Young et al., 2006); Nine Canyon (Erickson et al., 2003a); Hopkins Ridge (Young et al., 2007, 2009); Big Horn (Kronner et al., 2008a); Wild Horse (Erickson et al., 2008); Leaning Juniper (Gritski et al., 2008a); Biglow Canyon Phase I (Jeffrey, et al., 2009).

[2] Raptor estimates include diurnal raptors and owls.

[3] Nine Canyon II monitored only part-year.

[4] Wild Horse, Biglow Canyon, and Klondike III estimates include only data for the first year of the respective 2-year studies.

[5] Huso estimator used to determine estimated fatality rates (Gritski et al., 2008a, 2009a; Kronner et al., 2008a).

Table 14. Number and species composition of bird fatalities found at Columbia Plateau Ecoregion wind projects where fatality monitoring studies* have been completed or are in progress (data obtained from public files).

Species	% Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals**
horned lark	32.3	280	27
golden-crowned kinglet	5.9	51	3
gray partridge (n)	5.5	48	2
ring-necked pheasant (n)	5.1	44	14
European starling (n)	3.2	28	3
western meadowlark	3.2	28	1
chukar (n)	3.0	26	4
mourning dove	2.9	25	1
unidentified passerine	2.9	25	3
American kestrel	2.8	24	6
dark-eyed junco	2.3	20	5
white-crowned sparrow	2.2	19	3
unidentified bird	1.8	16	2
yellow-rumped warbler	1.5	13	1
winter wren	1.4	12	0
rock pigeon (n)	1.3	11	0
Townsend's warbler	1.3	11	0
red-tailed hawk	1.2	10	8
ruby-crowned kinglet	1.0	9	2
northern flicker	0.9	8	0
short-eared owl	0.9	8	1
American robin	0.8	7	2
black-billed magpie	0.8	7	0
red-breasted nuthatch	0.8	7	0
savannah sparrow	0.8	7	0
unidentified kinglet	0.8	7	0
house wren	0.7	6	0
golden-crowned sparrow	0.6	5	0
unidentified sparrow	0.5	4	0
Brewer's sparrow	0.3	3	4
Canada goose	0.3	3	1
common nighthawk	0.3	3	5
great blue heron	0.3	3	0
great-horned owl	0.3	3	0
mallard	0.3	3	0
song sparrow	0.3	3	1
American coot	0.2	2	0
American goldfinch	0.2	2	0
Cassin's vireo	0.2	2	0
chipping sparrow	0.2	2	0
common raven	0.2	2	0
downy woodpecker	0.2	2	0
ferruginous hawk	0.2	2	2
northern harrier	0.2	2	1
orange-crowned warbler	0.2	2	0
rough-legged hawk	0.2	2	3
sage thrasher	0.2	2	0
spotted towhee	0.2	2	1

Species	% Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals**
Swainson's hawk	0.2	2	5
unidentified buteo	0.2	2	0
unidentified warbler	0.2	2	0
vesper sparrow	0.2	2	1
Virginia rail	0.2	2	0
western tanager	0.2	2	0
acorn woodpecker	0.1	1	0
American pipit	0.1	1	0
barn owl	0.1	1	0
black-throated sparrow	0.1	1	0
Brewer's blackbird	0.1	1	0
brown-headed cowbird	0.1	1	0
California quail	0.1	1	0
common yellowthroat	0.1	1	0
Cooper's hawk	0.1	1	0
golden eagle	0.1	1	0
grasshopper sparrow	0.1	1	0
hairy woodpecker	0.1	1	0
hermit thrush	0.1	1	1
horned grebe	0.1	1	0
house finch	0.1	1	1
house sparrow (n)	0.1	1	1
killdeer	0.1	1	0
Lewis's woodpecker	0.1	1	0
Lincoln's sparrow	0.1	1	0
long-billed curlew	0.1	1	0
long-eared owl	0.1	1	0
MacGillivray's warbler	0.1	1	1
merlin	0.1	1	0
mountain bluebird	0.1	1	1
pine siskin	0.1	1	0
red-winged blackbird	0.1	1	0
ruddy duck	0.1	1	0
sharp-shinned hawk	0.1	1	0
Swainson's thrush	0.1	1	0
Townsend's solitaire	0.1	1	0
tree swallow	0.1	1	0
unidentified accipiter	0.1	1	0
unidentified duck	0.1	1	0
unidentified flycatcher	0.1	1	0
unidentified owl	0.1	1	0
unidentified thrush	0.1	1	0
unidentified vireo	0.1	1	0
varied thrush	0.1	1	0
Vaux's swift	0.1	1	1
warbling vireo	0.1	1	0
western grebe	0.1	1	1
western kingbird	0.1	1	0
western wood-pewee	0.1	1	0
white-throated swift	0.1	1	1
yellow warbler	0.1	1	0
American crow	0.0	0	1

Species	% Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals**
bufflehead	0.0	0	1
gray catbird	0.0	0	1
prairie falcon	0.0	0	1
sage sparrow	0.0	0	1
Williamson's sapsucker	0.0	0	1
Total (93 species identified) (87 native identified, 6 non-native)	**100.0**	**868**	**126**

* with similar study protocols.
** not all project data was verified. Includes most, but not all incidentals found during formal monitoring studies, and one incidental found after monitoring was complete.
n = non-native species

[1] Data from the following formal monitoring studies during the monitoring periods stated below. Includes one incidental found after monitoring was complete. For full reference, see reference Section 7.0. These are observed fatalities and not final estimates of fatalities, which are higher.

Erickson et al. 2000. Avian and bat mortality associated with the Vansycle Wind Plant, Umatilla County Oregon. 1999 study year.
Erickson et al. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002−August 2003.
Erickson et al. 2004. Stateline Wind Project Wildlife Monitoring Final Report, July 2001−December 2003.
Erickson et al. 2007. Stateline Wind Project Wildlife Monitoring Annual Report, January−December 2006.
Erickson et al., 2008. Wild Horse Wind Facility Construction Avian and Bat Monitoring First Annual Report, January−December, 2007.
Gritski et al., 2008a. Leaning Juniper Wind Power Project, 2006−2008. Wildlife monitoring final report.
Gritski et al., 2008b. White Creek Wind I wildlife monitoring annual summary, winter 2007−2008 through fall 2008.
Gritski et al., 2009a. Klondike III (Phase 1) Wind Power Project Wildlife Monitoring Year One Summary, October 2007−October 2008.
Gritski et al., 2009b. Rattlesnake Road Wind Farm, - mid-year 2009 progress report.
Gritski et al., 2009c. Pebble Springs Wind Power Project wildlife monitoring - mid-year 2009 progress report.
Jeffrey et al., 2008. Elkhorn Wind Project monitoring 2nd quarterly report, 2008.
Jeffrey, et al., 2009. Biglow Canyon Wind Farm Phase I post-construction avian and bat monitoring first annual report, January 2008−December 2008
Johnson, et al. 2003b. Avian and bat mortality at the Klondike, Oregon Phase I Wind Plant, Sherman County, Oregon. February 2002−February 2003.
Kidder, B. and D. Every. 2009. Goodnoe Hills avian/bat mortality monitoring first quarterly findings.
Kronner et al., 2008. Big Horn Wind Power Project Wildlife Monitoring Study, 2006−2007.
Kronner et al., 2009. White Creek Wind I − Results of monitoring year 2 winter season wildlife monitoring study and the clean-up search prior to formal monitoring of year 2 turbines, November 4, 2008−March 19, 2009.
Kronner, K. and S. Downes. 2009a. White Creek Wind I − Results of wildlife monitoring year 2 spring season, for the period March 20 through May 25, 2009.
Kronner. K. and S. Downes. 2009b. White Creek Wind I − Results of wildlife monitoring year 2 summer season, for the period June 1 through August 21, 2009.
NWC and WEST 2007. Avian and Bat Monitoring Report for the Klondike II Wind Power Project, Sherman County, Oregon. August 2005−August 2006.
Young et al. 2006. Eurus Combine Hills Turbine Ranch Phase 1 Post Construction Wildlife Monitoring First Annual Report February 2004−February 2005.
Young et al. 2007. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report. January−December 2006.
Young, Jr., D.P., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, post-construction avian and bat monitoring, second annual report, January−December 2008.

Table 15. Estimated raptor nest densities from Summit Ridge Wind Power Project and other regional and proposed and existing wind projects located primarily in comparable Columbia Plateau environments*.

Project Site**	Raptor Nest Density (#/mi^2), rounded							
	All Raptor Species Combined	Buteos				Eagle	Falcon	Owl
		SWHA	RTHA	FEHA	UNBU	GOEA	PRFA	GHOW
Summit Ridge, OR	0.24	0.00	0.20	0.00	0.01	0.00	0.01	0.01
Leaning Juniper, OR	0.41	0.18	0.16	0.03	0.00	0.00	0.02	0.02
Rattlesnake Road, OR	0.45	0.19	0.13	0.05	0.00	0.00	0.08	0.00
Hopkins Ridge, WA	0.42	0.01	0.27	0.01	0.05	0.00	0.00	0.08
Golden Hills, OR	0.25	0.04	0.16	0.00	0.00	0.00	0.00	0.05
Stateline OR/WA	0.21	0.03	0.08	0.03	0.00	0.00	0.00	0.07
Klondike I and II, OR	0.23 (5 mile radius survey area)	0.07	0.11	0.00	0.00	0.01	0.00	0.04
Klondike III, OR	0.20	0.04	0.11	0.00	0.01	0.00	0.00	0.03
Wild Horse, WA	0.16	0.00	0.12	0.00	0.00	0.00	0.02	0.02
Klickitat County, WA	0.12	0.00	0.09	0.00	0.00	0.00	0.01	0.03
Big Horn, WA	0.11	0.00	0.06	0.00	0.00	0.00	0.01	0.04
AVERAGE of Other Projects (excluding Summit Ridge)	0.26							

Codes:

SWHA = Swainson's hawk
RTHA = red-tailed hawk
FEHA = ferruginous hawk
GOEA = golden eagle
PRFA = prairie falcon
GHOW = great-horned owl
UNBU = unknown species of the genus *Buteo*

* Arid grassland and shrub-steppe environments with extensive dryland wheat, non-native grassland (CRP), and narrow riparian corridors in some drainages.

** References for projects: Big Horn (Johnson and Erickson, 2004), Leaning Juniper (Kronner et al., 2005a), Klondike I and II (Johnson et al., 2002), Klondike III (Mabee et al., 2005), Golden Hills (Jeffrey et al., 2008), Stateline (Erickson et al., 2004; NWC and WEST, 2001), Klickitat County (Johnson et al., 2003b), Hopkins Ridge (Young et al., 2003b), Wild Horse (Erickson et al., 2003b), Rattlesnake Road (Kronner et al., 2007a); Summit Ridge (Gerhardt et a., 2009).

American kestrel, short-eared owl, long-eared owl, turkey vulture, and burrowing owl are omitted for purposes of comparison due to general difficulty in determining nesting of these species with the raptor nest survey method (helicopter survey) employed in this and other studies.

Table 16. Annual bat mortality estimates at existing wind projects in the Columbia Plateau Ecoregion with completed fatality monitoring studies.

Wind Project [1] Listed in order of highest to lowest bat fatality rate per MW/year (last column)	**Number of Bat Fatalities Found**	**Annual Fatality Estimate** (number of bats)	**Number of Bat Fatalities per Turbine per Year** (mean)	**Number of Bat Fatalities per MW per Year** (mean)
Nine Canyon I [2], WA	27	119	3.21	2.47
Biglow Canyon, OR (Phase I)[3]	39	250	3.29	1.99
Leaning Juniper, OR[4]	20	199	2.97	1.98
Big Horn, WA[4]	59	380	2.86	1.90
Combine Hills, OR	21	77	1.88	1.88
Stateline I and II, WA/OR	128	500	1.12	1.70
Hopkins Ridge I, WA 2008	23	208	2.50	1.39
Klondike III, OR (Phase I)[3, 4]	24	289	2.37	1.33
Vansycle, OR	10	28	0.74	1.12
Klondike I, OR	6	19	1.16	0.77
Hopkins Ridge I, WA, 2006	19	94	1.13	0.63
Klondike II, OR	5	31	0.63	0.41
Wild Horse, WA[3]	17	89	0.70	0.39
Mean			**1.89**	**1.38**

[1] Projects are sorted by cumulative bat per MW rates. References for projects: Stateline I and II-partial (Erickson et al. ,2004); Vansycle (Erickson et al., 2000); Klondike I (Johnson et al., 2003c); Klondike II (NWC and West, 2007); Klondike III (Gritski et al., 2009a); Combine Hills (Young et al., 2006); Nine Canyon (Erickson et al., 2003a); Hopkins Ridge (Young et al., 2007); Big Horn (Kronner et al., 2008a); Wild Horse (Erickson et al., 2008); Leaning Juniper (Gritski et al., 2008a); Biglow Canyon (Jeffrey et al., 2009).

[2] Nine Canyon II monitored only part-year (July 25 through November 2, 2004).

[3] Wild Horse, Biglow Canyon, and Klondike III estimates include only data for the first year of the respective 2-year studies.

[4] Huso estimator used to determine fatality estimates (Gritski et al., 2009a; Gritski et al., 2008a; Kronner et al., 2008a).

10.0 Appendices

Appendix A. United States Fish and Wildlife Service species list for Wasco County, Oregon.

FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES AND SPECIES OF CONCERN UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE WHICH MAY OCCUR WITHIN WASCO COUNTY, OREGON

Last Updated December 19, 2009 U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office
http://www.fws.gov/oregonfwo/Species/Lists/Documents/County/WASCO%20COUNTY.pdf

LISTED SPECIES
Birds
Northern spotted owl *Strix occidentalis caurina* Threatened, Critical Habitat Designated
Fish
Inland: Bull trout *Salvelinus confluentus* Threatened, Critical Habitat Designated

PROPOSED SPECIES
None No Proposed Endangered Species No Proposed Threatened Species

CANDIDATE SPECIES
Reptiles and Amphibians
Inland:
Oregon spotted frog *Rana pretiosa*
Plants
Northern wormwood *Artemisia campestris var. wormskioldii*

SPECIES OF CONCERN
Mammals
Pallid bat *Antrozous pallidus pacificus*
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*
Spotted bat *Euderma maculatum*
California wolverine *Gulo gulo luteus*
Silver-haired bat *Lasionycteris noctivagans*
Small-footed myotis bat *Myotis ciliolabrum*
Long-eared myotis bat *Myotis evotis*
Long-legged myotis bat *Myotis volans*
Yuma myotis bat *Myotis yumanensis*

Birds
Northern goshawk *Accipiter gentilis*
Tricolored blackbird *Agelaius tricolor*
Western burrowing owl *Athene cunicularia hypugaea*
Ferruginous hawk *Buteo regalis*
Greater sage-grouse *Centrocercus urophasianus*
Olive-sided flycatcher *Contopus cooperi*
Willow flycatcher *Empidonax traillii adastus*
Yellow-breasted chat *Icteria virens*
Acorn woodpecker *Melanerpes formicivorus*
Lewis' woodpecker *Melanerpes lewis*
Mountain quail *Oreortyx pictus*
Band-tailed pigeon *Patagioenas fasciata*
White-headed woodpecker *PIcoides albolarvatus*
Purple martin *Progne subis*

Appendix A, Continued.

Reptiles and Amphibians
Northern Pacific pond turtle *Actinemys marmorata marmorata*
Coastal tailed frog *Ascaphus truei*
Oregon slender salamander *Batrachoseps wrighti*
Northern red-legged frog *Rana aurora aurora*
Cascades frog *Rana cascadae*
Northern sagebrush lizard *Sceloporus graciosus graciosus*

Fish
Pacific lamprey *Lampetra tridentata*
Coastal cutthroat trout *Oncorhynchus clarki ssp*

Invertebrates
Snails:
Columbia pebblesnail *Fluminicola fuscus (= columbianus)*
Minor Pacific sideband snail *Monadenia fidelis minor*
Insects:
Beller's ground beetle *Agonum belleri*
Clams:
California floater mussel *Anodonta californiensis*

Plants
Henderson ricegrass *Achnatherum hendersonii*
Henderson's bentgrass *Agrostis hendersonii*
Mountain grape fern *Botrychium montanum*
Dwarf evening-primrose *Camissonia pygmaea*
Oregon fleabane *Erigeron oreganus*
Suksdorf's desert parsley *Lomatium suksdorfii*
White meconella *Meconella oregana*
Barrett's penstemon *Penstemon barrettiae*
Dalles Mt. buttercup *Ranunculus triternatus*

DELISTED SPECIES
Birds
American Peregrine falcon *Falco peregrinus anatum*
Bald eagle *Haliaeetus leucocephalus*

Definitions:

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

Appendix B1. Oregon Natural Heritage Information Center response letter, January 29, 2009.

OREGON NATURAL HERITAGE INFORMATION CENTER

OSU
Oregon State University
Institute for Natural Resources
1322 SE Morrison Street
Portland, Oregon 97214-2423
503.731.3070
http://oregonstate.edu/ornhic

Thursday, January 29, 2009

Tamiko Ruhlen
Northwest Wildlife Consultants, Inc.
815 NW 4th St.
Pendleton, OR 97801

Dear Ms. Ruhlen:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Summit Ridge Wind Power Project at Wasco County.

Twenty-two (22) records total were noted within a five-mile radius of your project site and are included on the enclosed computer printouts.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

This data is confidential and for the specific purposes of your project and is **not to be distributed**. Please also note that as our database is continually updated, the data in this report should be considered current for one year from the date it was generated and should not be cited after **January 2010**.

Please forward the included invoice to the appropriate party in your organization.

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

Lindsey Koepke

Lindsey Koepke
Assistant Information Manager
lindsey.koepke@oregonstate.edu
503.731.3070 x104

encl.: **invoice (H-012909-LAK5)**
computer printouts and data key

Appendix B2. Oregon Natural Heritage Information Center response letter, December 14, 2009.

OREGON NATURAL HERITAGE INFORMATION CENTER

OSU
Oregon State

Institute for Natural Resources
1322 SE Morrison Street
Portland, Oregon 97214-2423
503.731.3070
http://oregonstate.edu/ornhic

Monday, December 14, 2009

Tamiko Ruhlen
Northwest Wildlife Consultants, Inc.
815 NW 4th St.
Pendleton, OR 97801

Dear Ms. Ruhlen:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Summit Ridge Expansion Project at sections of Wasco and Sherman counties.

Nine (9) records total were noted within your project site and are included on the enclosed computer printouts.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

This data is confidential and for the specific purposes of your project and is **not to be distributed**. Please also note that as our database is continually updated, the data in this report should be considered current for one year from the date it was generated and should not be cited after **December 2010**.

Please forward the included invoice to the appropriate party in your organization.

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

Lindsey Koepke

Lindsey Koepke
Assistant Information Manager
lindsey.koepke@oregonstate.edu
503.731.3070 x104

encl.: **invoice (H-121409-LAK3)**
computer printouts and data key

Appendix C. Rare plant species with potential for occurrence in the Summit Ridge Wind Power Project area.

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period
Achnatherum hendersonii **Henderson's ricegrass**	OR Rank: G3S2 ORNHIC List: 1 ODA: C USFWS: SC	Dry shallow rocky soils derived from basalt in sagebrush or ponderosa pine. Soils are often subject to frost heave.	Low	May - June
Arabis sparsiflora var. atrorubens **sickle-pod rockcress**	OR Rank: G5T3S2 ORNHIC List: 2	Dry meadows in sagebrush steppe and ponderosa pine.	Low	May - August
Astragalus conjunctus var. rickardii **Rickard's milkvetch**	OR Rank: G4T3SNR ORNHIC List: 3	Dry rocky slopes, scablands, and hilltops throughout the sagebrush desert. Elevation: typically above 2000 feet	Low	May - June
Astragalus hoodianus **Hood River milkvetch**	OR Rank: G4S3 ORNHIC List: 2	Sagebrush steppe, scablands, grasslands, ponderosa forests, and stony flats from the foothills into the lower mountains. Known occurrence within 5 miles.	High	April - June
Astragalus sclerocarpus **stalked-pod milk-vetch**	OR Rank: G5SNR ORNHIC List: 3	Dunes and sandy barrens. Elevation: 200-900 ft.	Moderate	April - June
Astragalus succumbens **Columbia milk-vetch**	OR Rank: G4G5S4 ORNHIC List: 4	Sandy places and rocky sagebrush desert, from the Columbia River to the lower foothills. Elevation: 300-1000 ft.	Moderate	April - June
Astragalus tyghensis **Tygh Valley milk-vetch**	OR Rank: G2S2 ORNHIC List: 1 ODA: LT	Dry, rocky, sandy-clay soils and grassy slopes, common in sagebrush-bunchgrass communities. Known occurrence within 5 miles of Project area.	Moderate	Late May - Mid June
Camissonia pygmaea **dwarf evening-primrose**	OR Rank: G3S1 ORNHIC List: 1 ODA: C USFWS: SOC	Dry plains and slopes with unstable soils or on gravel in steep talus, dry washes, banks and road-cuts. Elevation: 500-200 ft.	Moderate	June - August
Chaenactis nevii **John Day chaenactis**	OR Rank: G4S4 ORNHIC List: 4	Dry, barren soils, often heavy with clay or ash.	Low	May - July
Hackelia diffusa var. cottonii **creamy stickseed**	OR Rank: G4T4S3 ORNHIC List: 4	Cliffs and talus slopes, more common south of the Columbia Gorge.	Moderate	May - June

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period
Hackelia diffusa var. diffusa **diffuse stickseed**	OR Rank: G4T3S3 ORNHIC List: 4 ODA: C	Shaded areas, cliffs, talus, wooded flats and slopes, tending closer to the Columbia Gorge than *H. d. var. cottonii*. Elevations: ~1000 ft.	Low	May - June
Lesquerella douglasii **Columbia bladderpod**	OR Rank: G4?SNR ORNHIC List: 3	Sandy and gravelly soils in sagebrush, especially in and near arid juniper/ponderosa pine woodlands.	Low - Moderate	April - May
Lomatium farinosum var. hambleniae **Hamblen's lomatium**	OR Rank: G4G5T4S3 ORNHIC List: 4	Rocky slopes and scablands with sagebrush or in crevices in the basalt cliffs. Know occurrences near the Project area.	Moderate	April - May
Lomatium watsonii **Watson's desert-parsley**	OR Rank: G4S1 ORNHIC List: 2	Arid, open, often rocky hillsides often within sagebrush.	Low	Late April - May
Mimulus jungermannioides **Hepatic monkeyflower**	OR Rank: G3S3 ODA: C ORNHIC List: 4	Basalt crevices in seepage zones in vertical cliff faces and canyon walls. Elevation: 500-3300 ft.	Low	May - Late August
Navarettia leucocephala var. leucocephala **white-flowered navarretia**	OR Rank: G4T4?S4 ORNHIC List: 4	Moist meadows, vernal pools, and other moist, open places in the foothills and lowlands.	Low	May - July
Pediocactus nigrispinus **snowball cactus**	OR Rank: G4S4 ORNHIC List: 4	Thin, rocky soil on ridge tops, desert valleys, and low mountains.	Low - Moderate	May - July
Penstemon deustus var. variabilis **hot-rock penstemon**	OR Rank: G5T1T2SNR ORNHIC List: 3	Rock outcrops and thin xeric soils over basalt substrate.	Low	May - June
Penstemon seorsus **short-lobed beardtongue**	OR Rank: G4?S4 ORNHIC List: 4	Dry, rocky or gravelly soils, often on ridge tops; often associated with sagebrush	Low	Late May - June

USFWS Federal Ranking Key:

LE = Listed Endangered. Taxa in danger of Extinction throughout all or a significant portion of their range.
LT = Listed Threatened. Taxa likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of their range.
PE = Proposed Endangered. Taxa proposed to be listed as Endangered (formal rulemaking in progress).
PT = Proposed Threatened. Taxa proposed to be listed as Threatened (formal rulemaking in progress).
SC = Candidate Species. Taxa for which sufficient threats exist to warrant a proposal to list the species/subtaxon as threatened or endangered.
SOC = Species of Concern.

ODA (Oregon Department of Agriculture) Ranking Key:

LE = Listed Endangered.
LT = Listed Threatened.
C = Candidate for listing as Threatened or Endangered.

Appendix C Footnotes Continued:

OR Rank (Oregon Natural Heritage Program) Categories Key:

G = Global rank indicator; denotes rank based on range wide status.
T = Trinomial rank indicator; denotes range wide status of infraspecific taxa.
S = State rank indicator; denotes rank based on status within Oregon.
1 = Critically imperiled because of extreme rarity or some factor of its biology makes it especially vulnerable to extinction (typically 5 or fewer occurrences).
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (typically 6 to 20 occurrences).
3 = Rare or uncommon but not imperiled (typically 21 to100 occurrences).
4 = Not rare and apparently secure, but with cause for long-term concern (usually more than 100 occurrences).
5 = Demonstrably widespread, abundant, and secure.
H = Historical occurrence (i.e., formerly part of the native biota with the implied expectation that it might be rediscovered).
? = Not yet ranked.

ORNHIC (Oregon Natural Heritage Information Center) Special Status Plant Lists Key:

1 = Taxa which are Endangered or Threatened throughout their range or are presumed extinct.
2 = Taxa which are Threatened, Endangered, or possibly extirpated from Oregon, but are more stable elsewhere.
3 = Taxa for which more info is needed before status can be determined, but may be Threatened or Endangered in Oregon or throughout their range.
4 = Contains taxa of concern which are not currently Threatened or Endangered
EX = Thought to be extirpated from Oregon

Appendix D. Special status vertebrate wildlife species of known or potential occurrence in the Summit Ridge Wind Power Project area.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the Summit Ridge Wind Power Project D=Documented On-site N=Not Documented On-site
Mammals			
white-tailed jackrabbit *Lepus townsendii*	-	SV	**D-**Apparently rare, but one individual and some pellets encountered during special status wildlife species surveys.
pallid bat *Antrozous pallidus pacificus*	SoC	SV	**D**-Positively identified during bat inventory study. This species is largely non-migratory, however, and its typical foraging flight height is below that of turbine rotors. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	SoC	SC	**N**-Possible (a roost found in Klickitat County 30 miles from Summit Ridge), but not identified during bat inventory study; non-migratory and uncommon.
spotted bat *Euderma maculatum*	SoC	-	**N**-Unlikely; associated with arid desert terrain. Roosts include crevices in steep cliff faces. Known hunting grounds include open ponderosa pine forests, meadows, riparian areas, hay fields, and marshes adjacent to lakes.
hoary bat *Lasiurus cinereus*	-	SV	**D**-Positively identified during bat inventory study. This highly migratory species flies at heights that make it susceptible to collisions, and it comprises (with silver-haired bat) the majority of bat fatalities at Pacific Northwest wind energy facilities (Appendix G).
silver-haired bat *Lasionycteris noctivagansyotis*	SoC	SV	**D**-Positively identified during bat inventory study. Its flight height and migratory nature make it susceptible to turbine strikes; this is somewhat allayed by the relative lack of suitable foraging and roosting habitat on and near the Summit Ridge Project.
small-footed myotis *Myotis ciliolabrum*	SoC	-	**D**- This species was positively identified during bat inventory surveys, but its foraging behavior generally keeps it below turbine height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).
long-eared myotis *Myotis evotis*	SoC	-	**N**-Wide range of habitat from arid grasslands and ponderosa pine forests to humid coastal and montane forests. It uses buildings or under the bark of trees as day roosts. Maternity colonies usually are located in buildings. Caves and mine adits are used as temporary night roosts.
fringed myotis *Myotis thysanodes*	SoC	SV	**N**—Most common roosts are in caves, mines, and snags; there are no records of this species for the Columbia Plateau.
long-legged myotis *Myotis volans*	SoC	SV	**N**-Roosts in groups in buildings, rock crevices and trees. They night roost in mines and caves. Associated with montane coniferous forests but also occur in some desert and riparian habitats.
Yuma myotis *Myotis yumanensis*	SoC	-	**D?**-Calls of either this species or California myotis detected at one survey station and one survey night. Inhabits coastal forests, ponderosa pine/Douglas-fir forests and arid grasslands. Summer day roosts are usually in buildings and other man-made structures in close proximity to water.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the Summit Ridge Wind Power Project D=Documented On-site N=Not Documented On-site
			Birds
long-billed curlew *Numenius americanus*	BoCC	SV	**D**-A single detection of two flying individuals during special status wildlife species surveys. One adult was observed flying on July 11, 2005 during avian use surveys. Infrequency of detections makes local breeding unlikely.
greater sage-grouse *Centrocercus urophasianus*	SoC BoCC	SV	**N**-Very unlikely; populations extirpated from this area.
mountain quail *Oreortyx pictus*	SoC	-	**N**-Utilizes shrub openings within forests and riparian corridors; no suitable habitat on Project area.
bald eagle *Haliaeetus leucocephalus*	NW EPA BoCC	T	**D**-Four total detections. Two detections during winter avian use surveys 12/02/2008 and 02/02/2009. One detected outside of the plot radius March 16, 2009 during avian use surveys. One detected on August 4, 2005 during summer avian use surveys. Known to hunt uplands for carrion and small mammals.
golden eagle *Aquila chrysaetos*	EPA BoCC	-	**D**-Observed during avian use surveys in all seasons and in-transit to surveys. No active nests found, but four large stick nests that may have been built by this species found within 2 miles of proposed turbines.
Swainson's hawk *Buteo swainsoni*	-	SV	**D-**One observed during avian use surveys on April 21, 2005 and two detections outside of the plot radius, but within the Project area on June 23, 2005, and one in-transit observation Project contains potential breeding habitat, but is at extreme western edge of species' range; no nests found.
ferruginous hawk *Buteo regalis*	SoC BoCC	SC	**D**-Observed June 23, 2005 outside of avian use plot C radius, but located within the Project area. Project is outside known nesting range, and preferred prey (ground squirrels) absent; active nest occasionally found approx. 15 miles northeast (Kronner, field notes 2006).
northern goshawk *Accipiter gentilis*	SoC	SV	**N**-Prefers forested habitats, even in winter; unlikely except as transient.
peregrine falcon *Falco peregrinus*	NW BoCC	SV	**N-**Possible as transient, and may even forage in Project area, but not detected during studies.
western burrowing owl *Athene cunicularia*	SoC	SC	**N**-In shrub-steppe and grassland areas; uses existing burrows of coyotes, small mammals and badgers for nesting.
loggerhead shrike *Lanius ludovicianus*	BoCC	SV	**D**-Documented during avian use surveys, 3 in winter and 1 in spring. A total of 18 in-transit observations. Some potential nesting habitat present along the proposed transmission line.
acorn woodpecker *Melanerpes formicivorus*	SoC	-	**N**-Unlikely except as transient.
Lewis's woodpecker *Melanerpes lewis*	SoC BoCC	SC	**N**- Known from vicinity, and may be transient, but habitat for this species is not present within the site boundary. A small portion of the buffer area of a record for this species provided by ORNHIC intersects with the southern portion of the Project area (ORNHIC, 2009).
white-headed woodpecker *Picoides albolarvatus*	SoC BoCC	SC	**N**-Inhabits ponderosa pine forests that have open canopy and contain large old trees/snags and minimum shrub and small tree cover; no such habitat on Project; unlikely except as transient.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the Summit Ridge Wind Power Project D=Documented On-site N=Not Documented On-site
olive-sided flycatcher *Contopus cooperi*	SoC	SV	**N**-Unlikely; no suitable forest habitat on Project area.
willow flycatcher *Empidonax trailii adastus*	SoC BoCC	SV	**N**-No suitable riparian habitat exists within Project area.
tricolored blackbird *Agelaius tricolor*	SoC	-	**N**-Suitable breeding (wetlands) habitat not found on Project, but species may be found as transient.
yellow-breasted chat *Icteria virens*	SoC	-	**N**-No suitable riparian habitat exists within Project area.
grasshopper sparrow *Ammodramus savannarum*	-	SV	**D-**Rather common during breeding season and in a variety of habitat types. Observed during special status wildlife surveys, avian use surveys, and grassland bird displacement studies. Potential nesting habitat present along proposed transmission line.
Reptiles			
northern sagebrush lizard *Sceloparus graciosus graciosus*	SoC	SV	**N**-None recorded during the year of studies, whereas the congeneric western fence lizard was rather common.

Status Key

Federal:

T	Threatened	SoC	Species of Concern
E	Endangered	NW	Not Warranted**;** delisted
C	Candidate	EPA	Bald and Golden Eagle Protection Act

BoCC USFWS Birds of Conservation Concern (BCR 9, Great Basin)

- No special status

Note: All native migratory birds are protected by the federal Migratory Bird Treat Act (MBTA).

Oregon:

T Threatened

E Endangered

SC "Critical" sensitive species are those for which listing as threatened or endangered would be appropriate if immediate conservation actions were not taken. Some peripheral species which are at risk throughout their range and some disjunct populations (those that are geographically isolated from other populations) area also considered "Critical."

SV "Vulnerable" sensitive species are not in imminent danger of being listed as threatened or endangered, but could become sensitive-critical, threatened, or endangered with changes in populations, habitats or threats.

Sources for status = ODFW, 2008; ORNHIC, 2008; USFWS, 2008; USFWS, 2009

Appendix E. Comprehensive plant species list for the Summit Ridge Wind Power Project.

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym
2	*Achillea millefolium*	common yarrow	*Asteraceae*	N	
2	*Agoseris heterophylla*	annual agoseris	*Asteraceae*	N	
4	*Agropyron cristatum*	crested wheatgrass	*Poaceae*	I	*Agropyron cristatum*
5	*Allium acuminatum*	taper tip onion	*Lilaceae*	N	
5	*Amelanchier alnifolia*	pacific serviceberry	*Rosaceae*	N	
2	*Amsinckia lycopsoides*	fiddleneck tarweed	*Boraginaceae*	N	
5	*Amsinckia menziesii*	Menzie's fiddleneck	*Boraginaceae*	N	*Amsinckia retrorsa*
5	*Antennaria dimorpha*	low pussytoes	*Asteraceae*	N	
5	*Antennaria rosea*	rosy pussytoes	*Asteraceae*	N	
6	*Apocynum sp.*	Dogbane	*Apocynaceae*	N	
4	*Artemisia tridentata ssp. tridentate*	big basin sagebrush	*Asteraceae*	N	
5	*Astragalus purshii*	woollypod milkvetch	*Fabaceae*	N	
5	*Astragalus tweedyii*	Tweedy's milkvetch	*Fabaceae*	N	
5	*Balsamorhiza serrata*	serrate balsamroot	*Asteraceae*	N	
5	*Balsamorhiza sagitatta*	arrowleaf balsamroot	*Asteraceae*	N	
2	*Bromus arvensis*	field brome	*Poaceae*	I	*Bromus japonicus*
1	*Bromus tectorum*	cheat grass	*Poaceae*	I	
6	*Buglossoides arvensis*	corn gromwell	*Boraginaceae*	I	*Lithospermum arvense*
5	*Calochortus sp.*	mariposa lily	*Lilaceae*	N	
5	*Centaurea diffusa*	diffuse knapweed	*Asteraceae*	I	
5	*Ceratocephala testiculata*	bur-buttercup	*Ranunculaceae*	I	
5	*Chaenactis douglasii*	Douglas's dusty maiden	*Asteraceae*	N	
5	*Chenopodium album*	lambsquarters	*Chenopodiaceae*	I	
5	*Chorispora tenellus*	Crossflower	*Brassicaceae*	I	
4	*Chrysothamnus viscidiflorus*	green rabbitbrush	*Asteraceae*	N	
5	*Cirsium arvense*	Canada thistle	*Asteraceae*	I	
6	*Cirsium vulgare Bull*	bull thistle	*Asteraceae*	I	
2	*Collinsia parviflora*	maiden blue-eyed Mary	*Scrophulariaceae*	N	
5	*Collomia grandiflora*	grand colomia	*Polemoniaceae*	N	
6	*Collomia linearis*	tiny trumpet	*Polemoniaceae*	N	
5	*Convolvulus arvensis*	field bindweed	*Convolvulaceae*	I	
5	*Conyza Canadensis*	Canadian horseweed	*Asteraceae*		
2	*Crepis atrabarba*	slender hawksbeard	*Asteraceae*	N	
5	*Cryptantha flaccid*	weak cryptantha	*Boraginaceae*	N	
5	*Delphinium nuttallianum*	twolobe larkspur	*Ranunculaceae*	N	
2	*Descurainia pinnata*	western tansymustard	*Brassicaceae*	N	
3	*Descurainia Sophia*	herb Sophia	*Brassicaceae*	I	

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym
6	*Dodecatheon pulchellum*	darkthroat shootingstar	*Primulaceae*	N	
4	*Draba verna*	spring whitlow grass	*Brassicaceae*	N	
5	*Eleocharis palustris*	common spikerush	*Cyperaceae*	N	
5	*Elymus elymoides*	squirrel tail grass	*Poaceae*	N	*Sitanion hystrix*
2	*Epilobium brachycarpum*	desert willow-herb	*Onagraceae*	N	*Epilobium paniculatum*
2	*Ericameria nauseosa*	rubber rabbitbrush	*Asteraceae*	N	*Chrysothamnus*
5	*Erigeron linearis*	desert yellow fleabane	*Asteraceae*	N	
5	*Erigeron pumilus*	shaggy fleabane	*Asteraceae*	N	
5	*Eriogonum douglasii*	Douglas' buckwheat	*Polygonaceae*	N	
5	*Eriogonum heracleoides*	cream buckwheat	*Polygonaceae*	N	
5	*Eriogonum strictum*	strict buckwheat	*Polygonaceae*	N	
5	*Eriophyllum lanatum*	common wooly sunflower	*Asteraceae*	N	
2	*Erodium cicutarium*	storksbill geranium	*Geraniaceae*	I	
6	*Festuca idahoensis*	Idaho fescue	*Poaceae*	N	
6	*Fritillaria pudica*	yellow-bells	*Lilaceae*	N	
4	*Gutierriezia sarothrae*	Snakeweed	*Asteraceae*	N	
6	*Holodiscus discolor*	Oceanspray	*Rosaceae*	N	
2	*Holosteum umbellatum*	jagged chickweed	*Caryophyllaceae*	I	
5	*Juniperus occidentalis*	western juniper	*Cupressaceae*	N	
2	*Lactuca serriola*	prickly lettuce	*Asteraceae*	I	
3	*Lagophylla ramosissima*	rabbit-leaf	*Asteraceae*	N	
5	*Leymus cinereus*	basin wildrye	*Poaceae*	N	*Elymus cinereus*
5	*Lepidium latifolium*	broadleaf pepperweed	*Brassicaceae*	I	
5	*Lepidium perfoliatum*	clasping pepperweed	*Brassicaceae*	I	
3	*Lithophragma parviflora*	smallflower woodland star	*Saxifragaceae*	N	
5	*Lithospermum ruderale*	Stoneseed	*Boraginaceae*	N	
3	*Lomatium grayii*	Gray's desert parsley	*Apiaceae*	N	
2	*Lomatium macrocarpum*	big-seed biscuitroot	*Apiaceae*	N	
4	*Lomatium nudicaule*	barestem biscuitroot	*Apiaceae*	N	
3	*Lomatium triternatum*	nine-leaf biscuitroot	*Apiaceae*	N	
6	*Lupinus aridus ssp. Aridus*	desert lupine	*Fabaceae*	N	
5	*Lupinus leucophyllus*	velvet lupine	*Fabaceae*	N	
5	*Lupinus sericeus ssp. Sericeus*	silky lupine	*Fabaceae*	N	
5	*Madia exigua*	small tarweed	*Asteraceae*	N	
6	*Malva neglecta*	common mallow	*Malvaceae*	I	
4	*Medicago sativa*	Alfalfa	*Fabaceae*	I	
4	*Meliotus officinale*	sweet clover	*Fabaceae*	I	
4	*Microsteris gracilis*	slender phlox	*Polemoniaceae*	N	
6	*Navarettia intertexta*	needleleaf navarretia	*Polemoniaceae*	N	

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym
4	*Nothocalais troximoides*	sagebrush false dandelion	*Asteraceae*	N	*Microseris troximoides*
5	*Phacelia hastate*	silverleaf phacelia	*Hydrophyllaceae*	N	
5	*Phlox hoodii*	Hood's phlox	*Polemoniaceae*	N	
2	*Phlox longifolia*	longleaf phlox	*Polemoniaceae*	N	
6	*Pinus ponderosa*	ponderosa pine	*Pinaceae*	N	
2	*Plagiobothyrs tenellus*	Pacific popcorn flower	*Boraginaceae*	N	
6	*Plantago patagonica*	wooly plantain	*Plantaginaceae*	N	
4	*Plectritus macrocera*	longhorn plectritis	*Valerinaceae*	N	
2	*Poa bulbosa*	bulbous bluegrass	*Poaceae*	I	*Poa bulbosa*
6	*Poa pratensis*	Kentucky bluegrass	*Poaceae*	I	
1	*Poa secunda*	Sandberg's bluegrass	*Poaceae*	N	*Poa sandbergii*
5	*Polygonum aviculare*	prostate knotweed	*Polygonaceae*	I	
5	*Polygonum douglasii*	Douglas' knotweed	*Polygonaceae*	N	
6	*Populus trichocarpa*	black cottonwood	*Salicaceae*	N	
5	*Prunus virginiana*	Chokecherry	*Rosaceae*	N	
1	*Pseudoroegneria spicata*	bluebunch wheatgrass	*Poaceae*	N	*Agropyron spicatum*
6	*Purshia tridentate*	antelope bitterbrush	*Rosaceae*	N	
5	*Quercus garryana*	Oregon white oak	*Fagaceae*	N	
7	*Ranunculus aquatilis*	white water crowfoot	*Ranunculaceae*	N	
5	*Robinia pseudoacacia*	black locust	*Fabaceae*	N	
6	*Rumex crispus*	curly dock	*Polygonaceae*	I	
5	*Salsola kali*	Russian thistle	*Chenopodiaceae*	I	
6	*Sambucus cerulean*	blue elderberry	*Caprifoliaceae*	N	
2	*Sisymbrium altissimum*	tall tumble mustard	*Brassicaceae*	I	
4	*Taeniatherum caput-medusae*	medusahead rye	*Poaceae*	I	
6	*Taraxacum officinale*	common dandelion	*Asteraceae*	I	
7	*Thelypodium sp.*	Thelypody	*Brassicaceae*	N	
4	*Thinopyrum intermedium*	intermediate wheatgrass	*Poaceae*	N	*Agropyron intermedium*
2	*Thysanocarpus curvipes*	sand fringepod	*Brassicaceae*	N	
2	*Tragopogon dubius*	yellow salsify	*Asteraceae*	I	
5	*Triteleia grandiflora*	largeflower trideleia	*Lilaceae*	N	*Brodiaea howellii*
4	*Triticum aestivum*	common wheat	*Poaceae*	I	
5	*Verbascum Thapsus*	common mullein	*Scrophulariaceae*	I	
2	*Vulpia bromoides*	brome fescue	Poaceae	I	Festuca bromoides
5	*Zigadenus venenosus*	meadow deathcamus	*Liliaceae*	N	

*Abundance Codes:
1 = Abundant in multiple plant communities
2 = Common in multiple plant communities
3 = Uncommon in multiple plant communities
4 = Abundant in specific plant communities
5 = Common in specific plant communities
6 = Uncommon in specific plant communities
7 = Rare – three or fewer sightings in the Project

†From USDA Plants Database (UDSA 2009)

Nativity: N = Native I = Introduced

Appendix F. Comprehensive list of all vertebrate wildlife observed during 2005 and 2009 avian use surveys, 2009 grassland bird displacement studies, special status wildlife species surveys, and raptor nest surveys, including incidental and in-transit sightings, Summit Ridge Wind Power Project.

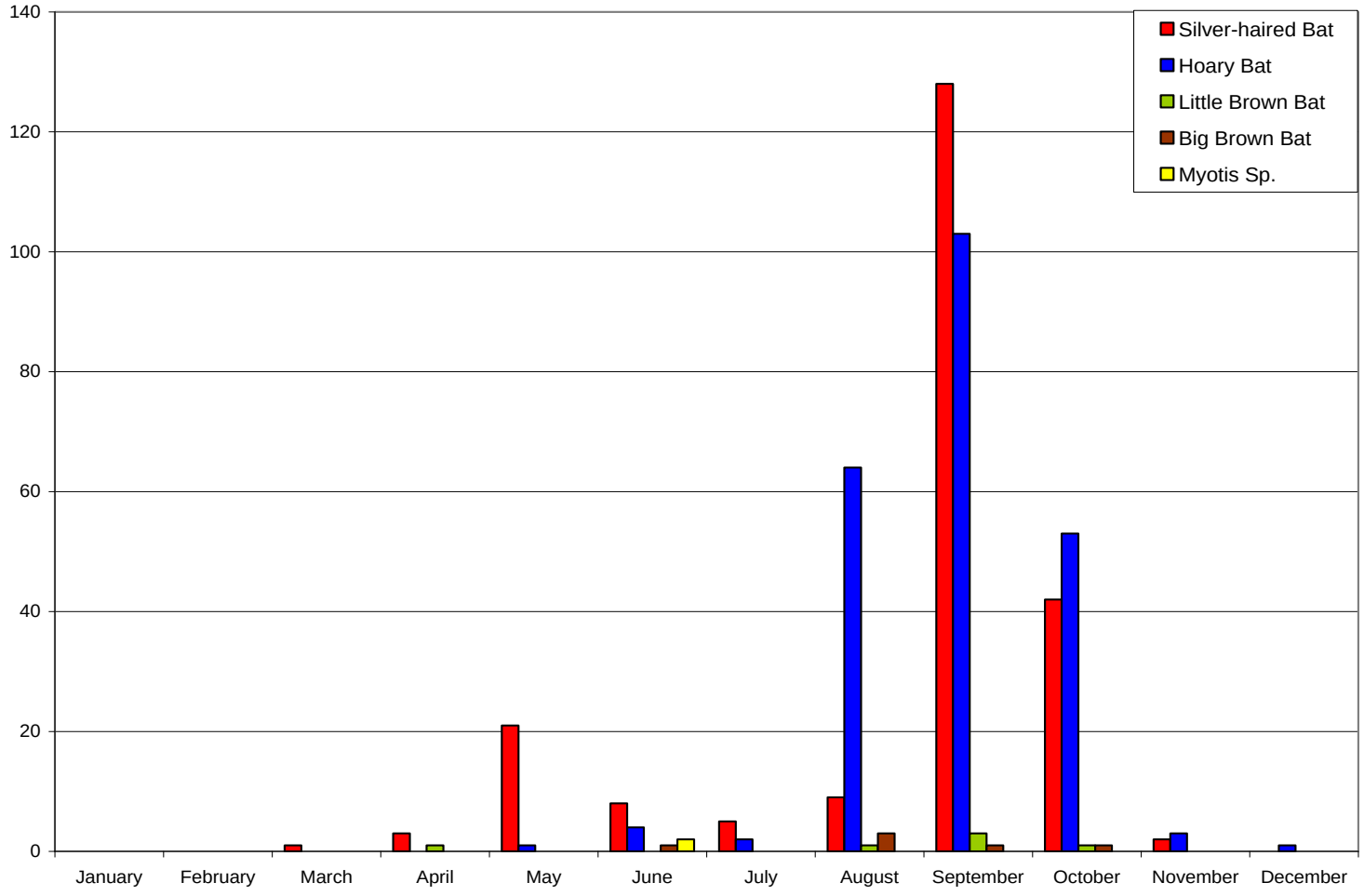
Common Name	*Scientific Name*	Avian Use Surveys	Grassland Bird Displace-ment	Special Status Wildlife Surveys	Raptor Nest Survey	Incidental or In-transit
		Birds				
American goldfinch	*Carduelis tristis*	X				
American kestrel	*Falco sparverius*	X		X		X
American robin	*Turdus migratorius*	X		X		X
American pipit	*Anthus rubescens*	X				
bald eagle*	*Haliaeetus leucocepahlus*	X				
barn swallow	*Hirundo rustica*	X		X		X
Bewick's wren	*Thryomanes bewickii*	X				
black-billed magpie	*Pica pica*	X		X		X
Brewer's blackbird	*Euphagus cyanocephalus*	X		X		X
Brewer's sparrow	*Spizella breweri*	X	X	X		X
brown-headed cowbird	*Molothrus ater*			X		X
Bullock's oriole	*Icterus bullockii*			X		
bushtit	*Psaltriparus minimus*	X				
California quail	*Callipepla californica*	X				X
chukar	*Alectoris chukar*	X		X		X
cliff swallow	*Hirundo pyrrhonota*	X				
common nighthawk	*Chordeiles minor*	X				X
common raven	*Corvus corax*	X		X		X
Cooper's hawk	*Accipiter cooperii*	X				X
dark-eyed junco	*Junco hyemalis*	X		X		
dusky flycatcher	*Empidonax wrightii*		X			
gray flycatcher	*Empidonax wrightii*			X		
gray partridge	*Perdix perdix*			X		
greater yellowlegs	*Tringa melanleuca*					X
European starling	*Sturnus vulgaris*	X		X		X
ferruginous hawk *	*Buteo regalis*	X				
golden eagle *	*Aquila chrysaetos*	X		X		X
grasshopper sparrow *	*Ammodramus savannarum*	X	X	X		
greater white-fronted goose	*Anser albifrons*	X				
great-horned owl	*Bubo virginianus*					X
horned lark	*Eremophila alpestris*	X		X		X
house finch	*Carpodacus mexicanus*	X		X		X
killdeer	*Charadrius vociferous*	X		X		X
lark sparrow	*Chondestes grammacus*	X		X		
lazuli bunting	*Passerina cyanea*		X	X		
loggerhead shrike*	*Lanius ludovicianus*	X				X
long-billed curlew *	*Numenius americanus*	X		X		
long-eared owl	*Asio otus*				X	

Common Name	*Scientific Name*	Avian Use Surveys	Grassland Bird Displace-ment	Special Status Wildlife Surveys	Raptor Nest Survey	Incidental or In-transit
mallard	*Anas platyrhynchos*					X
merlin	*Falco columbarius*	X				X
mourning dove	*Zenaida macroura*			X		X
mountain bluebird	*Sialia currucoides*	X				
northern flicker	*Colaptes auratus*	X				X
northern harrier	*Circus cyaneus*	X		X		X
northern rough-winged swallow	*Stelgidopteryx serripennis*	X				
northern shrike	*Lanius excubitor*	X				X
osprey	*Pandion haliaetus*	X				
prairie falcon	*Falco mexicanus*	X		X	X	X
red-tailed hawk	*Buteo jamaicensis*	X		X	X	X
red-winged blackbird	*Agelaius phoeniceus*	X				
ring-billed gull	*Larus delawarensis*	X				
ring-necked pheasant	*Phasianus colchicus*	X		X		X
rock pigeon	*Columba livia*	X		X		X
rock wren	*Salpinctes obsoletus*		X	X		
rough-legged hawk	*Buteo lagopus*	X				X
sage thrasher	*Oreoscoptes montanus*			X		
savannah sparrow	*Passerculus sandwichensis*	X	X	X		X
Say's phoebe	*Sayornis saya*	X		X		X
short-eared owl	*Asio flammeus*			X		
spotted sandpiper	*Actitis macularia*					X
spotted towhee	*Pipilo maculates*			X		
Swainson's hawk *	*Buteo swainsoni*	X				X
turkey vulture	*Cathartes aura*	X		X	X	X
unidentified blackbird		X				
unidentified finch		X				
unidentified gull		X				
unidentified passerine		X				
unidentified swallow		X				
Vaux's swift	*Chaetura vauxi*	X				
vesper sparrow	*Pooecetes gramineus*	X	X	X		X
violet-green swallow	*Tachycineta thalassina*	X		X		X
western kingbird	*Tyrannus verticalis*	X		X		X
western meadowlark	*Sturnella neglecta*	X	X	X		X
white-crowned sparrow	*Zonotrichia leucophrys*	X				X
yellow-rumped warbler	*Dendroica coronata*	X		X		
	Mammals					
badger	*Taxidea taxus*					X
California bighorn sheep	*Ovis canadensis californiana*	X		X	X	X
white-tailed jackrabbit	*Lepus townsenddi*			X		
mountain cottontail	*Sylvilagus nuttallii*	X				

Common Name	*Scientific Name*	Avian Use Surveys	Grassland Bird Displace-ment	Special Status Wildlife Surveys	Raptor Nest Survey	Incidental or In-transit
coyote	*Canis latrans*	*X*			*X*	*X*
mule deer	*Odocoileus hemionus*	*X*		*X*	*X*	*X*
	Reptiles and Amphibians					
common garter snake	*Thamnophis sirtalis*					*X*
gopher snake	*Pituophis catenifer*			*X*		*X*
Pacific chorus frog	*Pseudacris regilla*	*X*				
racer	*Coluber constrictor*					*X*
western fence lizard	*Sceloporus occidentalis*					*X*
western rattlesnake	*Crotalus viridis*			*X*		*X*

*- denotes species is of State or Federal special status.

Appendix G. Bat fatalities by month at twelve existing wind projects in the Columbia Plateau Ecoregion.



Data used are dates when bat fatality was discovered with no adjustment for age of carcass when found. References for projects included: Stateline I and II-partial (Erickson et al., 2004); Vansycle (Erickson et al., 2000); Klondike I (Johnson et al., 2003a); Klondike II (NWC and West, 2007); Klondike III year 1 (Gritski et al., 2009c); Combine Hills (Young et al., 2006); Nine Canyon I (Erickson et al., 2003a); Hopkins Ridge (Young et al., 2007, 2009); Big Horn (Kronner et al., 2008a); Wild Horse Year 1 (Erickson et al., 2008); Leaning Juniper I (Gritski et al., 2008a); Biglow Canyon (Jeffrey et al., 2009).

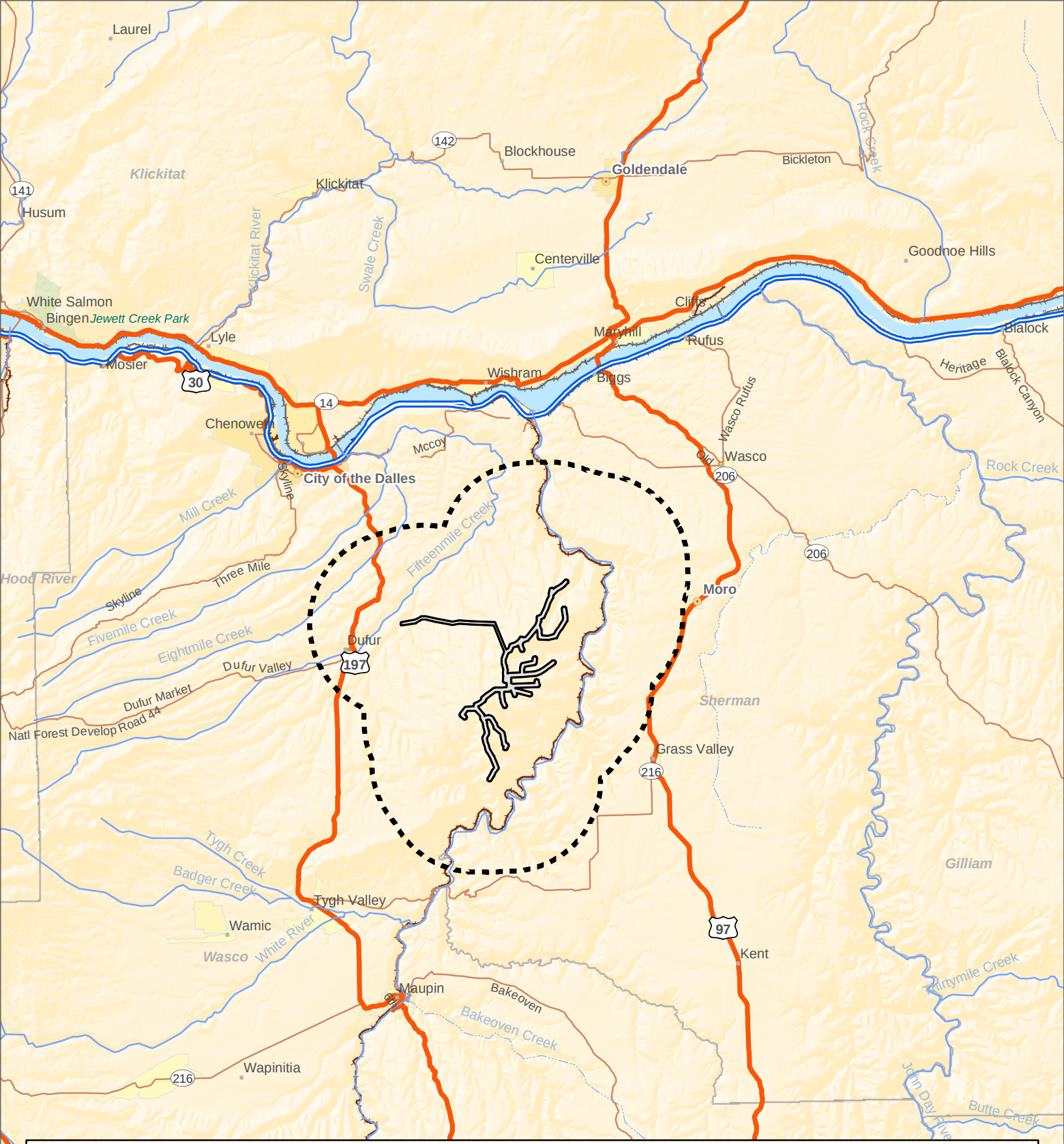


Figure 1. Summit Ridge Wind Power Project Vicinity and Database Search Analysis Area

Legend

- Project Boundary
- Project Boundary
- Database Search Analysis Area

N
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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

Miles
0 2.5 5 10 15

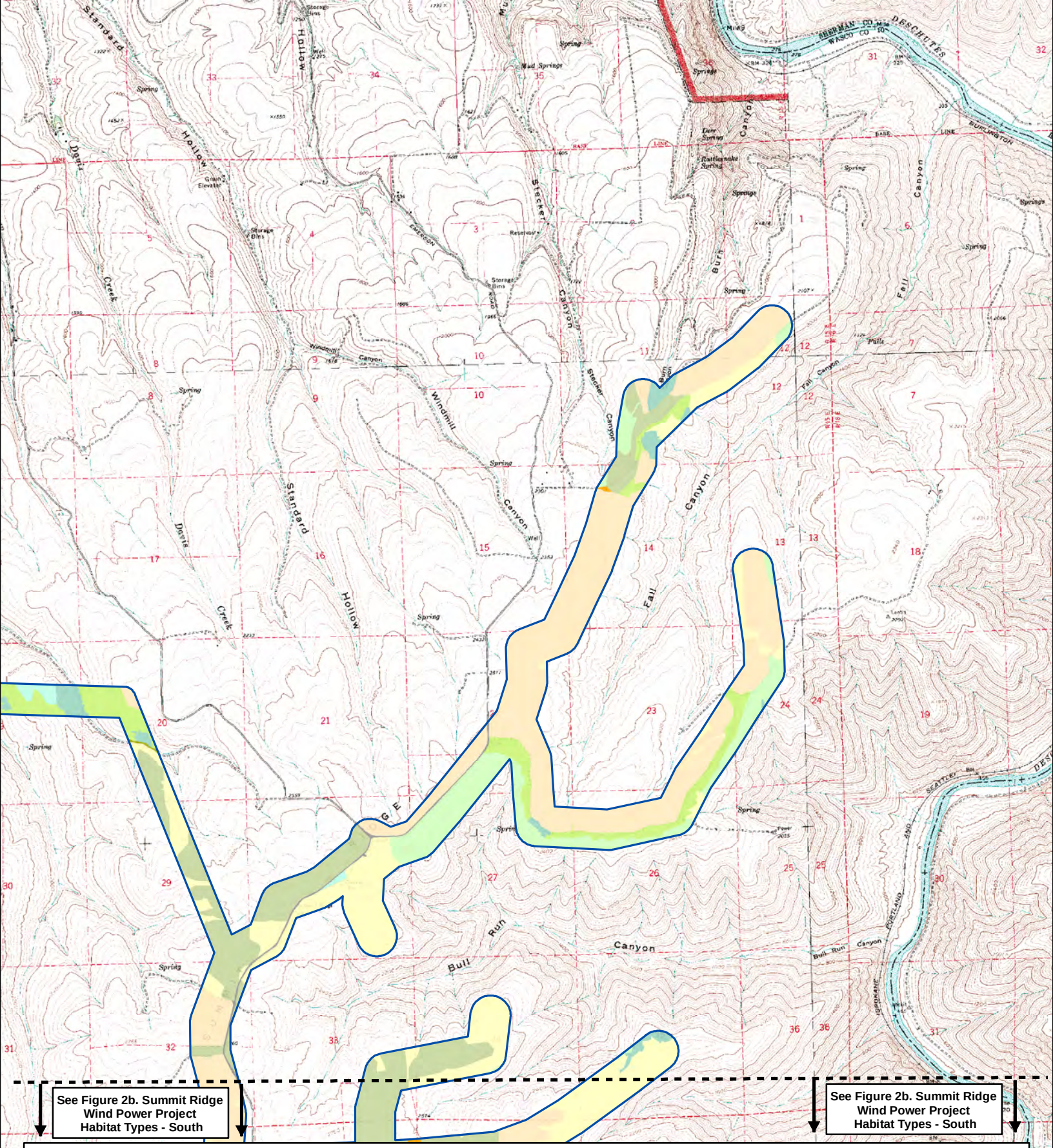

Figure 2a. Summit Ridge Wind Power Project Habitat Types - North

Legend

- Special Status Wildlife Survey Corridor

Habitat Types

- Dryland Wheat or Other Small Grain
- Farmyard or Residence
- Old Field
- Quarry
- Revegetated Grassland
- Road
- Escarpment
- Talus
- Exotic Annual Grassland
- Native Perennial Grassland
- Big Sagebrush Shrub-steppe
- Rabbitbrush/Buckwheat Shrub-steppe
- Pond
- Riparian Shrubland/Woodland
- Riparian Trees

N W E S

Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

0 0.25 0.5 1 1.5 Miles

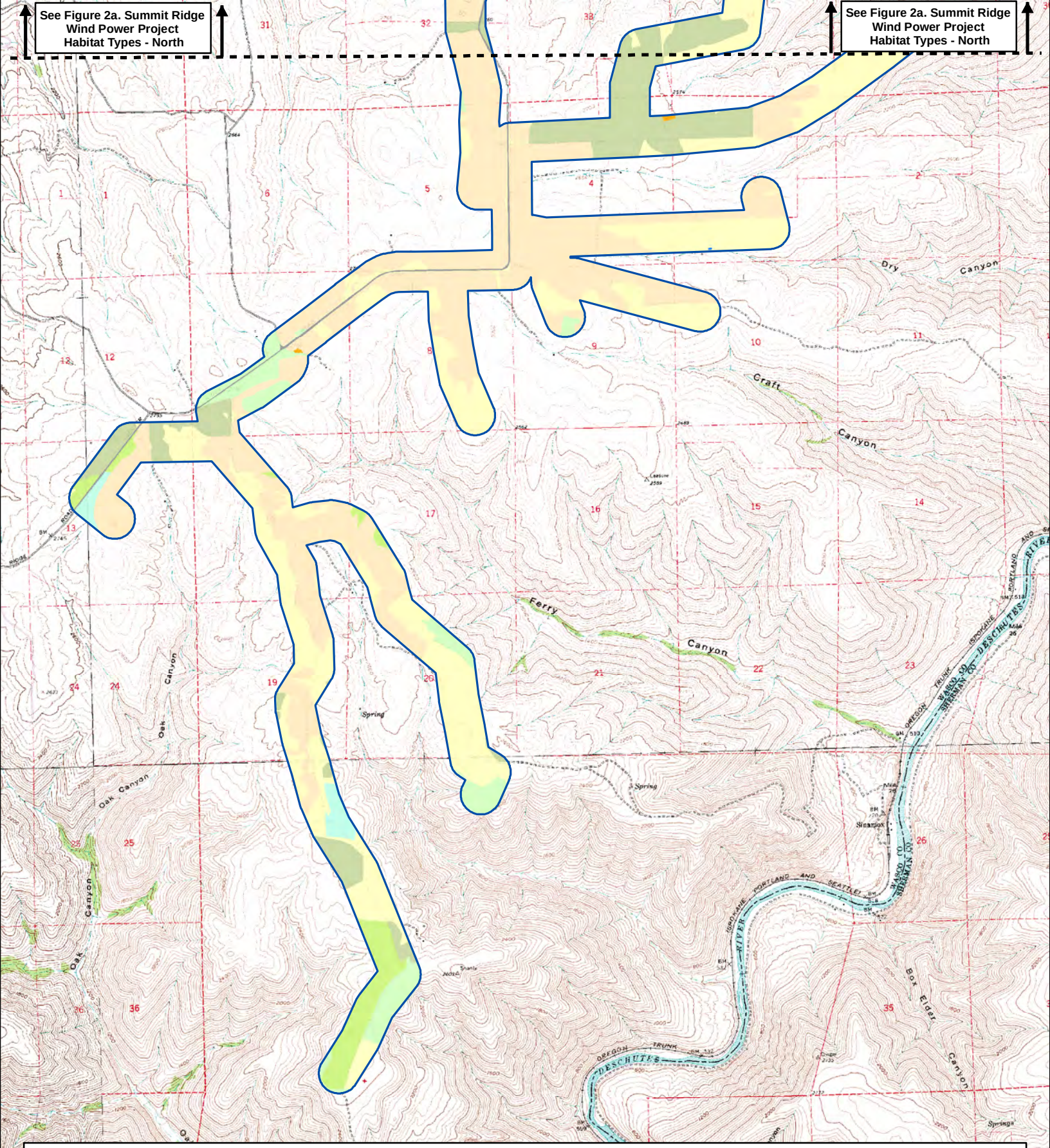

Figure 2b. Summit Ridge Wind Power Project Habitat Types - South

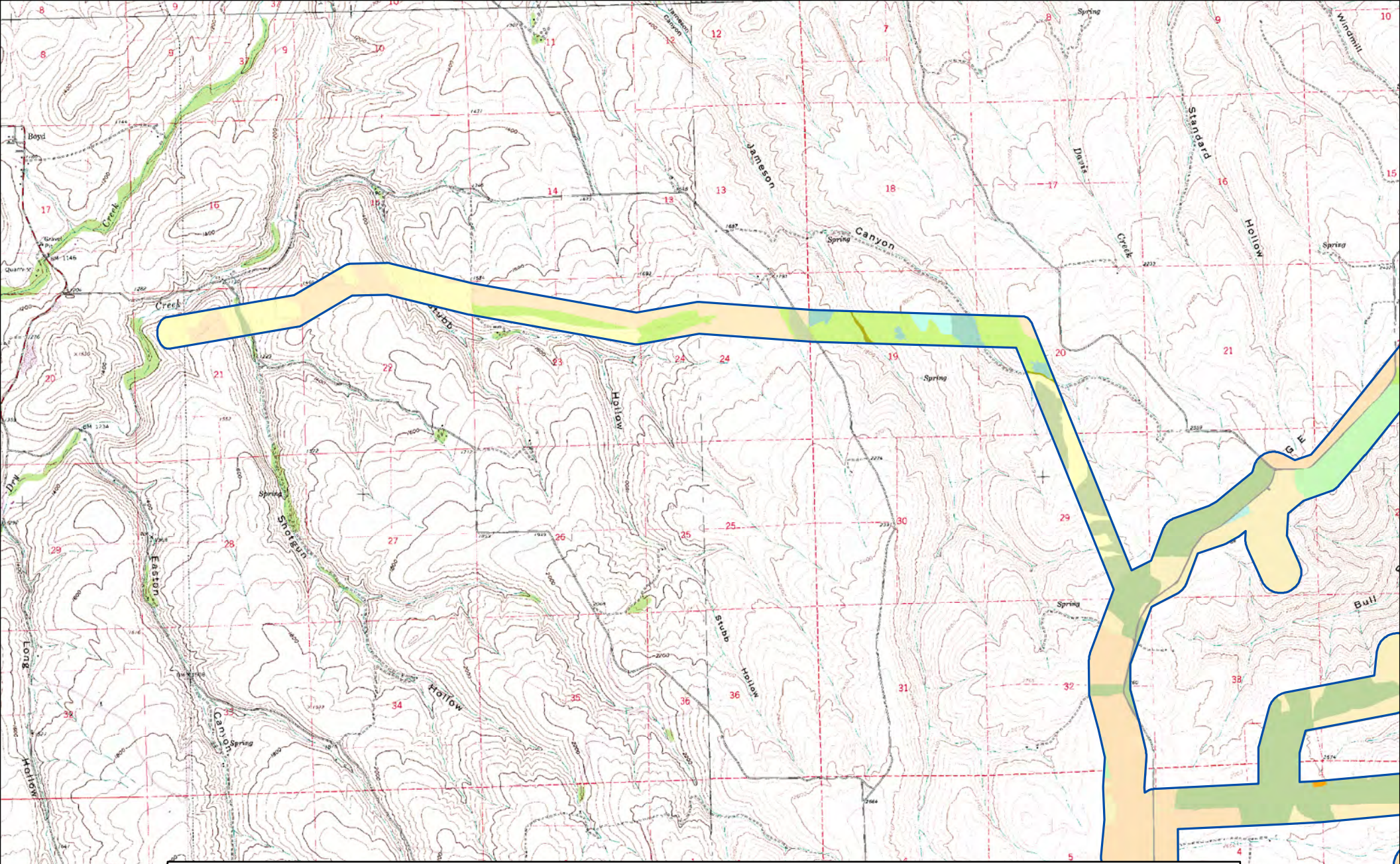

Figure 2c. Summit Ridge Wind Power Project Habitat Types - Transmission Line

Legend

- Special Status Wildlife Survey Corridor

Habitat Types

- Dryland Wheat or Other Small Grain
- Farmyard or Residence
- Old Field
- Quarry
- Revegetated Grassland
- Road
- Escarpment
- Talus
- Exotic Annual Grassland
- Native Perennial Grassland
- Big Sagebrush Shrub-steppe
- Rabbitbrush/Buckwheat Shrub-steppe
- Pond
- Riparian Shrubland/Woodland
- Riparian Trees

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

0 0.25 0.5 1 1.5 Miles

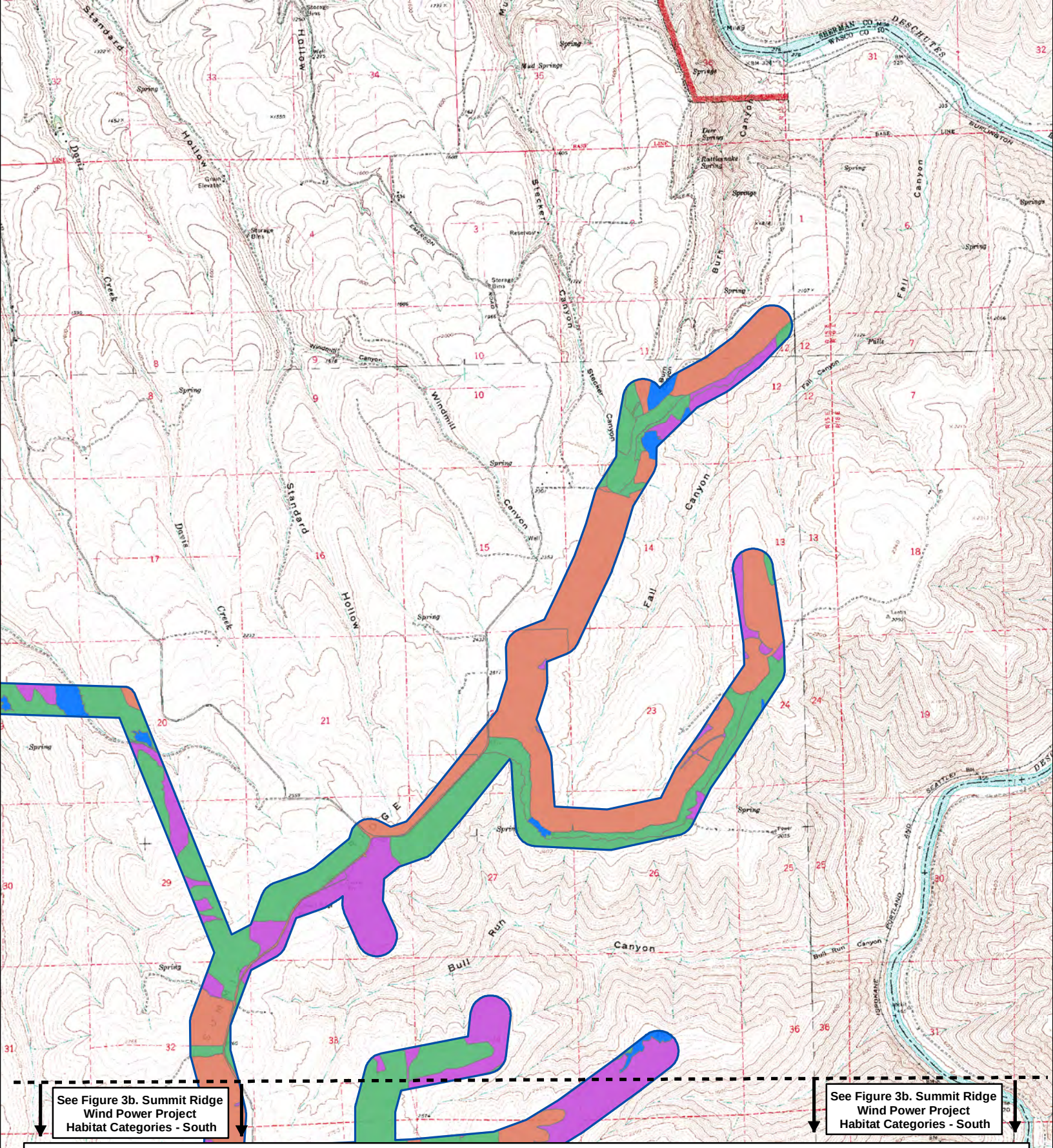

Figure 3a. Summit Ridge Wind Power Project Habitat Categories - North

Legend

Special Status Wildlife Survey Corridor

Habitat Category

2 Big Sagebrush Shrub-steppe

3 Revegetated Grassland
Native Perennial Grassland
Rabbitbrush/Buckwheat Shrub-steppe
Pond

4 Old Field
Exotic Annual Grassland

6 Dryland Wheat or Other Small Grain
Farmyard or Residence
Road

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

Miles
0 0.25 0.5 1 1.5

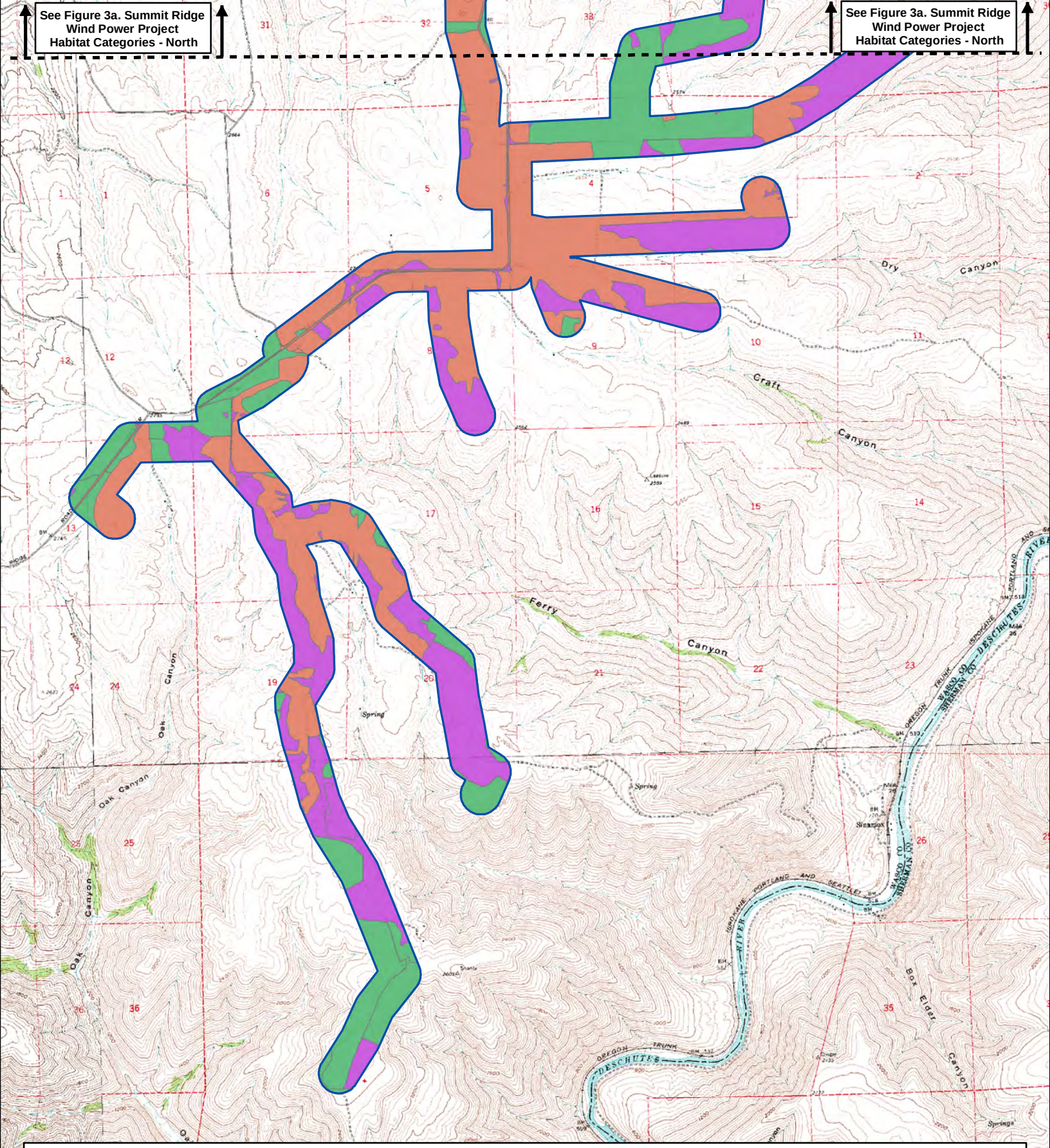

Figure 3b. Summit Ridge Wind Power Project Habitat Categories - South

Legend

Special Status Wildlife Survey Corridor

Habitat Category

2 Big Sagebrush Shrub-steppe

3 Revegetated Grassland
Native Perennial Grassland
Rabbitbrush/Buckwheat Shrub-steppe
Pond

4 Old Field
Exotic Annual Grassland

6 Dryland Wheat or Other Small Grain
Farmyard or Residence
Road

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

Miles
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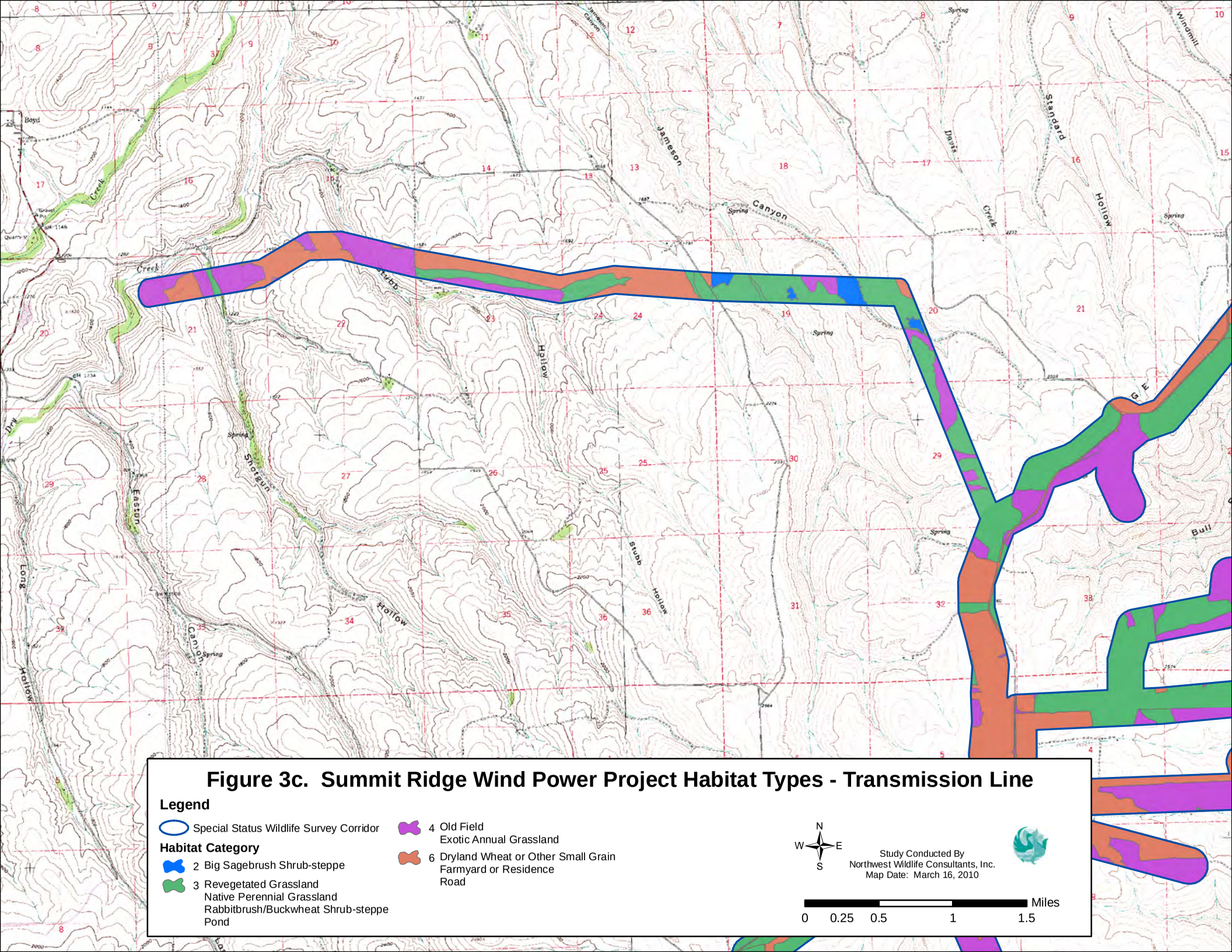

Figure 3c. Summit Ridge Wind Power Project Habitat Types - Transmission Line

Legend

Special Status Wildlife Survey Corridor

Habitat Category

2 Big Sagebrush Shrub-steppe

3 Revegetated Grassland
Native Perennial Grassland
Rabbitbrush/Buckwheat Shrub-steppe
Pond

4 Old Field
Exotic Annual Grassland

6 Dryland Wheat or Other Small Grain
Farmyard or Residence
Road

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

Miles
0 0.25 0.5 1 1.5

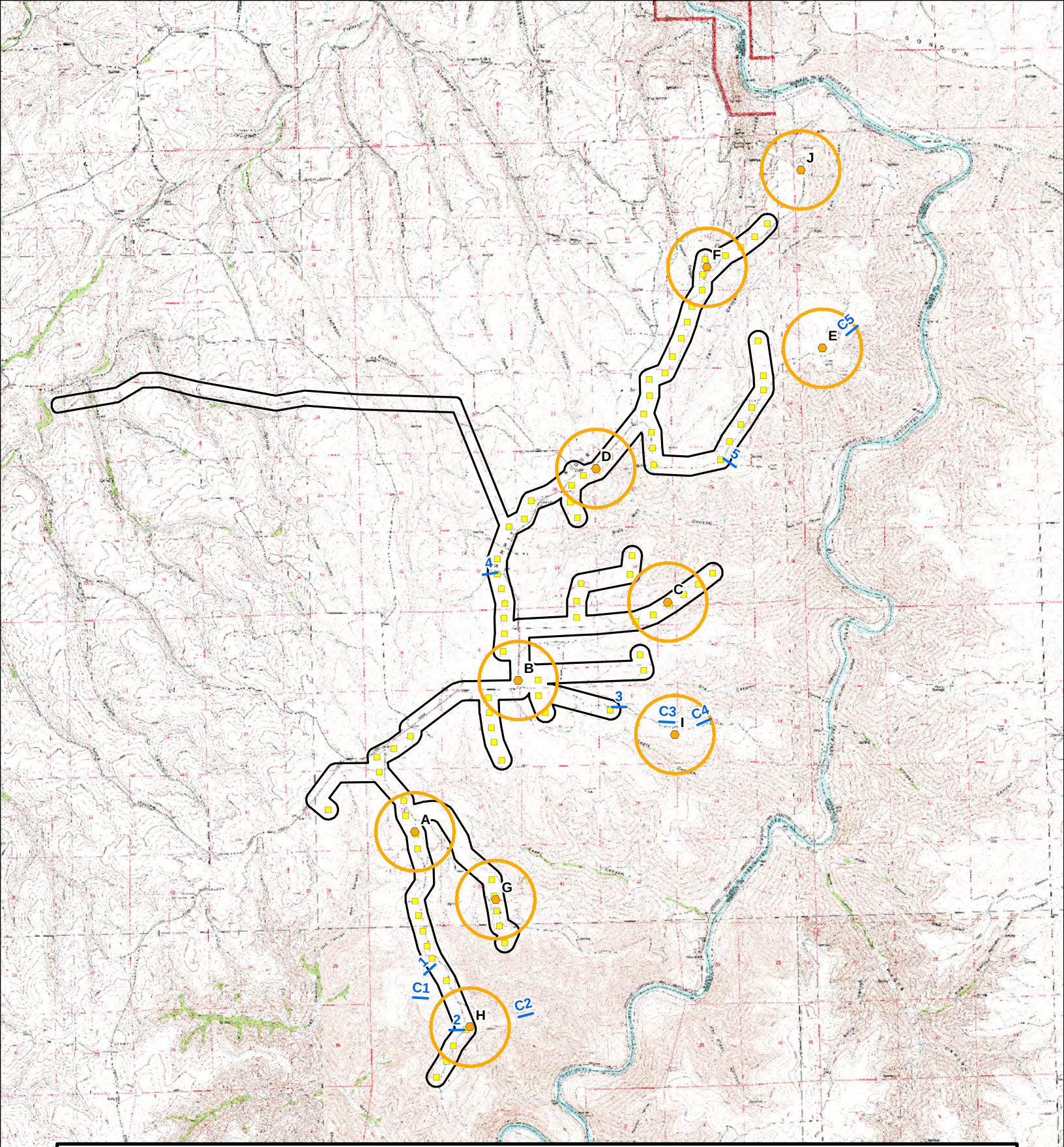

Figure 4. Summit Ridge Wind Power Project Avian Use Study Plots and Grassland Bird Displacement Transects

Legend

- Project Boundary
- Proposed Turbine
- Avian Use Study Plot Center
- Avian Use Study Plot Perimeter - 800 meter buffer
- Grassland Bird Displacement Study Transect - 300 meters

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Study Conducted by
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

0 0.5 1 2 3 4 Miles

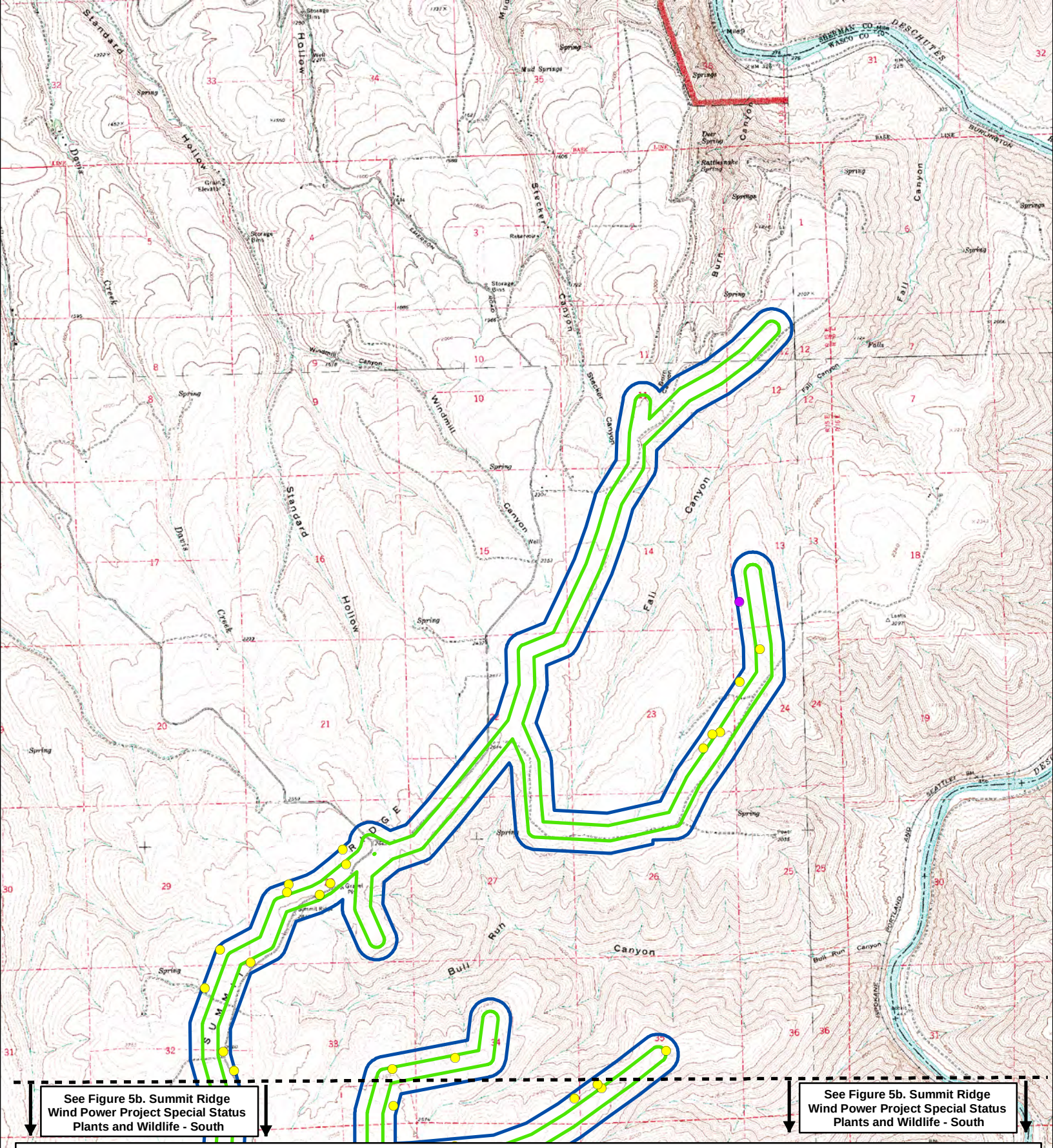

Figure 5a. Summit Ridge Wind Power Project Special Status Plants and Wildlife - North

Legend

- Special Status Wildlife Survey Corridor
- Special Status Plant Survey Corridor
  Note: Surveyed in nonagriculture lands only, No special status plants detected

Special Status Wildlife

- Grasshopper Sparrow
- Long-billed Curlew

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

Miles
0 0.25 0.5 1 1.5

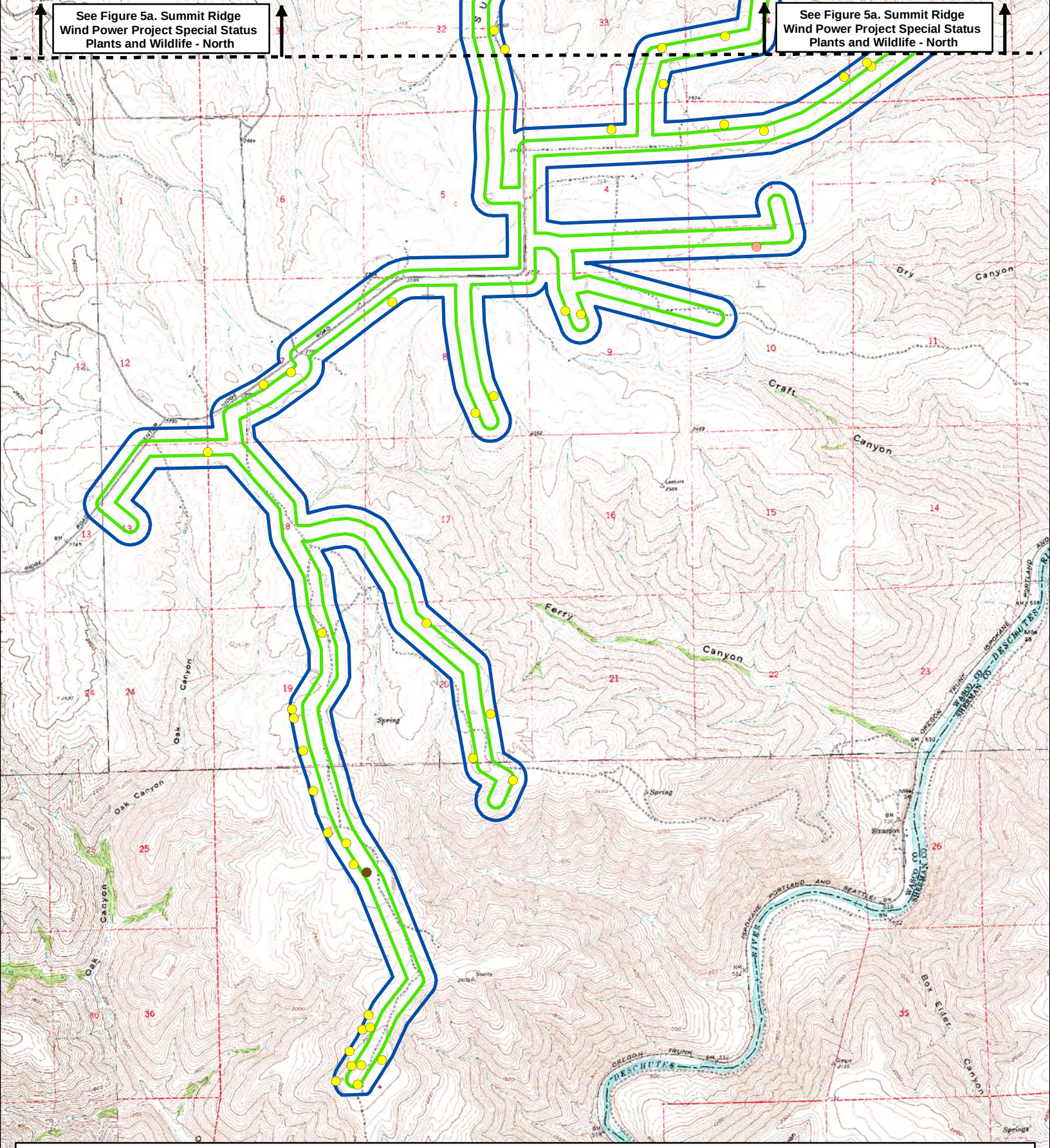

Figure 5b. Summit Ridge Wind Power Project Special Status Plants and Wildlife - South

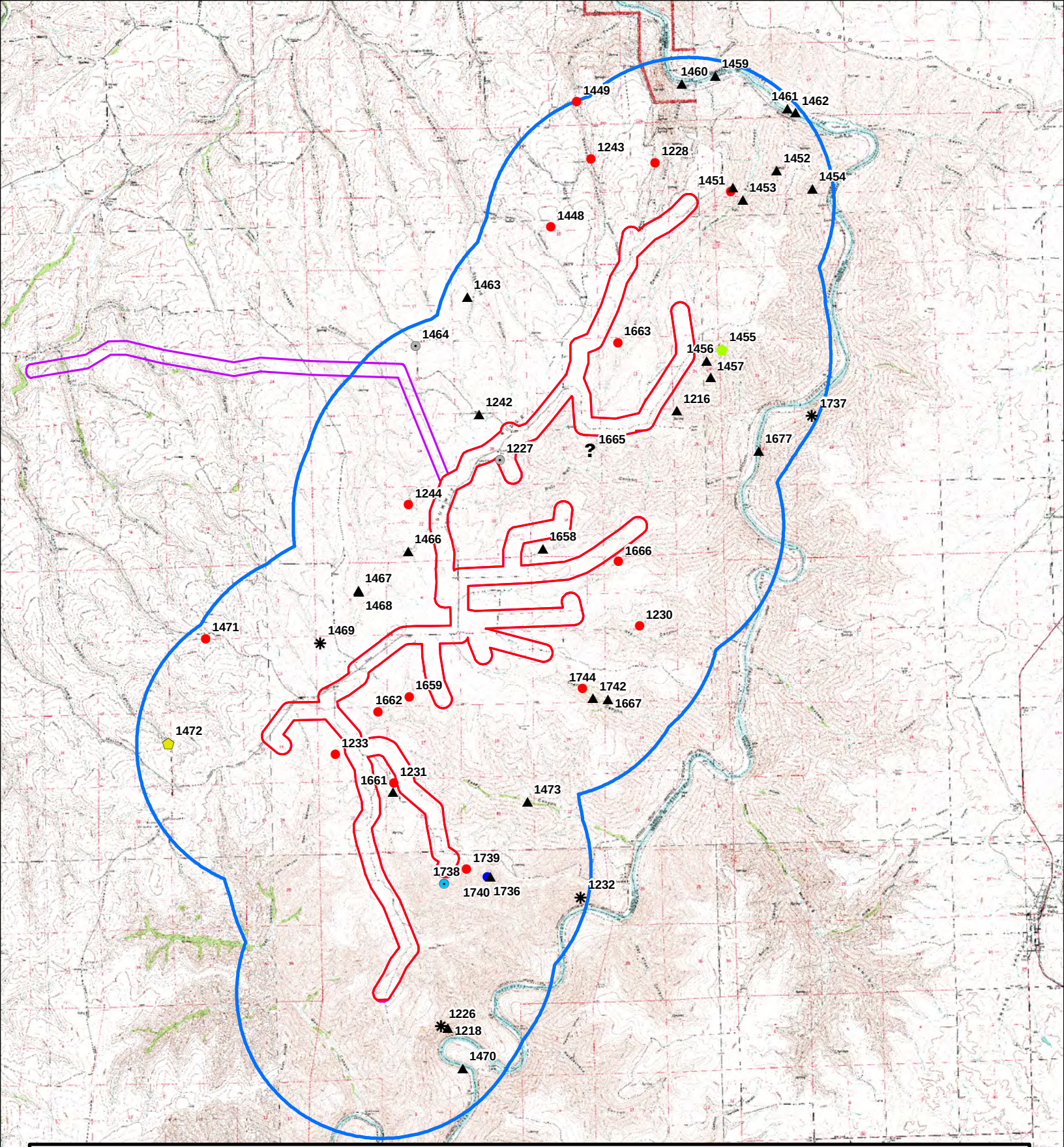

Figure 6. Summit Ridge Wind Power Project Raptor and Other Large Bird Nests

Legend

- Raptor Nest Survey Extent
- Potential Disturbance Corridor - Surveyed in 2009
- Transmission Line Corridor - Scheduled for survey in 2010

Raptor Nests or Other Large Bird Nest

- Inactive
- Inactive - Large Stick Nest
- Common Raven
- Great Horned Owl
- Long-eared Owl
- Prairie Falcon
- Red-tailed Hawk
- Turkey Vulture
- Unknown Buteo

N W E S

Study Conducted by
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

Miles
0 1 2 4

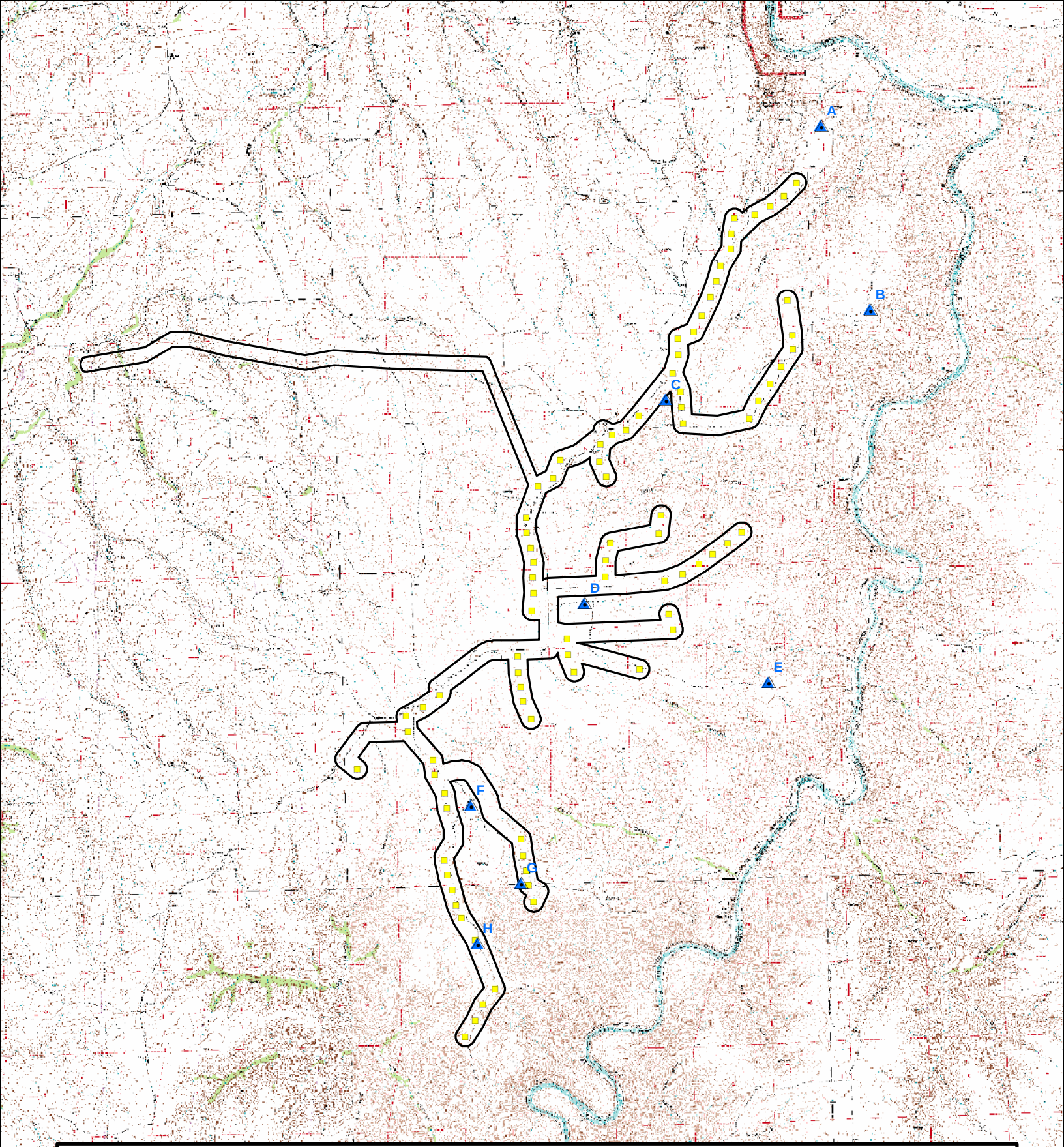

Figure 7. Summit Ridge Wind Power Project Bat Inventory Survey Points

Legend

- Project Boundary
- Proposed Turbine
- Bat Survey Points

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Study Conducted by
Northwest Wildlife Consultants, Inc.
Map Date: March 16, 2010

0 0.5 1 2 3 4 Miles

Raptor Nest Survey
of the
Proposed Transmission Line
Summit Ridge Wind Power Project

Wasco County, Oregon

Addendum to March 22, 2010 Consolidated Report

Prepared for:

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9611 NE 117th Avenue, Suite 2840
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Prepared by:

Rick Gerhardt, Zed Ruhlen,
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Pendleton, Oregon 97801

June 30, 2010

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2.0 Methods **1**
3.0 Results **1**
4.0 Discussion **2**
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Figure 1. Summit Ridge Wind Power Project 2010 Raptor and other Large Bird Nests..... 3

1.0 INTRODUCTION

This report serves as an addendum to the Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Power Project (Gerhardt et al., 2010; "consolidated report"). The consolidated report was developed by Northwest Wildlife Consultants, Inc. (NWC) for LotusWorks for the Summit Ridge Wind Power Project (Project) located in Wasco County, Oregon. It summarized the methods and results of reviews and site-specific biological surveys conducted by NWC as well as an impact assessment and mitigation and monitoring section for the Project design as of December 9, 2009 within the site boundary (which was defined in that report as inclusive of the proposed transmission line). Still outstanding at the time of that report were three surveys of the proposed transmission line. This addendum provides results of one of those surveys, the raptor nest survey. Results of the other two surveys of the proposed transmission line are provided under separate cover. The Project, including the transmission line, is described in the consolidated report.

2.0 METHODS

One aerial survey of the area was conducted on May 15, 2010 via helicopter, using an experienced biologist and a helicopter pilot experienced at this type of survey. The surveyor identified all raptor and raven (or other corvid) nests, both active and inactive, within a one-mile corridor centered on the proposed transmission line (Figure 1) exclusive of area already surveyed in 2009. Raptors not included in this survey type were the ground-nesting owls and northern harrier (*Circus cyaneus*) and small cavity-nesters like American kestrel (*Falco sparverius*). All potential nesting areas—trees, transmission lines, and rock formations—were flown to provide complete coverage of this area. Stick nests built by common ravens (*Corvus corax*) or black-billed magpies (*Pica hudsonia*) were recorded if observed, since these could be used by raptors in subsequent breeding seasons.

All raptor (or corvid) nests were documented and their locations recorded with a hand-held Global Positioning System (GPS) unit (Figure 1). This included all confirmed and potential nests regardless of their activity status. To determine whether a nest was active or inactive, the biologist relied on clues that included behavior of adults and presence of eggs, young, or whitewash. For each active nest, the species of raptor using it was identified and documented.

A more complete description of methods and objectives is found in the consolidated report.

3.0 RESULTS

The aerial raptor nest survey covered an area of approximately 5.0 square miles. Four active nests were found, and all four were red-tailed hawks (*Buteo jamaicensis*), which is not a Federal or State Listed, Candidate, or Proposed species or a State Sensitive species. Three of these nests were in trees (a cottonwood, a pine, and an oak), and one was on an existing transmission line pole. All four nests were in the incubation stage. In addition, two inactive nests, both in cottonwoods, were also observed. Locations of all nests detected, both active and inactive, are shown in Figure 1.

4.0 DISCUSSION

The nest density within the transmission line survey area—at 0.80/ mi^2—was greater than that in the area surveyed for the wind farm itself (0.24/mi^2; Gerhardt et al., 2010). However, nesting density within linear areas is not a metric that is commonlu used to describe nesting levels in areas. The higher elevations where turbines are proposed offer relatively few nesting structures, whereas the proposed transmission line crosses draws and riparian areas that contain native trees such as cottonwoods and oaks. All of the raptors nesting near the proposed transmission line were red-tailed hawks, which—though protected by the Migratory Bird Treaty Act—do not have special federal or state status. Nonetheless, it is expected that construction of the transmission line will not involve removal of nest trees and will be accomplished in a way that minimizes disturbance to nesting raptors.

5.0 REFERENCES

Gerhardt, R., R. Gritski, B. Anderson. 2010. Ecological baseline studies and impact assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon – Consolidated Report. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Pendleton, Oregon.

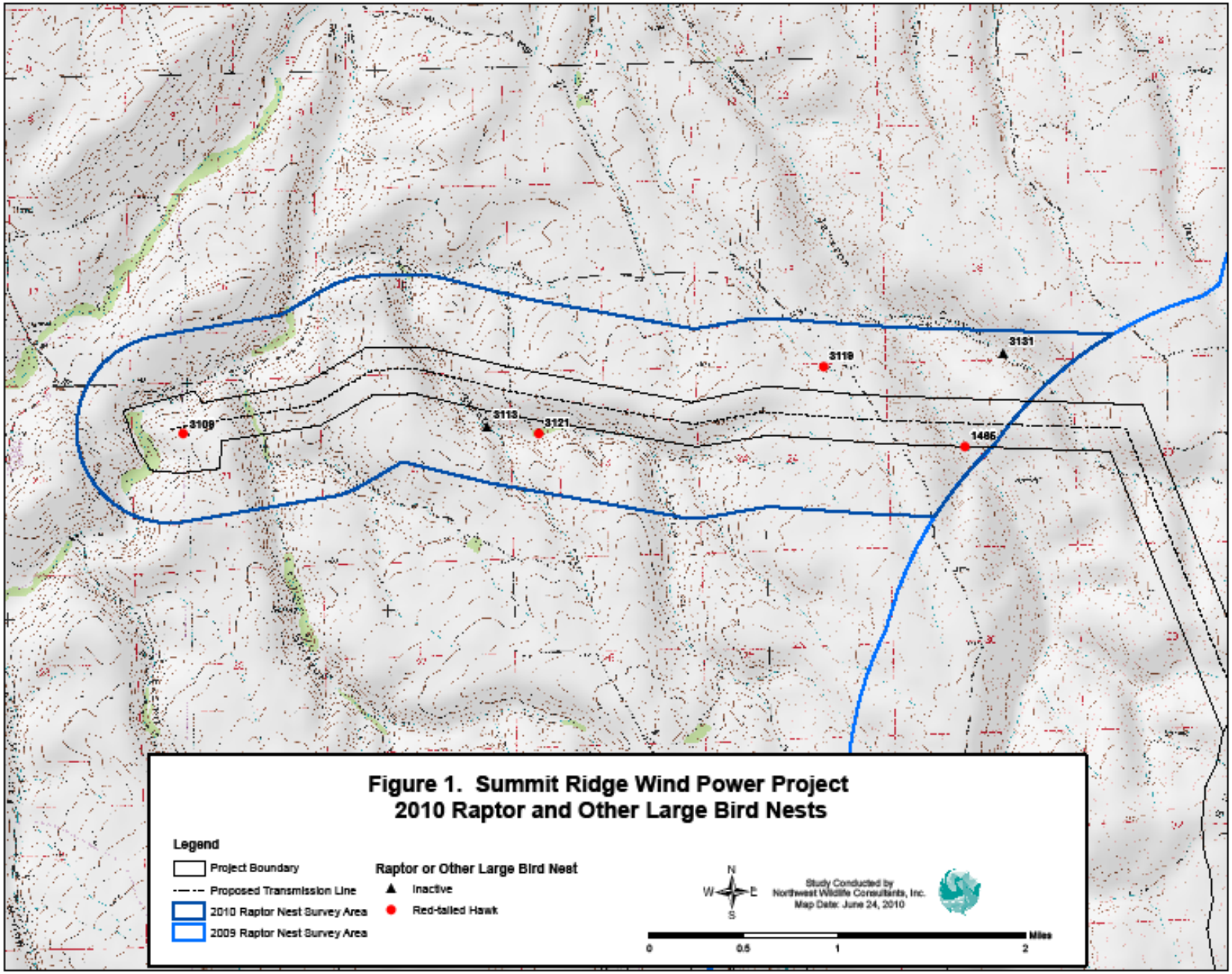

Figure 1. Summit Ridge Wind Power Project
2010 Raptor and Other Large Bird Nests

Special Status Plant Survey
of the
Proposed Transmission Line
Summit Ridge Wind Power Project

Wasco County, Oregon

Addendum to March 22, 2010 Consolidated Report

Prepared for:

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June 30, 2010

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1.0 Introduction 1

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2.2 Field Survey 1

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Figure 1. Summit Ridge Wind Power Project 2010 Special Status Plants **Error! Bookmark not defined.**

Appendix

Appendix A. Addendum to comprehensive plant species list for the Summit Ridge Wind Power Project (plant species found during survey of transmission line May 28, 2010 not found during 2009 surveys of Project). 4

1.0 INTRODUCTION

This report serves as an addendum to the Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Power Project (Gerhardt et al., 2010; "consolidated report"). The consolidated report was developed by Northwest Wildlife Consultants, Inc. (NWC) for LotusWorks for the Summit Ridge Wind Power Project (Project) located in Wasco County, Oregon. It summarized the methods and results of reviews and site-specific surveys conducted by NWC as well as an impact assessment and mitigation and monitoring section for the Project design as of December 9, 2009 within the site boundary (which was defined in that report as inclusive of the proposed transmission line). Still outstanding at the time of that report were three surveys of the proposed transmission line. This addendum provides results of one of those surveys, the special status plant survey. Results of the other two surveys of the proposed transmission line are provided under separate cover. The Project, including the transmission line, is described in the consolidated report.

2.0 METHODS

2.1 Target Species and Pre-field Review

Prior to the beginning of field surveys, NWC staff compiled a list of target rare plant taxa with potential for occurrence at the Project site (Appendix C of consolidated report). This list was developed by first including all rare taxa known to occur in the vicinity of the Project area from existing Oregon Natural Heritage Information Program data (Appendices B1 and B2 of consolidated report). Several additional taxa were then added to this list after reviewing the distributions and habitats associated with other listed plant taxa known to occur in eastern Wasco and western Sherman Counties (ORNHIC, 2009a). Through this process, 19 listed plant taxa were identified as potentially occurring on the Project site and rated with low, moderate, or high likelihood of presence (Appendix C of consolidated report). While efforts were made to search for and identify all unique vascular plant taxa, this approach helped guide and prioritize survey efforts through specific knowledge of the vegetative associates and habitats for rare taxa likely to be encountered.

2.2 Field Survey

The special status plant field survey was conducted along the proposed transmission line on May 28, 2010. Searches were conducted throughout the survey corridor by a qualified botanist familiar with the Columbia Plateau flora in general and with specific pre-field experience and species identification training to enable accurate identification of all focal rare plant taxa. The survey was confined to a buffer area extending 200 feet outwards from the proposed transmission line for a 400-foot wide survey corridor (Figure 1). A more complete description of the survey methods can be found in the consolidated report.

3.0 RESULTS

On December 15, 2009, a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the proposed transmission line was received from ORNHIC (Appendix B2 of consolidated report). Their database search discovered two records of special status plant species within the search area. Both ORNHIC rare plant records were of Hood River milk-vetch (*Astragalus hoodianus*), although this species was not observed within survey corridors during 2010 surveys.

A total of 126 vascular plant taxa were identified within the survey corridor (Figure 1) of the proposed transmission line. Primarily because the proposed transmission line corridor included riparian areas (the line itself will span riparian habitat)—a habitat type not represented in plant surveys of the remainder of the Project—25 of these (listed in Appendix A) were species not found during previous surveys of the Project. None of the plants found were Federal or State listed special status plant species. The late-May survey date fell within the identification periods of all potentially occurring listed plant taxa as identified in the target plant list (Appendix C of consolidated report).

4.0 DISCUSSION

No special status plant species were detected within the survey corridor of the proposed transmission line. Neither the transmission line nor the overall Project are expected to have any impact on special status plant species.

5.0 REFERENCES

Gerhardt, R., R. Gritski, and B. Anderson. 2010. Ecological baseline studies and impact assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon, consolidated report. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Inc., Pendleton, Oregon.

Oregon Natural Heritage Information Center (ORNHIC). 2009a. Vascular Plant Update to the March 2007 edition of "Rare, Threatened and Endangered Species of Oregon". March 2009. Available online at: http://oregonstate.edu/ornhic/documents/Plants_Update_Sp09_final-Vascular.pdf

US Department of Agriculture (USDA). 2009. The PLANTS Database: Version 3.5. National Plant Data Center, Baton Rouge, LA. http://plants.usda.gov

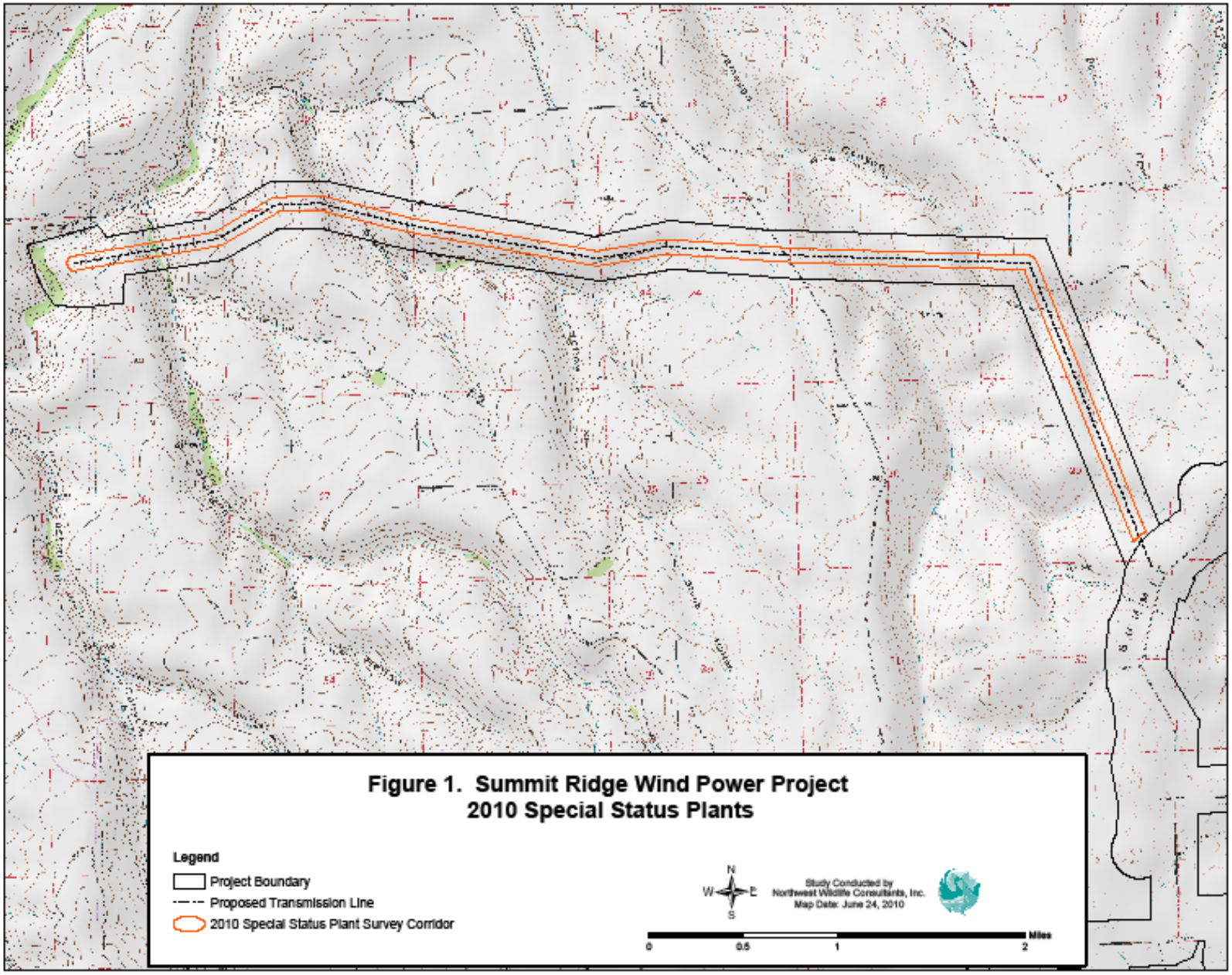

Figure 1. Summit Ridge Wind Power Project
2010 Special Status Plants

Appendix A. Addendum to comprehensive plant species list for the Summit Ridge Wind Power Project (plant species found during survey of proposed transmission line May 28, 2010 not found during 2009 surveys of Project).

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym or Notes
6	*Angelica sp.*	angelica	*Apiaceae*	N	Too early for ID
6	*Arabis sp.*	rockcress	*Brassicaceae*	N	Too early for ID
7	*Astragalus howellii*	Howell's milkvetch	*Fabaceae*	N	
6	*Castilleja sp.*	paintbrush	*Scrophulariaceae*	N	Too early for ID
5	*Claytonia perfoliata ssp. perfoliata*	miners lettuce	*Portulacaceae*	N	*Montia perfoliata*
6	*Clematis sp.*	clematis	*Ranunculaceae*	N	Too early for ID
7	*Cornus sericea ssp. sericea*	redosier dogwood	*Cornaceae*	N	
7	*Crataegus douglasii*	black hawthorne	*Rosaceae*	N	
5	*Equisetum hyemale*	scouringrush horsetail	*Equisetaceae*	N	
3	*Galium aparine*	stickywilly	*Rubiaceae*	N	
3	*Lathyrus sp.*	sweet-pea	*Fabaceae*	N	Too early for ID
5	*Mentha arvensis*	wild mint	*Lamiaceae*	N	
6	*Mimulus guttatus*	seep monkeyflower	*Schropulariaceae*	N	
6	*Nasturtium officinale*	water cress	*Brassicaceae*	N	*Rorippa nasturtium-aquaticum*
6	*Potentilla sp.*	cinquefoil	*Rosaceae*	N	
7	*Ribes aureum*	golden currant	*Grossulariaceae*	N	
6	*Rosa woodsii var. ultramontane*	Woods' rose	*Rosaceae*	N	
7	*Rubus discolor*	Himalayan blackberry	*Rosaceae*	I	
4	*Salix sp.*	willow	*Salicaceae*	N	Too early for ID (3 different species observed)
6	*Scirpus americanus*	American bulrush	*Cyperaceae*	N	
6	*Symphoricarpos albus*	common snowberry	*Caprifoliaceae*	N	
6	*Urtica dioica*	stinging nettle	*Urticaceae*	I	
5	*Veronica Americana*	American speedwell	*Schrophulariaceae*	N	
3	*Vicia americana*	American vetch	*Fabaceae*	N	

*Abundance Codes:

1 = Abundant in multiple plant communities
2 = Common in multiple plant communities
3 = Uncommon in multiple plant communities
4 = Abundant in specific plant communities
5 = Common in specific plant communities
6 = Uncommon in specific plant communities
7 = Rare – three or fewer sightings in the Project

Nativity:

N = Native I = Introduced

†From USDA Plants Database (UDSA, 2009)

Special Status Wildlife Species Survey of the Proposed Transmission Line Summit Ridge Wind Power Project

Wasco County, Oregon

Addendum to March 22, 2010 Consolidated Report

Prepared for:

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1.0 INTRODUCTION

This report serves as an addendum to the Ecological Baseline Studies and Impact Assessment for the Summit Ridge Wind Power Project (Gerhardt et al., 2010; "consolidated report"). The consolidated report was developed by Northwest Wildlife Consultants, Inc. (NWC) for LotusWorks for the Summit Ridge Wind Power Project (Project) located in Wasco County, Oregon. It summarized the methods and results of reviews and site-specific surveys conducted by NWC as well as an impact assessment and mitigation and monitoring section for the Project design as of December 9, 2009 within the site boundary (which was defined in that report as inclusive of the proposed transmission line). Still outstanding at the time of that report were three surveys of the proposed transmission line. This addendum provides results of one of those surveys, the special status terrestrial vertebrate wildlife species survey. Results of the other two surveys of the proposed transmission line are provided under separate cover. The Project, including the transmission line, is described in the consolidated report.

2.0 METHODS

2.1 Target Species and Pre-field Review

Prior to the beginning of field surveys, NWC staff compiled a list of special status terrestrial vertebrate wildlife species with potential for occurrence at the Project site (Appendix D of consolidated report). This list included Federal Endangered, Threatened, Candidate, Sensitive status species, and/or Federal "Species of Concern" (USFWS, 2008). Also included in the list were species that the Oregon Department of Fish and Wildlife lists as having special status ("Threatened,", "Endangered," or "Critical"; ODFW, 2008) and the U.S. Fish and Wildlife Service lists as "Birds of Conservation Concern" (USFWS, 2002). In early December, 2009, request was made of the Oregon Natural Heritage Program (ORNHIC) for their records of special status wildlife species found within 5 miles of the proposed transmission line (Appendix B2 in the consolidated report). From these sources and a habitat review of the area utilizing aerial photos, a target list was compiled of 19 species of birds, 12 species of mammals, and one species of reptile with special status and potential occurrence during all or part of the year within the anticipated development areas of the Summit Ridge Wind Power Project, including the transmission line (Appendix D of the consolidated report). This list does not include numerous species of fish, turtles, amphibians, or invertebrates (snails) for which there is no suitable riverine habitat on the Project area.

2.2 Field Survey

Special status wildlife surveys were conducted by experienced biologists and technicians using standard, agency-acceptable protocols, conducting walking surveys with corridors representing a 200-foot buffer of the proposed transmission line (Figure 1). General data recorded included date, time, and weather variables. Locations of target species detections were recorded using hand-held Global Positioning System (GPS) units; data recorded in association with these locations include species and number, age and sex, behavior and habitat. The survey was conducted on May 28, 2010, which was during the breeding or rearing season for the vertebrate wildlife species with potential for occurrence on the Project.

3.0 RESULTS

3.1 Target Species and Pre-field Review

On December 15, 2009, a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the proposed transmission line was received from ORNHIC (Appendix B2 in the consolidated report). Their database search discovered nine records of special status plant and wildlife species within the search area, but none of these records were of terrestrial vertebrate species. The list of vertebrate wildlife species with potential for occurrence within the Project area, including the transmission line, can be found as Appendix D of the consolidated report.

3.2 Field Survey

A single terrestrial vertebrate wildlife species with State special status was detected during this survey. This was the State Sensitive-Vulnerable grasshopper sparrow (*Ammodramus savannarum*), which was documented in two locations (Figure 1). State Sensitive-Vulnerable species are defined as "not in imminent danger of being listed as Threatened or Endangerd, but could become Sensitive-Critical, Threatened, or Endangered with changes in populations, habitats, or threats (ODFW, 2008). A single avian species was detected that was not previously documented during other surveys of the Project; this was yellow-breasted chat (*Icteria virens*), a Federal Species of Concern (see consolidated report Appendix A for USFWS list of species of concern for Wasco County). This species was not plotted on Figure 1, as only State special status species are plotted on this figure. The proposed transmission line will span some riparian habitat–a habitat type not represented in special status wildlife surveys in the remainder of the Project, and habitat for the yellow-breasted chat.

4.0 DISCUSSION

The State Sensitive-Vulnerable grasshopper sparrow, was also detected during special status wildlife species surveys of the wind farm portion of the Project, in a variety of habitat types (Gerhardt et al., 2010). Construction of the transmission line is expected to result in the loss of a small amount of suitable habitat for this species; mitigation for this habitat loss is addressed in the draft Habitat Mitigation Plan (Gerhardt, 2010). No impacts, temporary or permanent, are expected to riparian habitats (Table 2 of the consolidated report), therefore, no impacts are expected for the Federal Species of Concern, yellow-breasted chat, which occurs in this habitat type.

5.0 REFERENCES

Gerhardt, R. 2010. Summit Ridge Wind Project habitat mitigation plan. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Inc. Pendleton, Oregon.

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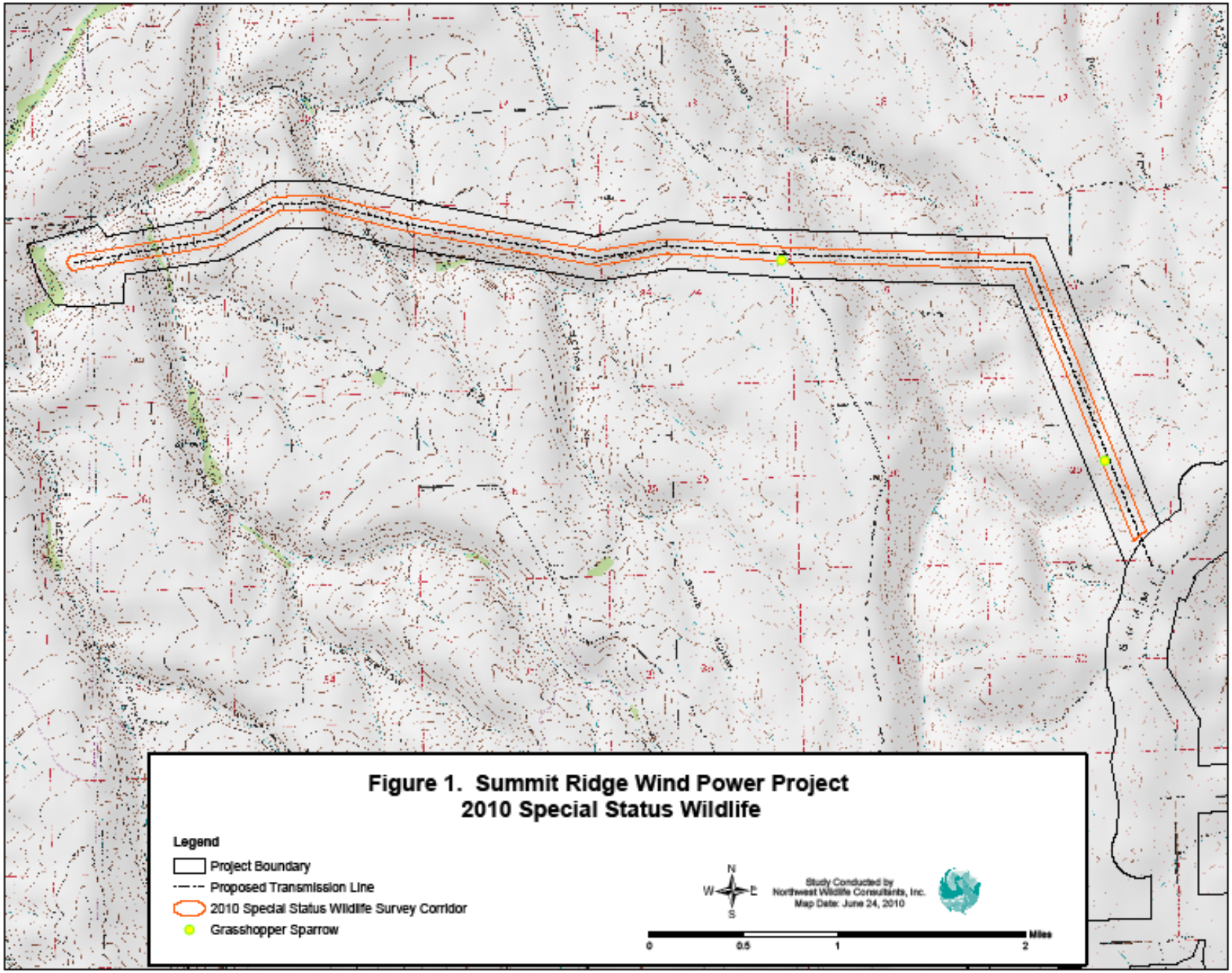

Figure 1. Summit Ridge Wind Power Project
2010 Special Status Wildlife

ATTACHMENT P-2

Special status vertebrate wildlife species of known or potential occurrence in the Summit Ridge Wind Farm

Attachment P_2. Special status vertebrate wildlife species of known or potential occurrence in the Summit Ridge Wind Power Project area.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the Summit Ridge Wind Power Project D=Documented On-site N=Not Documented On-site
Mammals			
white-tailed jackrabbit *Lepus townsendii*	-	SV	**D-**Apparently rare, but one individual and some pellets encountered during special status wildlife species surveys.
pallid bat *Antrozous pallidus pacificus*	SoC	SV	**D**-Positively identified during bat inventory study. This species is largely non-migratory, however, and its typical foraging flight height is below that of turbine rotors. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	SoC	SC	**N**-Possible (a roost found in Klickitat County 30 miles from Summit Ridge), but not identified during bat inventory study; non-migratory and uncommon.
spotted bat *Euderma maculatum*	SoC	-	**N**-Unlikely; associated with arid desert terrain. Roosts include crevices in steep cliff faces. Known hunting grounds include open ponderosa pine forests, meadows, riparian areas, hay fields, and marshes adjacent to lakes.
hoary bat *Lasiurus cinereus*	-	SV	**D**-Positively identified during bat inventory study. This highly migratory species flies at heights that make it susceptible to collisions, and it comprises (with silver-haired bat) the majority of bat fatalities at Pacific Northwest wind energy facilities (Appendix G).
silver-haired bat *Lasionycteris noctivagansyotis*	SoC	SV	**D**-Positively identified during bat inventory study. Its flight height and migratory nature make it susceptible to turbine strikes; this is somewhat allayed by the relative lack of suitable foraging and roosting habitat on and near the Summit Ridge Project.
small-footed myotis *Myotis ciliolabrum*	SoC	-	**D**- This species was positively identified during bat inventory surveys, but its foraging behavior generally keeps it below turbine height. To date, this species has not been positively identified as a fatality at 12 wind energy sites in the CPE where fatality monitoring has been conducted (Appendix G).
long-eared myotis *Myotis evotis*	SoC	-	**N**-Wide range of habitat from arid grasslands and ponderosa pine forests to humid coastal and montane forests. It uses buildings or under the bark of trees as day roosts. Maternity colonies usually are located in buildings. Caves and mine adits are used as temporary night roosts.
fringed myotis *Myotis thysanodes*	SoC	SV	**N**—Most common roosts are in caves, mines, and snags; there are no records of this species for the Columbia Plateau.
long-legged myotis *Myotis volans*	SoC	SV	**N**-Roosts in groups in buildings, rock crevices and trees. They night roost in mines and caves. Associated with montane coniferous forests but also occur in some desert and riparian habitats.
Yuma myotis *Myotis yumanensis*	SoC	-	**D?**-Calls of either this species or California myotis detected at one survey station and one survey night. Inhabits coastal forests, ponderosa pine/Douglas-fir forests and arid grasslands. Summer day roosts are usually in buildings and other man-made structures in close proximity to water.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the Summit Ridge Wind Power Project D=Documented On-site N=Not Documented On-site
			Birds
long-billed curlew *Numenius americanus*	BoCC	SV	**D**-A single detection of two flying individuals during special status wildlife species surveys. One adult was observed flying on July 11, 2005 during avian use surveys. Infrequency of detections makes local breeding unlikely.
greater sage-grouse *Centrocercus urophasianus*	SoC BoCC	SV	**N**-Very unlikely; populations extirpated from this area.
mountain quail *Oreortyx pictus*	SoC	-	**N**-Utilizes shrub openings within forests and riparian corridors; no suitable habitat on Project area.
bald eagle *Haliaeetus leucocephalus*	NW EPA BoCC	T	**D**-Four total detections. Two detections during winter avian use surveys 12/02/2008 and 02/02/2009. One detected outside of the plot radius March 16, 2009 during avian use surveys. One detected on August 4, 2005 during summer avian use surveys. Known to hunt uplands for carrion and small mammals.
golden eagle *Aquila chrysaetos*	EPA BoCC	-	**D**-Observed during avian use surveys in all seasons and in-transit to surveys. No active nests found, but four large stick nests that may have been built by this species found within 2 miles of proposed turbines.
Swainson's hawk *Buteo swainsoni*	-	SV	**D-**One observed during avian use surveys on April 21, 2005 and two detections outside of the plot radius, but within the Project area on June 23, 2005, and one in-transit observation Project contains potential breeding habitat, but is at extreme western edge of species' range; no nests found.
ferruginous hawk *Buteo regalis*	SoC BoCC	SC	**D**-Observed June 23, 2005 outside of avian use plot C radius, but located within the Project area. Project is outside known nesting range, and preferred prey (ground squirrels) absent; active nest occasionally found approx. 15 miles northeast (Kronner, field notes 2006).
northern goshawk *Accipiter gentilis*	SoC	SV	**N**-Prefers forested habitats, even in winter; unlikely except as transient.
peregrine falcon *Falco peregrinus*	NW BoCC	SV	**N-**Possible as transient, and may even forage in Project area, but not detected during studies.
western burrowing owl *Athene cunicularia*	SoC	SC	**N**-In shrub-steppe and grassland areas; uses existing burrows of coyotes, small mammals and badgers for nesting.
loggerhead shrike *Lanius ludovicianus*	BoCC	SV	**D**-Documented during avian use surveys, 3 in winter and 1 in spring. A total of 18 in-transit observations. Some potential nesting habitat present along the proposed transmission line.
acorn woodpecker *Melanerpes formicivorus*	SoC	-	**N**-Unlikely except as transient.
Lewis's woodpecker *Melanerpes lewis*	SoC BoCC	SC	**N**- Known from vicinity, and may be transient, but habitat for this species is not present within the site boundary. A small portion of the buffer area of a record for this species provided by ORNHIC intersects with the southern portion of the Project area (ORNHIC, 2009).
white-headed woodpecker *Picoides albolarvatus*	SoC BoCC	SC	**N**-Inhabits ponderosa pine forests that have open canopy and contain large old trees/snags and minimum shrub and small tree cover; no such habitat on Project; unlikely except as transient.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the Summit Ridge Wind Power Project D=Documented On-site N=Not Documented On-site
olive-sided flycatcher *Contopus cooperi*	SoC	SV	**N**-Unlikely; no suitable forest habitat on Project area.
willow flycatcher *Empidonax trailii adastus*	SoC BoCC	SV	**N**-No suitable riparian habitat exists within Project area.
tricolored blackbird *Agelaius tricolor*	SoC	-	**N**-Suitable breeding (wetlands) habitat not found on Project, but species may be found as transient.
yellow-breasted chat *Icteria virens*	SoC	-	**N**-No suitable riparian habitat exists within Project area.
grasshopper sparrow *Ammodramus savannarum*	-	SV	**D-**Rather common during breeding season and in a variety of habitat types. Observed during special status wildlife surveys, avian use surveys, and grassland bird displacement studies. Potential nesting habitat present along proposed transmission line.
Reptiles			
northern sagebrush lizard *Sceloparus graciosus graciosus*	SoC	SV	**N**-None recorded during the year of studies, whereas the congeneric western fence lizard was rather common.

Status Key

Federal:

T	Threatened	SoC	Species of Concern
E	Endangered	NW	Not Warranted**;** delisted
C	Candidate	EPA	Bald and Golden Eagle Protection Act

BoCC USFWS Birds of Conservation Concern (BCR 9, Great Basin)

- No special status

Note: All native migratory birds are protected by the federal Migratory Bird Treat Act (MBTA).

Oregon:

T Threatened

E Endangered

SC "Critical" sensitive species are those for which listing as threatened or endangered would be appropriate if immediate conservation actions were not taken. Some peripheral species which are at risk throughout their range and some disjunct populations (those that are geographically isolated from other populations) area also considered "Critical."

SV "Vulnerable" sensitive species are not in imminent danger of being listed as threatened or endangered, but could become sensitive-critical, threatened, or endangered with changes in populations, habitats or threats.

Sources for status = ODFW, 2008; ORNHIC, 2008; USFWS, 2008; USFWS, 2009

ATTACHMENT P-3

Rare plant species with potential for occurrence in the Summit Ridge Wind Farm

ATTACHMENT P-3

Rare plant species with potential for occurrence in the Summit Ridge Wind Farm

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period
Achnatherum hendersonii **Henderson's ricegrass**	OR Rank: G3S2 ORNHIC List: 1 ODA: C USFWS: SC	Dry shallow rocky soils derived from basalt in sagebrush or ponderosa pine. Soils are often subject to frost heave.	Low	May - June
Arabis sparsiflora var. atrorubens **sickle-pod rockcress**	OR Rank: G5T3S2 ORNHIC List: 2	Dry meadows in sagebrush steppe and ponderosa pine.	Low	May - August
Astragalus conjunctus var. rickardii **Rickard's milkvetch**	OR Rank: G4T3SNR ORNHIC List: 3	Dry rocky slopes, scablands, and hilltops throughout the sagebrush desert. Elevation: typically above 2000 feet	Low	May - June
Astragalus hoodianus **Hood River milkvetch**	OR Rank: G4S3 ORNHIC List: 2	Sagebrush steppe, scablands, grasslands, ponderosa forests, and stony flats from the foothills into the lower mountains. Known occurrence within 5 miles.	High	April - June
Astragalus sclerocarpus **stalked-pod milk-vetch**	OR Rank: G5SNR ORNHIC List: 3	Dunes and sandy barrens. Elevation: 200-900 ft.	Moderate	April - June
Astragalus succumbens **Columbia milk-vetch**	OR Rank: G4G5S4 ORNHIC List: 4	Sandy places and rocky sagebrush desert, from the Columbia River to the lower foothills. Elevation: 300-1000 ft.	Moderate	April - June
Astragalus tyghensis **Tygh Valley milk-vetch**	OR Rank: G2S2 ORNHIC List: 1 ODA: LT	Dry, rocky, sandy-clay soils and grassy slopes, common in sagebrush-bunchgrass communities. Known occurrence within 5 miles of study area.	Moderate	Late May - Mid June

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period
Camissonia pygmaea **dwarf evening-primrose**	OR Rank: G3S1 ORNHIC List: 1 ODA: C USFWS: SOC	Dry plains and slopes with unstable soils or on gravel in steep talus, dry washes, banks and road-cuts. Elevation: 500-200 ft.	Moderate	June - August
Chaenactis nevii **John Day chaenactis**	OR Rank: G4S4 ORNHIC List: 4	Dry, barren soils, often heavy with clay or ash.	Low	May - July
Hackelia diffusa var. cottonii **creamy stickseed**	OR Rank: G4T4S3 ORNHIC List: 4	Cliffs and talus slopes, more common south of the Columbia Gorge.	Moderate	May - June
Hackelia diffusa var. diffusa **diffuse stickseed**	OR Rank: G4T3S3 ORNHIC List: 4 ODA: C	Shaded areas, cliffs, talus, wooded flats and slopes, tending closer to the Columbia Gorge than *H. d. var. cottonii*. Elevations: ~1000 ft.	Low	May - June
Lesquerella douglasii **Columbia bladderpod**	OR Rank: G4?SNR ORNHIC List: 3	Sandy and gravelly soils in sagebrush, especially in and near arid juniper/ponderosa pine woodlands.	Low - Moderate	April - May
Lomatium farinosum var. hambleniae **Hamblen's lomatium**	OR Rank: G4G5T4S3 ORNHIC List: 4	Rocky slopes and scablands with sagebrush or in crevices in the basalt cliffs. No occurrences near the ~~project~~analysis area.	Moderate	April - May
Lomatium watsonii **Watson's desert-parsley**	OR Rank: G4S1 ORNHIC List: 2	Arid, open, often rocky hillsides often within sagebrush.	Low	Late April - May
Mimulus jungermannioides **Hepatic monkeyflower**	OR Rank: G3S3 ODA: C ORNHIC List: 4	Basalt crevices in seepage zones in vertical cliff faces and canyon walls. Elevation: 500-3300 ft.	Low	May - Late August

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period
Navarettia leucocephala var. leucocephala **white-flowered navarretia**	OR Rank: G4T4?S4 ORNHIC List: 4	Moist meadows, vernal pools, and other moist, open places in the foothills and lowlands.	Low	May - July
Pediocactus nigrispinus **snowball cactus**	OR Rank: G4S4 ORNHIC List: 4	Thin, rocky soil on ridge tops, desert valleys, and low mountains.	Low - Moderate	May - July
Penstemon deustus var. variabilis **hot-rock penstemon**	OR Rank: G5T1T2SNR ORNHIC List: 3	Rock outcrops and thin xeric soils over basalt substrate.	Low	May - June
Penstemon seorsus **short-lobed beardtongue**	OR Rank: G4?S4 ORNHIC List: 4	Dry, rocky or gravelly soils, often on ridge tops; often associated with sagebrush	Low	Late May - June

Appendix C Footnotes:

USFWS Federal Ranking Key:

LE = Listed Endangered. Taxa in danger of Extinction throughout all or a significant portion of their range.
LT = Listed Threatened. Taxa likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of their range.
PE = Proposed Endangered. Taxa proposed to be listed as Endangered (formal rulemaking in progress).
PT = Proposed Threatened. Taxa proposed to be listed as Threatened (formal rulemaking in progress).
SC = Candidate Species. Taxa for which sufficient threats exist to warrant a proposal to list the species/subtaxon as threatened or endangered.
SOC = Species of Concern.

ODA (Oregon Department of Agriculture) Ranking Key:

LE = Listed Endangered.
LT = Listed Threatened.
C = Candidate for listing as Threatened or Endangered.

OR Rank (Oregon Natural Heritage Program) Categories Key:

G = Global rank indicator; denotes rank based on range wide status.
T = Trinomial rank indicator; denotes range wide status of infraspecific taxa.
S = State rank indicator; denotes rank based on status within Oregon.
1 = Critically imperiled because of extreme rarity or some factor of its biology makes it especially vulnerable to extinction (typically 5 or fewer occurrences).
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (typically 6 to 20 occurrences).
3 = Rare or uncommon but not imperiled (typically 21 to100 occurrences).
4 = Not rare and apparently secure, but with cause for long-term concern (usually more than 100 occurrences).
5 = Demonstrably widespread, abundant, and secure.
H = Historical occurrence (i.e., formerly part of the native biota with the implied expectation that it might be rediscovered).
? = Not yet ranked.

ORNHIC (Oregon Natural Heritage Information Center) Special Status Plant Lists Key:

1 = Taxa which are Endangered or Threatened throughout their range or are presumed extinct.
2 = Taxa which are Threatened, Endangered, or possibly extirpated from Oregon, but are more stable elsewhere.
3 = Taxa for which more info is needed before status can be determined, but may be Threatened or Endangered in Oregon or throughout their range.
4 = Contains taxa of concern which are not currently Threatened or Endangered
EX = Thought to be extirpated from Oregon

ATTACHMENT P-4

Wildlife Species Observed During Field Surveys

ATTACHMENT P-4
Wildlife Species Observed During Field Surveys

Comprehensive list of all vertebrate wildlife observed during 2005 and 2009 avian use surveys, 2009 grassland bird displacement studies, special status wildlife species surveys, and raptor nest surveys, including incidental and in-transit sightings, Summit Ridge Wind Farm.

Common Name	Scientific Name	Avian Use Surveys	Grassland Bird Displace-ment	Special Status Wildlife Surveys	Raptor Nest Survey	Incidental or In-transit
		Birds (see ADDENDUM NOTE at the end)				
American goldfinch	*Carduelis tristis*	X				
American kestrel	*Falco sparverius*	X		X		X
American robin	*Turdus migratorius*	X		X		X
American pipit	*Anthus rubescens*	X				
bald eagle*	*Haliaeetus leucocepahlus*	X				
barn swallow	*Hirundo rustica*	X		X		X
Bewicks's wren	*Thryomanes bewickii*	X				
black-billed magpie	*Pica pica*	X		X		X
Brewer's blackbird	*Euphagus cyanocephalus*	X		X		X
Brewer's sparrow	*Spizella breweri*	X	X	X		X
brown-headed cowbird	*Molothrus ater*			X		X
Bullock's oriole	*Icterus bullockii*			X		
bushtit	*Psaltriparus minimus*	X				
California quail	*Callipepla californica*	X				X
chukar	*Alectoris chukar*	X		X		X
cliff swallow	*Hirundo pyrrhonota*	X				
common nighthawk	*Chordeiles minor*	X				X
common raven	*Corvus corax*	X		X		X
Cooper's hawk	*Accipiter cooperii*	X				X
dark-eyed junco	*Junco hyemalis*	X		X		
dusky flycatcher	*Empidonax wrightii*		X			
gray flycatcher	*Empidonax wrightii*			X		
gray partridge	*Perdix perdix*			X		
greater yellowlegs	*Tringa melanleuca*					X
European starling	*Sturnus vulgaris*	X		X		X
ferruginous hawk *	*Buteo regalis*	X				
golden eagle *	*Aquila chrysaetos*	X		X		X
grasshopper sparrow *	*Ammodramus savannarum*	X	X	X		
great-horned owl	*Bubo virginianus*					X
horned lark	*Eremophila alpestris*	X		X		X
house finch	*Carpodacus mexicanus*	X		X		X
killdeer	*Charadrius vociferous*	X		X		X
lark sparrow	*Chondestes grammacus*	X		X		
lazuli bunting	*Passerina cyanea*		X	X		
loggerhead shrike*	*Lanius ludovicianus*					X
long-billed curlew *	*Numenius americanus*	X		X		

Common Name	Scientific Name	Avian Use Surveys	Grassland Bird Displace-ment	Special Status Wildlife Surveys	Raptor Nest Survey	Incidental or In-transit
long-eared owl	*Asio otus*				X	
mallard	*Anas platyrhynchos*					X
merlin	*Falco columbarius*	X				X
mourning dove	*Zenaida macroura*			X		X
mountain bluebird	*Sialia currucoides*	X				
northern flicker	*Colaptes auratus*					X
northern harrier	*Circus cyaneus*	X		X		X
northern rough-winged swallow	*Stelgidopteryx serripennis*	X				
northern shrike	*Lanius excubitor*	X				X
osprey	*Pandion haliaetus*	X				
prairie falcon	*Falco mexicanus*	X		X	X	X
red-tailed hawk	*Buteo jamaicensis*	X		X	X	X
red-winged blackbird	*Agelaius phoeniceus*	X				
ring-billed gull	*Larus delawarensis*	X				
ring-necked pheasant	*Phasianus colchicus*	X		X		X
rock pigeon	*Columba livia*	X		X		X
rock wren	*Salpinctes obsoletus*		X	X		
rough-legged hawk	*Buteo lagopus*	X				X
sage thrasher	*Oreoscoptes montanus*			X		
savannah sparrow	*Passerculus sandwichensis*	X	X	X		X
Say's phoebe	*Sayornis saya*	X		X		X
spotted sandpiper	*Actitis macularia*					X
spotted towhee	*Pipilo maculates*			X		
Swainson's hawk *	*Buteo swainsoni*	X				X
turkey vulture	*Cathartes aura*	X		X	X	X
unidentified blackbird		X				
unidentified finch		X				
unidentified gull		X				
unidentified passerine		X				
unidentified swallow		X				
Vaux's swift	*Chaetura vauxi*	X				
vesper sparrow	*Pooecetes gramineus*	X	X	X		X
violet-green swallow	*Tachycineta thalassina*	X		X		X
western kingbird	*Tyrannus verticalis*	X		X		X
western meadowlark	*Sturnella neglecta*	X	X	X		X
white-crowned sparrow	*Zonotrichia leucophrys*	X				X
yellow-rumped warbler	*Dendroica coronata*			X		
Mammals						
badger	*Taxidea taxus*					X
California bighorn sheep	*Ovis canadensis californiana*	X		X	X	X
white-tailed jackrabbit	*Lepus townsenddi*			X		
mountain cottontail	*Sylvilagus nuttallii*	X				
coyote	*Canis latrans*	X			X	X

Common Name	Scientific Name	Avian Use Surveys	Grassland Bird Displace-ment	Special Status Wildlife Surveys	Raptor Nest Survey	Incidental or In-transit
mule deer	*Odocoileus hemionus*	*X*		*X*	*X*	*X*
	Reptiles and Amphibians					
common garter snake	*Thamnophis sirtalis*					*X*
gopher snake	*Pituophis catenifer*			*X*		*X*
Pacific chorus frog	*Pseudacris regilla*	*X*				
racer	*Coluber constrictor*					*X*
western fence lizard	*Sceloporus occidentalis*					*X*
western rattlesnake	*Crotalus viridis*			*X*		*X*

*- denotes species is of State or Federal special status.

ADDENDUM NOTE:

Supplemental information for the Birds table section above:

Yellow-breasted chat (Icteria virens): discovered in the transmission corridor Special Status Wildlife Survey (as noted in Attachment P-1c)

ATTACHMENT P-5

Vascular Plant List

Summit Ridge Wind Farm

ATTACHMENT P-5
Vascular Plant List
Summit Ridge Wind Farm

Comprehensive plant species list for the Summit Ridge Wind Power Facility

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym
2	*Achillea millefolium*	common yarrow	*Asteraceae*	N	
2	*Agoseris heterophylla*	annual agoseris	*Asteraceae*	N	
4	*Agropyron cristatum*	crested wheatgrass	*Poaceae*	I	*Agropyron cristatum*
5	*Allium acuminatum*	taper tip onion	*Lilaceae*	N	
5	*Amelanchier alnifolia*	pacific serviceberry	*Rosaceae*	N	
2	*Amsinckia lycopsoides*	fiddleneck tarweed	*Boraginaceae*	N	
5	*Amsinckia menziesii*	Menzie's fiddleneck	*Boraginaceae*	N	*Amsinckia retrorsa*
5	*Antennaria dimorpha*	low pussytoes	*Asteraceae*	N	
5	*Antennaria rosea*	rosy pussytoes	*Asteraceae*	N	
6	*Apocynum sp.*	Dogbane	*Apocynaceae*	N	
4	*Artemisia tridentata ssp. tridentate*	big basin sagebrush	*Asteraceae*	N	
5	*Astragalus purshii*	woollypod milkvetch	*Fabaceae*	N	
5	*Astragalus tweedyii*	Tweedy's milkvetch	*Fabaceae*	N	
5	*Balsamorhiza serrata*	serrate balsamroot	*Asteraceae*	N	
5	*Balsamorhiza sagitatta*	arrowleaf balsamroot	*Asteraceae*	N	
2	*Bromus arvensis*	field brome	*Poaceae*	I	*Bromus japonicus*
1	*Bromus tectorum*	cheat grass	*Poaceae*	I	
6	*Buglossoides arvensis*	corn gromwell	*Boraginaceae*	I	*Lithospermum arvense*
5	*Calochortus sp.*	mariposa lily	*Lilaceae*	N	
5	*Centaurea diffusa*	diffuse knapweed	*Asteraceae*	I	
5	*Ceratocephala testiculata*	bur-buttercup	*Ranunculaceae*	I	
5	*Chaenactis douglasii*	Douglas’s dusty maiden	*Asteraceae*	N	
5	*Chenopodium album*	lambsquarters	*Chenopodiaceae*	I	
5	*Chorispora tenellus*	Crossflower	*Brassicaceae*	I	
4	*Chrysothamnus viscidiflorus*	green rabbitbrush	*Asteraceae*	N	
5	*Cirsium arvense*	Canada thistle	*Asteraceae*	I	
6	*Cirsium vulgare Bull*	bull thistle	*Asteraceae*	I	
2	*Collinsia parviflora*	maiden blue-eyed Mary	*Scrophulariaceae*	N	
5	*Collomia grandiflora*	grand colomia	*Polemoniaceae*	N	
6	*Collomia linearis*	tiny trumpet	*Polemoniaceae*	N	
5	*Convolvulus arvensis*	field bindweed	*Convolvulaceae*	I	
5	*Conyza Canadensis*	Canadian horseweed	*Asteraceae*		
2	*Crepis atrabarba*	slender hawksbeard	*Asteraceae*	N	
5	*Cryptantha flaccid*	weak cryptantha	*Boraginaceae*	N	

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym
5	*Delphinium nuttallianum*	twolobe larkspur	*Ranunculaceae*	N	
2	*Descurainia pinnata*	western tansymustard	*Brassicaceae*	N	
3	*Descurainia Sophia*	herb Sophia	*Brassicaceae*	I	
6	*Dodecatheon pulchellum*	darkthroat shootingstar	*Primulaceae*	N	
4	*Draba verna*	spring whitlow grass	*Brassicaceae*	N	
5	*Eleocharis palustris*	common spikerush	*Cyperaceae*	N	
5	*Elymus elymoides*	squirrel tail grass	*Poaceae*	N	*Sitanion hystrix*
2	*Epilobium brachycarpum*	desert willow-herb	*Onagraceae*	N	*Epilobium paniculatum*
2	*Ericameria nauseosa*	rubber rabbitbrush	*Asteraceae*	N	*Chrysothamnus*
5	*Erigeron linearis*	desert yellow fleabane	*Asteraceae*	N	
5	*Erigeron pumilus*	shaggy fleabane	*Asteraceae*	N	
5	*Eriogonum douglasii*	Douglas' buckwheat	*Polygonaceae*	N	
5	*Eriogonum heracleoides*	cream buckwheat	*Polygonaceae*	N	
5	*Eriogonum strictum*	strict buckwheat	*Polygonaceae*	N	
5	*Eriophyllum lanatum*	common wooly sunflower	*Asteraceae*	N	
2	*Erodium cicutarium*	storksbill geranium	*Geraniaceae*	I	
6	*Festuca idahoensis*	Idaho fescue	*Poaceae*	N	
6	*Fritillaria pudica*	yellow-bells	*Lilaceae*	N	
4	*Gutierriezia sarothrae*	Snakeweed	*Asteraceae*	N	
6	*Holodiscus discolor*	Oceanspray	*Rosaceae*	N	
2	*Holosteum umbellatum*	jagged chickweed	*Caryophyllaceae*	I	
5	*Juniperus occidentalis*	western juniper	*Cupressaceae*	N	
2	*Lactuca serriola*	prickly lettuce	*Asteraceae*	I	
3	*Lagophylla ramosissima*	rabbit-leaf	*Asteraceae*	N	
5	*Leymus cinereus*	basin wildrye	*Poaceae*	N	*Elymus cinereus*
5	*Lepidium latifolium*	broadleaf pepperweed	*Brassicaceae*	I	
5	*Lepidium perfoliatum*	clasping pepperweed	*Brassicaceae*	I	
3	*Lithophragma parviflora*	smallflower woodland star	*Saxifragaceae*	N	
5	*Lithospermum ruderale*	Stoneseed	*Boraginaceae*	N	
3	*Lomatium grayii*	Gray's desert parsley	*Apiaceae*	N	
2	*Lomatium macrocarpum*	big-seed biscuitroot	*Apiaceae*	N	
4	*Lomatium nudicaule*	barestem biscuitroot	*Apiaceae*	N	
3	*Lomatium triternatum*	nine-leaf biscuitroot	*Apiaceae*	N	
6	*Lupinus aridus ssp. Aridus*	desert lupine	*Fabaceae*	N	
5	*Lupinus leucophyllus*	velvet lupine	*Fabaceae*	N	
5	*Lupinus sericeus ssp. Sericeus*	silky lupine	*Fabaceae*	N	
5	*Madia exigua*	small tarweed	*Asteraceae*	N	
6	*Malva neglecta*	common mallow	*Malvaceae*	I	
4	*Medicago sativa*	Alfalfa	*Fabaceae*	I	

Ab Code*	Accepted Scientific Name†	Common Name	Family	Nativity	Hitchcock & Cronquist Synonym
4	*Meliotus officinale*	sweet clover	*Fabaceae*	I	
4	*Microsteris gracilis*	slender phlox	*Polemoniaceae*	N	
6	*Navarettia intertexta*	needleleaf navarretia	*Polemoniaceae*	N	
4	*Nothocalais troximoides*	sagebrush false dandelion	*Asteraceae*	N	*Microseris troximoides*
5	*Phacelia hastate*	silverleaf phacelia	*Hydrophyllaceae*	N	
5	*Phlox hoodii*	Hood's phlox	*Polemoniaceae*	N	
2	*Phlox longifolia*	longleaf phlox	*Polemoniaceae*	N	
6	*Pinus ponderosa*	ponderosa pine	*Pinaceae*	N	
2	*Plagiobothyrs tenellus*	Pacific popcorn flower	*Boraginaceae*	N	
6	*Plantago patagonica*	wooly plantain	*Plantaginaceae*	N	
4	*Plectritus macrocera*	longhorn plectritis	*Valerinaceae*	N	
2	*Poa bulbosa*	bulbous bluegrass	*Poaceae*	I	*Poa bulbosa*
6	*Poa pratensis*	Kentucky bluegrass	*Poaceae*	I	
1	*Poa secunda*	Sandberg's bluegrass	*Poaceae*	N	*Poa sandbergii*
5	*Polygonum aviculare*	prostate knotweed	*Polygonaceae*	I	
5	*Polygonum douglasii*	Douglas' knotweed	*Polygonaceae*	N	
6	*Populus trichocarpa*	black cottonwood	*Salicaceae*	N	
5	*Prunus virginiana*	Chokecherry	*Rosaceae*	N	
1	*Pseudoroegneria spicata*	bluebunch wheatgrass	*Poaceae*	N	*Agropyron spicatum*
6	*Purshia tridentate*	antelope bitterbrush	*Rosaceae*	N	
5	*Quercus garryana*	Oregon white oak	*Fagaceae*	N	
7	*Ranunculus aquatilis*	white water crowfoot	*Ranunculaceae*	N	
5	*Robinia pseudoacacia*	black locust	*Fabaceae*	N	
6	*Rumex crispus*	curly dock	*Polygonaceae*	I	
5	*Salsola kali*	Russian thistle	*Chenopodiaceae*	I	
6	*Sambucus cerulean*	blue elderberry	*Caprifoliaceae*	N	
2	*Sisymbrium altissimum*	tall tumble mustard	*Brassicaceae*	I	
4	*Taeniatherum caput-medusae*	medusahead rye	*Poaceae*	I	
6	*Taraxacum officinale*	common dandelion	*Asteraceae*	I	
7	*Thelypodium sp.*	Thelypody	*Brassicaceae*	N	
4	*Thinopyrum intermedium*	intermediate wheatgrass	*Poaceae*	N	*Agropyron intermedium*
2	*Thysanocarpus curvipes*	sand fringepod	*Brassicaceae*	N	
2	*Tragopogon dubius*	yellow salsify	*Asteraceae*	I	
5	*Triteleia grandiflora*	largeflower trideleia	*Lilaceae*	N	*Brodiaea howellii*
4	*Triticum aestivum*	common wheat	*Poaceae*	I	
5	*Verbascum Thapsus*	common mullein	*Scrophulariaceae*	I	
2	*Vulpia bromoides*	brome fescue	Poaceae	I	Festuca bromoides
5	*Zigadenus venenosus*	meadow deathcamus	*Liliaceae*	N	

*Abundance Codes:

1 = Abundant in multiple plant communities
2 = Common in multiple plant communities
3 = Uncommon in multiple plant communities
4 = Abundant in specific plant communities
5 = Common in specific plant communities
6 = Uncommon in specific plant communities
7 = Rare – three or fewer sightings in the Facility

†From USDA Plants Database (UDSA 2009)

Nativity: N = Native I = Introduced

ATTACHMENT P-6
Summit Ridge Wind Project Habitat Mitigation Plan

Summit Ridge Wind Project
Habitat Mitigation Plan

Prepared for:

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March 30, 2010

Introduction

This document has been prepared for the Summit Ridge Wind Project (Project) Site Certificate Application (SCA) submitted to the Oregon Department of Energy (ODOE). It provides primary concepts for meeting habitat mitigation needs and will be finalized into a formal Habitat Mitigation Plan (HMP). The proposed concepts were discussed with the Oregon Department of Fish and Wildlife in December 2009 and again on March 30, 2010.

The Summit Ridge Wind Project is located in Wasco County, Oregon. As part of the SCA (Exhibits P and Q), Northwest Wildlife Consultants, Inc. (NWC) completed habitat mapping and quality assessment of the Project area, and conducted site-specific biological studies that included rare plant surveys, avian use surveys, a grassland bird displacement study, special status vertebrate wildlife species surveys, a raptor nest survey, an inventory of bat species, and big game observations, as well as reviews for potential occurrence of or records of special status species (Gerhardt et al., 2009a, 2009b). Based on a combination of the results of these studies, Project impact estimates provided by LotusWorks and David Evans Associates (DEA), experience with such mitigation, and knowledge of the wildlife and habitats impacted by wind energy development in the Columbia Plateau, NWC offers the concepts in this document as recommendations for inclusion in the Project's final Habitat Mitigation Plan. Details on habitat types, subtypes, and Categories 1–6 can be found in the SCA, Exhibit P.

Description of Project Impacts

As presently designed (as of December 9, 2009), the Summit Ridge Wind Project will consist of 87 2.3 megawatt (MW) turbines. The Project is expected to have a generating capacity of 200 megawatts. Other associated facilities include turbine pads, maintenance roads, overhead and underground electrical cables, an operations and maintenance building, a batch plant, and one 230-kilovolt overhead transmission line.

Most of the Project's footprint (area to be covered by permanent facilities) will occupy dryland agriculture, which is Category 6 habitat. No Category 1 habitat will be impacted, but a small amount of Category 2 (big sagebrush shrub-steppe) habitat will be permanently impacted. Most of the footprint will occupy Category 3 (revegetated grassland, native perennial grassland, or rabbitbrush/buckwheat shrub-steppe) or Category 4 (old field or exotic annual grassland) habitats.

In addition to the permanent impacts mentioned above, construction of the Project will entail temporary impacts to the same types and categories of habitat. Temporary impacts are summarized as follows: no Category 1 impacts, a small amount of impact to Category 2 habitat, some Category 3 and Category 4 impacts, and mostly Category 6 habitat will be impacted. Grassland habitats (Category 3 and 4) are expected to require two to five years after construction impacts to recover to a mature state of grassland cover. Native forbs in perennial grasslands (as well as in shrub-steppe) may not recover to pre-construction diversity or will take longer to recolonize the restored areas. Shrub-steppe habitats

(Category 2 and 3) may take much longer to achieve the shrub species maturity and height that existed prior to construction.

Calculation of the Size of the Mitigation Area

The Habitat Mitigation Area (HMA) must be large enough and have the characteristics to meet the standards set by the Oregon Department of Fish and Wildlife (ODFW) in their Wildlife Habitat Mitigation Policy (OAR 635-415-0025). These standards include "no net loss" and a "net benefit" in habitat quality and quantity for Category 2 habitats, and "no net loss" of habitat for Categories 3 and 4. Mitigation standards for Category 6 involve minimizing direct habitat loss and avoiding impacts to off-site habitat.

For the purposes of this discussion, the acreages of impact are the current estimate of the maximum affected area. The actual areas of disturbance will be determined based on the final design layout of the Project. It is anticipated that ODOE and ODFW will require that they be provided with the final design layout and the associated impact acreages prior to the beginning of Project construction.

Current maximum habitat impact estimates of the Summit Ridge Wind Project (including the transmission line) are:

Habitat Category	Permanent Impacts	Temporary Impacts
Category 2	0.43	0.37
Category 3	17.43	28.03
Category 4	18.89	19.76
Category 6*	45.27	51.36
Total Acres	82.02	99.52

* no mitigation required

Based on these impact estimates, calculation of the mitigation area requirement is as follows:

Category 2
Footprint: 0.43 acres (2:1 ratio)
Temporary impacts: 0.37 acres (2:1 ratio)
Mitigation area required: (0.43 x 2) + (0.37 x 2) = 1.60 acres

Category 3
Footprint: 17.43 acres (1:1 ratio)
Temporary impacts: revegetated grassland 18.00 (0:1); native perennial grassland and shrub-steppe 10.03 (0.5:1 ratio)
Mitigation area required: 17.43 acres + (10.03 x 0.5) = 22.45 acres

Category 4
Footprint: 18.89 acres (1:1 ratio)
Mitigation area required: 18.89 acres

Total mitigation area required (to nearest whole acre): 43 acres

Description of the Habitat Mitigation Area (HMA)

According to ODFW standards, areas appropriate for mitigation of Category 2 and Category 3 habitat impacts must be "in proximity" to the Project and have potential for habitat and enhancement. The applicant has identified four habitat parcels for consideration by ODFW and ODOE (Figure 1). These range in size from 15 to 77 acres, and are revegetated grasslands of varying quality. NWC believes that the parcels under current consideration have adequate potential for mitigating the habitat loss expected to occur and for providing benefit for the wildlife species most likely to be impacted by habitat loss associated with the Project, including grasshopper sparrow (*Ammodramus savannarum*), Brewer's sparrow (*Spizella breweri*), vesper sparrow (*Pooecetes gramineus*), and loggerhead shrike (*Lanius ludovicianus*). The referenced parcels for mitigation will be discussed with ODFW, LotusWorks, NWC, and the associated landowners, and other parcels may be considered as well.

Possible Habitat Enhancement Options

It is assumed that the habitat designated for mitigation will be conserved and protected from alteration for the life of the Project. Besides such legal protection, actions that are proposed for enhancement of the mitigation area include fencing out livestock (if not already fenced), modification of livestock grazing (wildlife habitat values take precedence over livestock grazing), weed control, revegetation with native plants, and fire control.

Monitoring

It is expected that a comprehensive program of monitoring the HMA and the success of its protection and enhancements will be required by ODOE and ODFW. Such monitoring will be conducted by an independent and qualified specialist (wildlife biologist/botanist). Annual monitoring will include assessments of quality of vegetation, success of weed control measures, recovery of native grasses and forbs (in response to reductions in livestock grazing), and success of revegetation measures (where applicable). In addition, some requirement for periodic monitoring of avian species use of the area (especially during the breeding season) is recommended for understanding the enhancement success. Details of monitoring time frames and success criteria will be designed after the final site is selected.

Results of all monitoring will be reported to ODOE and ODFW on an annual basis, along with a report of the mitigation/enhancement measures undertaken that year.

Criteria for Success

Success of this Habitat Mitigation Plan will be predicated upon several criteria. These include increased vegetative cover consisting of desired native vegetation (relative to the structure prior to initiation of enhancement actions), increased avian use of the area (increased diversity of species), success of noxious weed control, increased recruitment of native forbs, and increased seed production of native bunchgrasses.

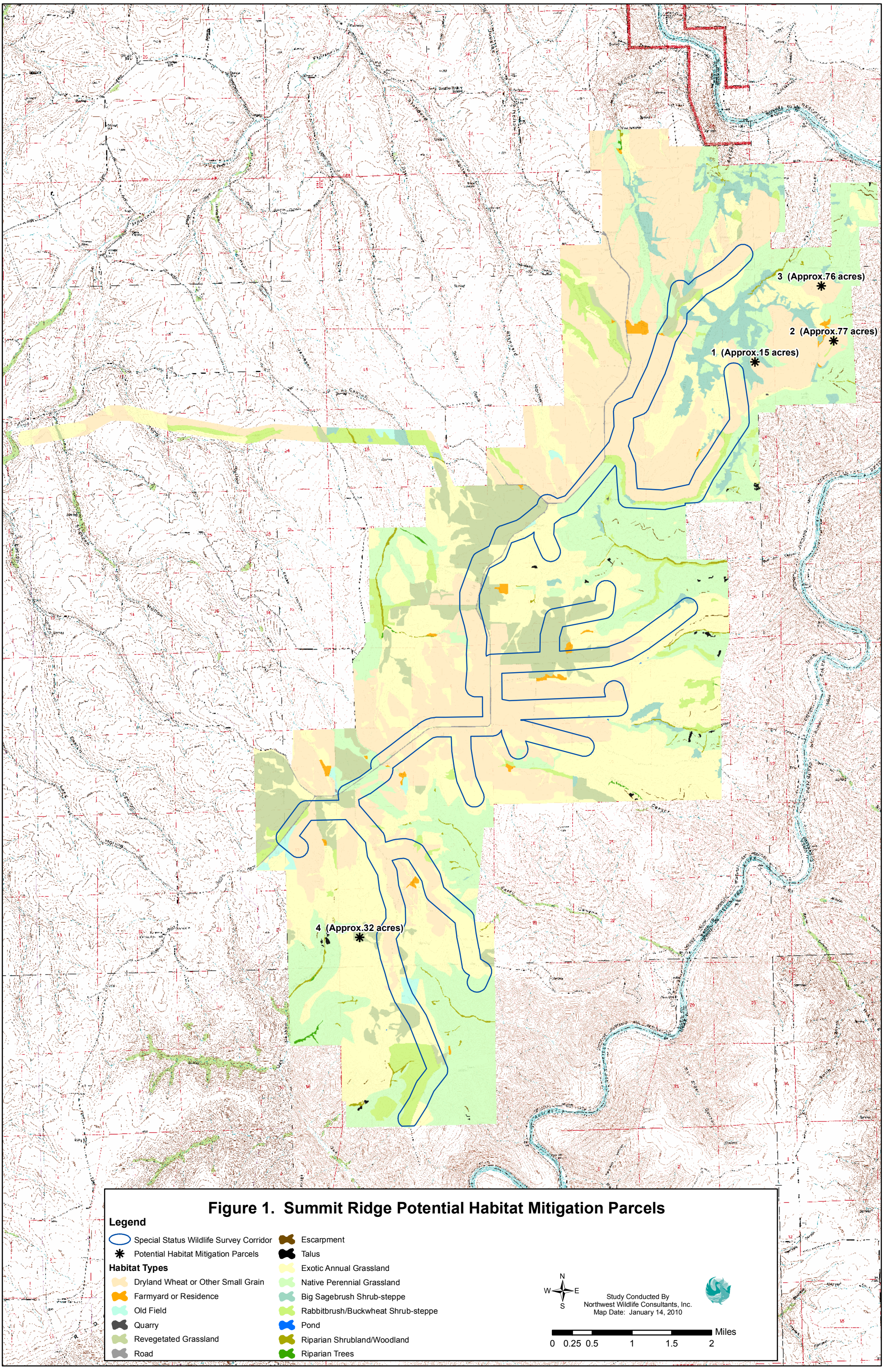

Figure 1. Summit Ridge Potential Habitat Mitigation Parcels

References

Gerhardt, R., R. Gritski, B. Anderson. 2009a. Ecological baseline studies and impact assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon—Interim Report. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Pendleton, Oregon.

Gerhardt, R., R. Gritski, B. Anderson. 2009b. Ecological baseline studies and impact assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon—Addendum. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Pendleton, Oregon.

ATTACHMENT P-7
Summit Ridge Wind Project Wildlife Monitoring and Mitigation Plan

Summit Ridge Wind Project
Wildlife Monitoring and Mitigation Plan

Prepared for:

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March 30, 2010

Introduction

This document has been prepared for the Summit Ridge Wind Project (Project) Site Certificate Application (SCA) submitted to the Oregon Department of Energy (ODOE). It provides primary concepts for meeting the operations phase wildlife monitoring and mitigation needs and will be finalized (by ODOE) into a formal Wildlife Monitoring and Mitigation Plan (WMMP). The objectives of the monitoring are to determine whether the Project causes significant fatalities of birds and bats and to determine whether the Project results in a loss of habitat quality. The concepts provided here are consistent with approved plans in place for other Oregon wind projects, in particular those that are permitted through the State process and the Energy Facility Siting Council. The Leaning Juniper II (2007) and Stateline (revised 2009) Wildlife Monitoring and Mitigation Plans served as models for the Summit Ridge concepts.

The Project consists of up to 87 wind turbines and related or supporting facilities as described in the site certificate. The permanent Project components will occupy approximately 82 acres, of which up to 37 acres is Category 4 wildlife habitat or better (Gerhardt et al. 2009a), based on the Oregon Department of Fish and Wildlife (ODFW) standards (OAR 635-415-0025). The remainder is Category 6—cropland.

The Wildlife Monitoring and Mitigation Plan will have the following components:

1) Fatality monitoring program, including:
    a) Carcass removal trials
    b) Searcher efficiency trials
    c) Fatality search protocol
    d) Statistical analysis
    e) Mitigation
2) Grassland bird displacement study
3) Wildlife reporting and handling process
4) Data reporting requirements
5) Process for amending the WMMP

1. Fatality Monitoring

Seasons for fatality monitoring will be as follows:

Season	Dates
Spring Migration	March 16 to May 15
Summer/Breeding	May 16 to August 15
Fall Migration	August 16 to October 31
Winter	November 1 to March 15

Fatality monitoring will be conducted over two years, with half of the turbines being searched each year. At the end of the two years, all turbines will have been searched for a full year. It is anticipated that each search plot will contain one or two turbines and this will be confirmed when the final layout is available. Search plots will be square and will be centered on the turbine location and will have a length equal to the maximum blade tip height of the turbine contained within the plot. Maps of the search plots will be provided to ODOE before beginning fatality monitoring at the Project. The same search plots will be used throughout a monitoring year.

In each monitoring year, fatality monitoring searches will be conducted at the rates of frequency shown below. Over the course of one monitoring year, 16 searches would be conducted, as follows:

Season	**Frequency**
Spring Migration	2 searches per month (4 searches)
Summer/Breeding	1 search per month (3 searches)
Fall Migration	2 searches per month (5 searches)
Winter	1 search per month (4 searches)

During each year of fatality monitoring, both carcass removal trials and searcher efficiency trials will be conducted, as discussed below.

(a) Carcass Removal Trials

The objective of the carcass removal trials is to estimate the length of time avian and bat carcasses remain in the search area. “Carcass removal” refers to the disappearance—due to predation, scavenging, farming activity, or other means—of a carcass from the search area. Obtaining this estimate will allow the adjustment of fatality estimates to account for removal bias. Removal rates will be estimated by size class, habitat type, and season.

One carcass removal trial will be conducted during each season of fatality monitoring. Each trial will involve the placement and observation of at least ten small bird carcasses and ten large bird carcasses. The “small bird” size class will use carcasses of house sparrows, starlings, commercially available game bird chicks, or legally obtained native birds to simulate passerines. The “large bird” size class will use carcasses of raptors provided by agencies, commercially available adult game birds, or cryptically colored chickens to simulate raptors, game birds, and waterfowl. If fresh bat carcasses are available, they may also be used.

To avoid confusion with turbine-related fatalities, carcasses will not be placed in fatality monitoring search plots. Instead, they will be placed at non-searched turbines at sufficient distance from turbines that are searched so as not to attract scavengers to the search plots. The carcasses will be placed randomly within the carcass removal trial plots and in a variety of postures—hidden, partially hidden, and exposed. Trial carcasses will be marked discreetly for recognition by searchers and other personnel.

Carcasses will be checked for a period of 35 days to determine removal rates. They will be checked approximately every day for the first 4 days, and then on day 7, day 10, day 14, day 21, day 28 and day 35. This schedule may vary depending on weather and coordination with other survey work. At the end of the 35-day period, the trial carcasses and scattered feathers will be removed.

(b) Searcher Efficiency Trials

The purpose of searcher efficiency trials is to estimate the percentage of bird and bat fatalities that searchers are able to find. Searcher efficiency trials will be conducted on the fatality monitoring search plots in both grassland/shrub-steppe and cultivated agriculture habitat types. Searcher efficiency will be estimated by size class and season. A pooled estimate of searcher efficiency will enable adjustment of fatality estimates to account for detection bias.

A searcher efficiency trial will be conducted during each of the seasons defined above during the years in which the fatality monitoring occurs. Each trial will involve approximately 25 carcasses (approximately 100 carcasses per year). The number of days needed to complete each trial (and thus the number of carcasses required each trial-day) will be varied among seasons so that searchers will not know the total number of trial carcasses being used on any given day. Personnel conducting fatality searches will not be made aware of the dates or plots on which searcher efficiency trials will be conducted.

Trial carcasses will be placed in the different habitat types roughly in proportion to the habitat composition of the Project. During each season, both small bird and large bird carcasses will be used in approximately equal numbers. Each efficiency trial will be spread over the entire season to incorporate effects of varying weather and vegetation growth.

Trial carcasses will be placed before search personnel arrive; where appropriate (if, for example, avian scavengers are suspected in the area), carcasses will be placed before daylight. The number and location of efficiency trial carcasses found during the carcass search will be recorded. The number of efficiency trial carcasses available for detection during each trial-day will be determined immediately after the day's searching by the person responsible for distributing the carcasses.

(c) Fatality Monitoring Search Protocol

The objective of fatality monitoring is to estimate the number of bird and bat fatalities that are attributable to Project operation as an indicator of the impact of the Project on habitat quality. The goal of bird and bat fatality monitoring is to estimate fatality rates and associated variances. Standardized carcass searches will be conducted over two years (16 searches each year), beginning one month after the start of commercial operation of that phase.

Fatality rates will be estimated using the statistical methods described below Section (d). Fatality estimates will be computed annually for eight categories: 1) all birds, 2) small birds, 3) large birds, 4) raptors, 5) grassland birds, 6) nocturnal migrants, 7) State Sensitive Species listed under OAR 635-100-0040 and 8) bats.

All carcasses located within areas surveyed, regardless of species, will be recorded and, if possible, a cause of death determined based on necropsy results. If a different cause of death is not apparent, the fatality will be attributed to facility operation. The total number of avian and bat fatalities will be estimated by adjusting for carcass removal and searcher efficiency bias (Sections (a) and (b)).

Trained personnel will conduct the carcass searches by walking parallel transects within the search plots. Transects will be set at 6 meters apart in the area to be searched. A searcher will walk at a rate of approximately 45 to 60 meters per minute along each transect, searching both sides out to three meters for casualties. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial. The searchers will record the condition of each carcass found, using the following condition categories:

- Intact: a carcass that is completely intact, is not badly decomposed and shows no sign of being fed upon by a predator or scavenger
- Scavenged: an entire carcass that shows signs of being fed upon by a predator or scavenger, or portions of a carcass in one location (e.g., wings, skeletal remains, legs, pieces of skin, etc.)
- Feather Spot: 10 or more feathers or 2 or more primary feathers at one location (indicative of predation or scavenging)

All carcasses (avian and bat) found during the standardized carcass searches will be photographed, recorded, and labeled with a unique number. Each carcass will be bagged and frozen for future reference and possible necropsy. A copy of the data sheet for each carcass will be kept with the carcass at all times. For each carcass found, searchers will record species, sex and age when possible, date and time collected, location, condition (e.g., intact, scavenged, feather spot) and any comments that may indicate cause of death. Searchers will photograph each carcass as found and will map the find on a detailed map of the search area showing the location of the wind turbines and associated facilities. Collection of state endangered, threatened, sensitive or other state protected species will be coordinated with ODFW. Collection of federally-listed endangered or threatened species and avian species protected under the Migratory Bird Treaty Act will be coordinated with the U.S. Fish and Wildlife Service (USFWS). Appropriate collection permits will be obtained from ODFW and USFWS.

Carcasses may be discovered incidental to formal carcass searches (as while driving between search plots or while setting up carcass removal or searcher efficiency trials). All such carcasses will be recorded, analyzed, and collected just like those found during formal searches. If the incidentally discovered carcass is found within a formal search plot, the fatality data will be included in the calculation of fatality rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be reported separately.

A protocol for handling injured birds will be developed and followed. Any injured native birds found on the Project site will be carefully captured by a trained biologist or technician and transported to an approved rehabilitation specialist (Blue Mountain Wildlife in Pendleton or other certified wildlife care center).

(d) Statistical Methods for Fatality Estimates

The estimate of the total number of wind facility-related fatalities will be based on:

(1) The observed number of carcasses found during standardized searches for which the cause of death is attributed to the Project.
(2) Searcher efficiency expressed as the proportion of planted carcasses found by searchers.
(3) Carcass removal rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during the entire survey period.

The following variables are used in the equations below:

c_i the number of carcasses detected at plot *i* for the study period of interest (e.g., one year) for which the cause of death is either unknown or is attributed to the Project

n the number of search plots

k the number of turbines searched (includes the turbines centered within each search plot and a proportion of the number of turbines adjacent to search plots to account for the effect of adjacent turbines on the search plot buffer area)

$\bar{c}$ the average number of carcasses observed per turbine per year

s the number of carcasses used in removal trials

s_c the number of carcasses in removal trials that remain in the study area after 40 days

se standard error (square of the sample variance of the mean)

t_i the time (days) a carcass remains in the study area before it is removed

$\bar{t}$ the average time (days) a carcass remains in the study area before it is removed

d the total number of carcasses placed in searcher efficiency trials

p the estimated proportion of detectable carcasses found by searchers

I the average interval between searches in days

$\hat{\pi}$ the estimated probability that a carcass is both available to be found during a search and is found

m_t the estimated annual average number of fatalities per turbine per year, adjusted for removal and observer detection bias

C nameplate energy output of turbine in megawatts (MW)

The estimated average number of carcasses ($\bar{c}$) observed per turbine per year is:

$$\bar{c} = \frac{\sum_{i=1}^{n} c_i}{k} . \tag{1}$$

Estimates of carcass removal are used to adjust carcass counts for removal bias. Mean carcass removal time ($\bar{t}$) is the average length of time a carcass remains at the site before it is removed:

$$\bar{t} = \frac{\sum_{i=1}^{s} t_i}{s - s_c} . \tag{2}$$

This estimator is the maximum likelihood estimator assuming the removal times follow an exponential distribution and there is right-censoring of data. Any trial carcasses still remaining at 40 days are collected, yielding censored observations at 40 days. If all trial carcasses are removed before the end of the trial, then s_c is 0, and $\bar{t}$ is just the arithmetic average of the removal times. Removal rates will be estimated by carcass size (small and large), habitat type, and season.

Observer detection rates (i.e., searcher efficiency rates) are expressed as *p,* the proportion of trial carcasses that are detected by searchers. Observer detection rates will be estimated by carcass size, habitat type, and season.

The estimated per turbine annual fatality rate (m_t) is calculated by:

$$m_t = \frac{\bar{c}}{\hat{\pi}} , \tag{3}$$

where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and observer detection bias assuming that the carcass removal times t_i follow an exponential distribution. Under these assumptions, this detection probability is estimated by:

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(I / \bar{t} \right) - 1}{\exp\left(I / \bar{t} \right) - 1 + p} \right] . \tag{4}$$

The estimated per MW annual fatality rate (m) is calculated by:

$$m = \frac{m_t}{C} . \tag{5}$$

Fatality estimates will be calculated for: (1) all birds, (2) small birds, (3) large birds, (4) raptors, (5) grassland birds, (6) nocturnal migrants 7) State Sensitive Species listed under OAR 635-100-0040 and 8) bats. The final reported estimates of *m*, associated standard errors, and 90% confidence intervals will be calculated using bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. For each iteration of the bootstrap, $\bar{c}$, $\bar{t}$, p, $\hat{\pi}$ and *m* will be calculated. A total of 5,000 bootstrap iterations will be used. The reported estimates will be the means of the 5,000 bootstrap estimates. The standard deviation of the bootstrap estimates is the estimated standard error. The lower 5th and upper 95th percentiles of the 5000 bootstrap estimates are estimates of the lower limit and upper limit of 90% confidence intervals.

(e) Mitigation

Mitigation may be appropriate if fatality rates exceed a threshold of concern. For the purpose of determining whether a threshold has been exceeded, the average annual fatality rates will be calculated by species groups after monitoring is completed. Based on current knowledge of the species that are likely to use the habitat in the area of the Project, and based on thresholds established for other EFSC-level permitted wind projects, the following thresholds apply to Summit:

Species Group	**Threshold of Concern** (fatalities per MW)
Raptors (All eagles, hawks, falcons and owls)	0.09
Raptor species of special concern (Swainson's hawk, ferruginous hawk, peregrine falcon, golden eagle, bald eagle, burrowing owl and any federal threatened or endangered raptor species.)	0.06
Grassland species (All native bird species that rely on grassland habitat and are either resident species occurring year round or species that nest in the area, excluding horned lark, burrowing owl and northern harrier.)	0.59
State sensitive avian species listed under OAR 635-100-0040 (Excluding raptors listed above.)	0.2
Bat species as a group	2.5

If the data show that a threshold of concern for a species group has been exceeded, additional mitigation may be implemented (if determined to be warranted by ODOE and ODFW). ODOE may also determine that mitigation is appropriate if fatality rates for individual avian or bat species (especially State Sensitive Species) are higher than expected and at a level of biological concern. If mitigation is warranted, appropriate mitigation measures will be proposed in consultation with the ODOE and ODFW to benefit the affected species.

Mitigation may include, but is not limited to, protection of nesting habitat for the affected group of native species (as through a conservation easement or similar agreement), enhancement of the protected tract by weed removal and control, increasing the diversity of native grasses and forbs, planting sagebrush or other shrubs, constructing and maintaining

artificial nest structures for raptors, improving wildfire response, and/or conducting research or making a contribution to research that will aid in better understanding the affected species and its conservation needs in the region.

2. Grassland Bird Displacement Study

A grassland bird displacement study was begun as part of pre-construction biological surveys of the Summit Ridge Wind Power Project (Gerhardt et al., 2009b). Five 300m-long and 100m-wide transects were established perpendicular to proposed turbine strings, and five control transects were established at least 800m away from proposed turbines or roads. Transects (both experimental and control) were placed in native habitat where grassland bird species were expected to occur. Transects were each surveyed three times during the spring 2009 breeding season. Grassland birds that were documented on-site during baseline surveys conducted in 2009 included grasshopper sparrow, savannah sparrow, vesper sparrow, Brewer's sparrow, western meadowlark, and horned lark. Locations were recorded (as distance from transect start and distance from center line) for all birds within the transect except horned larks.

If possible—and given a more precise understanding of final turbine layout and location of habitat mitigation plots—a second year of pre-construction (baseline) surveys will be conducted in 2010. Some experimental transects may be altered to align their starting points more closely to turbine locations. Some control transects may be altered to ensure their placement within a habitat mitigation plot. Sample size (of both experimental and control transects) may be increased, if suitable native habitat exists.

Two years of post-construction surveys will be conducted using the same transects and methods used in pre-construction surveys. The objective of this before-and-after design is to determine if there are noticeable changes in the presence and overall use by grassland bird species as a result of Project construction and operation. It is hoped that this study will provide information on whether operation of the Project discourages use of the area by the indicator species, grasshopper sparrow. Post-construction surveys will, however, include observations of common species such as western meadowlark, savannah sparrow, vesper sparrow, and Brewer's sparrow to provide information on the presence and distribution of these species within the study area and their behavior relative to turbine locations. Post-construction surveys will begin in the first spring after the Project is fully operational.

A comprehensive report of this research will be submitted to ODOE following the completion of the second year of post-construction surveys. The report will include maps showing transects walked and specific areas of use by the indicator species, plus analysis of any changes noted in distances from turbines by grassland bird species before and after Project construction. The report will also include a description of vegetation compared to pre-construction conditions as recorded in 2009 or 2010, including notes on any changes in land use, wildfire influences, and grazing, and describing any areas of intense vegetation impact.

3. Wildlife Reporting and Handling Process

A monitoring program will be established whereby maintenance personnel will be trained to report avian and bat casualties while conducting routine duties associated with the

operation of the Project. This monitoring program will include initial response, handling, and reporting of bird and bat carcasses discovered incidental to maintenance operations.

All avian and bat carcasses discovered by maintenance personnel will be photographed and the data recorded as would be done for carcasses within the formal search sample during scheduled searches. If incidental finds are made, maintenance personnel will notify a Project biologist. The biologist will collect the carcass or will instruct maintenance personnel to have an on-site carcass handling permittee collect the carcass. That permittee will be a person who is listed on state and federal scientific or salvage collection permits and who is available to process (collect) the find on the day it is discovered. The find will be processed on the same day as it is discovered.

During the years in which fatality monitoring occurs, if maintenance personnel discover incidental finds outside the search plots for the fatality monitoring searches, the data will be reported separately from fatality monitoring data. If maintenance personnel discover carcasses within search plots, the data will be included in the calculation of fatality rates.

4. Data Reporting Requirements

Wildlife monitoring data and analysis will be reported to ODOE. Monitoring data include fatality monitoring program data, grassland bird study data, and wildlife reporting and handling data. These reports may be included in the annual report required under OAR 345-026-0080 or submitted as a separate document at the same time the annual report is submitted.

USFWS and ODFW will be notified immediately if any federal or state endangered or threatened species are killed or injured on the Project site.

5. Process for Amending the WMMP

This document provides draft concepts for incorporation within the Wildlife Monitoring and Mitigation Plan that will be written by ODOE for the Summit Ridge Wind Project. It is expected that the completed WMMP will make provision for an amendment process that would depend upon the agreement of all concerned parties.

References

Gerhardt, R., R. Gritski, B. Anderson. 2009a. Ecological baseline studies and impact assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon—Addendum. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Pendleton, Oregon.

Gerhardt, R., R. Gritski, B. Anderson. 2009b. Ecological baseline studies and impact assessment for the Summit Ridge Wind Power Project, Wasco County, Oregon—Interim Report. Prepared for LotusWorks, Vancouver, Washington. Prepared by Northwest Wildlife Consultants, Pendleton, Oregon.

Manly, B.F. 1997. Randomization, bootstrap, and Monte Carlo methods in biology. 2nd edition. Chapman and Hall, New York. 399 pp.

ATTACHMENT P-8

ODFW Letter dated May 24, 2010

Oregon
Theodore R. Kulongoski, Governor

Department of Fish and Wildlife
Mid-Columbia Field Office
3701 West 13th Street
The Dalles, OR 97058
(541) 296-4628
FAX (541) 298-4993

RECEIVED JUN - 7 2010

May 24, 2010

Chuck Leber
Lotus Works
9611 NE 117th Ave., Suite 2840
Vancouver, WA 98662

Mr. Leber;

Upon reviewing the draft habitat mitigation and wildlife monitoring plans, we have only a couple comments;

1) ODFW would like to see a spring site protected adjacent to mitigation site number four as discussed on the site visit. We feel that inclusion of water within this established grassland habitat would be a benefit to all species within the area.
2) Protect seedling sage brush within mitigation site number two. This site offers excellent potential to benefit grassland species, and the current sage seedlings should only serve to boost restoration efforts.
3) Fences at both sites should be of high enough quality to exclude livestock. Contingencies should be put in place for dealing with livestock that trespass into mitigation sites.

If you have any other questions please feel to contact me.

Sincerely,

Jeremy Thompson
Wildlife Biologist
Oregon Department of Fish and Wildlife
3701 W. 13th Street
The Dalles, Oregon 97058
541-296-4628

Cc: Sue Oliver, ODOE
Chris Carey, ODFW
Sean Sullivan, David Evans and Associates, Inc.

EXHIBIT Q

THREATENED AND ENDANGERED SPECIES

OAR 345-021-0010(1)(q) and OAR 345-022-0070

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Q.1 INTRODUCTION

OAR 345-021-0010(1)(q) *Information about threatened and endangered plant and animal species that may be affected by the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0070. The applicant shall include:*

Response: To issue a site certificate, the Council, after consultation with appropriate state agencies, must find that: (1) For plant species that the Oregon Department of Agriculture has listed as threatened or endangered under ORS 564.105(2), the design, construction and operation of the proposed Facility, taking into account mitigation: (a) Are consistent with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3); or (b) If the Oregon Department of Agriculture has not adopted a protection and conservation program, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species; and (2) For wildlife species that the Oregon Fish and Wildlife Commission has listed as threatened or endangered under ORS 496.172(2), the design, construction and operation of the proposed Facility, taking into account mitigation, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species.

LotusWorks - Summit Ridge I, LLC ("Applicant") proposes to develop, construct and operate a wind generation facility in Wasco County, Oregon, with a generating capacity of approximately 200 MW, up to 87 turbine locations. The Facility will be located on private land, approximately 15 miles southeast of The Dalles, Oregon. Please refer to Exhibit C, for maps of the site vicinity, the Facility location, and the Facility components, respectively.

This exhibit describes methodology and results of studies conducted for threatened and endangered plant and animal species in the project analysis area, which includes 400-foot corridors surrounding all project facilities, including turbine strings, access roads, meteorological towers, electrical connection system, substation, transmission lines, operations and maintenance facility, and laydown areas. Please refer to Exhibit B for more detailed description of project elements.

Q.2 ANALYSIS AREA

For threatened and endangered plant species, the analysis area is within the site boundary and five miles from the site boundary. An initial database search was conducted within five miles of the lease boundary. Special status wildlife surveys were conducted using standard, agency-acceptable protocols, conducting walking surveys with corridors representing a 400-foot buffer on all project facilities. Threatened and endangered plant species were included in overall rare plant surveys, which were conducted in a buffer area extending 200 feet outwards from all proposed development linear center lines and 200 feet from the outside edge of non-linear facilities and their associated construction zones. Linear corridors will be a minimum of 400 feet wide.

Q.3 METHODOLOGY

OAR 345-021-0010(q)(A) *Based on appropriate literature and field study, identification of all threatened or endangered species listed under ORS 496.172(2), ORS 564.105(2) or 16 USC § 1533 that may be affected by the proposed facility;*

Response:

Q.3.1 Pre-Field Review

The pre-field review for special status/sensitive species of plants and wildlife within the analysis area included a query of the ORNHIC and USFWS databases for documented and projected occurrences of endangered, threatened, and special status wildlife and plant species likely to be present in and near the project area (ORNHIC, 2009; USFWS, 2008). Existing literature and scientific data were reviewed to determine species distribution and habitat requirements. A biological protocol was prepared to define the project analysis and survey areas and the species that would be included within Exhibits P and Q of this ASC. The wildlife baseline study protocols are included as Attachment P-1.

The Oregon Natural Heritage Information Center database search discovered 22 records of special status plant and wildlife species within the search area. Figure Q-1 (available in the confidential submittal) provides a graphic representation of the results of the database search within the five-mile buffered analysis area. The 12 species include special status species as rare species tracked by ORNHIC and include: 1 avian species, 2 fish species, 7 invertebrate species, and two plant species. The avian species noted was State Candidate Lewis's woodpecker (*Melanerpes lewis*), 1 record of 100 individuals in one location was documented. Fish records include: 2 records of Federally Threatened and State Candidate steelhead, Middle Columbia River ESU, summer run (*Oncorhynchus mykiss* pop. 28), 2 records of the Middle Columbia River ESU winter run steelhead (*Oncorhynchus mykiss* pop. 29), and one record of Federally Threatened and State Candidate bull trout (*Salvelinus confluentus* pop.2). Invertebrate records include: 5 records of shortface lanx (giant Columbia river limpet, *Fisherola nuttalli*), 3 records of federal Species of Concern Columbia pebblesnail (*Fluminicola focus*),1 record of purple-lipped juga snail (*Juga hemphilli maupinensis*), 1 record of Shasta juga (*Juga silicula*), 1 record of Federal Species of Concern Oregon snail (Dalles sideband, *Monadenia fidelis minor*), 1 record of Dalles mountainsnail (*Oreohelix variabilis*), and 1 record of Columbia Gorge Hesperian snail (*Vespericola depressa*). Rare plant records include: 2 records of Hood River milk-vetch (*Astragalus hoodianus*), and 1 record of State Threatened Tygh Valley milk-vetch (*Astragalus tyghensis*). All fish and invertebrate records were located in the Deschutes River and do not occur within the Facility boundary. The only ORNHIC record that does occur partially within the Facility boundary is that of the Lewis's woodpecker.

Habitat preferences and identification periods were derived from the literature for each potential species. Using this information, along with topographic maps of the project area, a field survey plan was developed to guide the timing and intensity of the field surveys. Based on the pre-field review, 19 special status plant taxa and 32 special status wildlife taxa were identified as potentially occurring on the Facility site. Of these 51 taxa, only two were listed as threatened or endangered – bald eagle and Tygh Valley milk-vetch. These two species, their status, and their likelihood of occurrence in the analysis area are described in Table Q-

1. These do not include numerous species of fish, turtles, amphibians, or invertebrates (snails) for which there is no suitable riverine habitat on the project area.

Q.3.2 Field Surveys

The special status plant field survey was conducted along the proposed turbine strings on June 1-2, 2009. Special status plant species surveys were conducted for the proposed transmission line corridor on May 28, 2010. Searches were conducted using an intuitively controlled survey method commonly used for rare plant surveys (USDA BLM/USFS, 1998; Elzinga et al., 1998). Sensitive plant searches were conducted throughout all survey corridors but with most efforts focused on areas dominated by native plant communities considered more likely to support rare plants, based on habitat associations for the rare taxa identified in the pre-field review. Areas with low native plant cover, such as agricultural and CRP, were surveyed less intensely, mainly to ensure that no high-potential native habitats were missed. In order to maximize the likelihood of detecting and accurately identifying rare plant species, the survey date was scheduled to coincide with known identification periods for as many "moderate" to "high" likelihood focal rare plant taxa as possible.

All plant surveys were conducted by qualified botanists familiar with the Columbia Plateau flora in general and with specific pre-field experience and species identification training to enable accurate identification of all focal rare plant taxa. Surveys were confined to a buffer area extending 200 feet outwards from proposed turbine string center lines and access roads for a minimum total of 400-foot wide survey corridors.

During surveys, field crews were equipped with reference literature, pre-field review data, orthophotos, and handheld GPS units, to ensure adequate survey coverage and to record the locations of any listed species encountered. All vascular plant species encountered during surveys were identified to species, where possible. Potential rare taxa were definitively identified on site or, if necessary, collected and pressed for later identification in the office or through comparison to documented herbarium specimens. For plant identification, the technical keys of Hitchcock and Cronquist (1973) were used, the accepted standard reference for vascular plants of the Pacific Northwest, with frequent reference to the five-volume flora upon which this single volume is based (Hitchcock et al., 1955-1969). Currently accepted taxonomic nomenclature was obtained from the PLANTS database (USDA, 2009). A comprehensive list of plants found during surveys can be found in Appendix D.

Special status terrestrial vertebrate wildlife species surveys were conducted June 1–2, 2009. Special status wildlife species surveys were conducted for the proposed transmission line corridor on May 28, 2010. The method employed was the walking transect method through habitats in the established micro-siting corridors. The surveys were conducted during the breeding or rearing season for most of the vertebrate wildlife species with potential for occurrence on the Facility. Special status wildlife surveys were conducted by experienced biologists and technicians using standard, agency-acceptable protocols, conducting walking surveys with corridors representing a 500-foot buffer of all project facilities. General data recorded included date, time, and weather variables. Locations of species detections were recorded using hand-held Global Positioning System (GPS) units; data recorded in association with these locations include species and number, age and sex, behavior and

habitat. Species encountered in-transit while on site between survey corridors were also recorded.

The special status species surveys were conducted for the transmission line corridor in May 2010 and included the following surveys:

- Raptor nest survey (Proposed transmission line corridor and ½-mile buffer, excluding area already surveyed): conducted May 15, 2010, with report submitted June 30, 2010.
- Special status vertebrate wildlife species survey (Proposed transmission line corridor and 200-ft buffer): conducted May 28, 2010, with report submitted June 30, 2010.
- Special status plant survey (Proposed transmission line corridor and 200-ft buffer): May 28, 2010, with report submitted June 30, 2010.

Q.4 EXISTING CONDITIONS AND POTENTIAL IMPACTS TO STATE AND FEDERAL LISTED, CANDIDATE AND PROPOSED SPECIES

OAR 345-021-0010(1)(q)(B) *For each species identified under (A), a description of the nature, extent, locations and timing of its occurrence in the analysis area and how the facility might adversely affect it;*

Response: Table Q-1 outlines those listed and candidate plant and wildlife species that are known to occur or have the potential to occur in the analysis area, based on habitat suitability and background literature. No listed plant species were observed during surveys within the site boundary; thus, the Facility is not expected to have any impact on listed plant species.

The bald eagle, although it has been delisted, is still protected under the federal Bald and Golden Eagle Protection Act and is still listed by the state as threatened. Four detections of bald eagles were made during avian use surveys - two during winter (12/02/2008 and 02/02/2009); one during spring (March 16, 2009); and one during summer (August 4, 2005). The spring detection was outside of the plot radius. This species winters along the Columbia River and is known to hunt upland for carrion and small mammals. They also have been and can be expected to pass through the site infrequently during the spring and/or fall migration, but are not expected to nest on the site or near the turbine development area. The ORNHIC database search and bald eagle reports did not identify any bald eagle nests or roosting areas within the 5 mile search area (ORNHIC, 2009; Isaacs, 2007). Bald eagles do not appear susceptible to colliding with wind turbines (unlike golden eagles), likely because of their differences in foraging habits (golden eagles are predators and move through the landscape in search of upland prey whereas bald eagles tend to feed on fish or scavenge). There have been no reported instances of a bald eagle fatality at any U.S. wind project (Erickson et al., 2001). Fall season avian use surveys are not yet completed, but at this point it seems unlikely that the Summit Ridge Wind Power Facility will have any negative effect on bald eagles.

Table Q-1. Listed, Proposed and Candidate Plant and Wildlife Species with Potential for Occurrence in the Summit Ridge Wind Power Facility Area

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period (Plants only)
		WILDLIFE		
Bald eagle *Haliaeetus leucocephalus*	EPA ODA: LT	Nests in large, dominant trees with exposed limbs capable of supporting large nest structure, usually within one mile of a large waterbody; winters along large rivers and reservoirs	Low	NA
		PLANTS		
Tygh Valley milk-vetch *Astragalus tyghensis*	OR Rank: G2S2 ORNHIC List: 1 ODA: LT	Dry, rocky, sandy-clay soils and grassy slopes, common in sagebrush-bunchgrass communities. Known occurrence within 5 miles of project area.	Moderate	Late May - Mid June
Achnatherum hendersonii **Henderson's ricegrass**	OR Rank: G3S2 ORNHIC List: 1 ODA: C USFWS: SC	Dry shallow rocky soils derived from basalt in sagebrush or ponderosa pine. Soils are often subject to frost heave.	Low	May - June
Camissonia pygmaea **dwarf evening-primrose**	OR Rank: G3S1 ORNHIC List: 1 ODA: C USFWS: SOC	Dry plains and slopes with unstable soils or on gravel in steep talus, dry washes, banks and road-cuts. Elevation: 500-200 ft.	Moderate	June - August
Hackelia diffusa var. diffusa **diffuse stickseed**	OR Rank: G4T3S3 ORNHIC List: 4 ODA: C	Shaded areas, cliffs, talus, wooded flats and slopes, tending closer to the Columbia Gorge than *H. d. var. cottonii*. Elevations: ~1000 ft.	Low	May - June

Name	Status	Typical Habitat	Likelihood of Occurrence	Identification Period (Plants only)
Mimulus jungermannioides **Hepatic monkeyflower**	OR Rank: G3S3 ODA: C ORNHIC List: 4	Basalt crevices in seepage zones in vertical cliff faces and canyon walls. Elevation: 500-3300 ft.	Low	May - Late August

Footnotes:

USFWS Federal Ranking Key:
LT= Listed Threatened. Taxa likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of their range.
EPA = Bald and Golden Eagle Protection Act

ODA (Oregon Department of Agriculture) Ranking Key:
LT = Listed Threatened.
C = Candidate for listing as Threatened or Endangered.

OR Rank (Oregon Natural Heritage Program) Categories Key:
G = Global rank indicator; denotes rank based on range wide status.
T = Trinomial rank indicator; denotes range wide status of infraspecific taxa.
S = State rank indicator; denotes rank based on status within Oregon.
1 = Critically imperiled because of extreme rarity or some factor of its biology makes it especially vulnerable to extinction (typically 5 or fewer occurrences).
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (typically 6 to 20 occurrences).
3 = Rare or uncommon but not imperiled (typically 21 to100 occurrences).
4 = Not rare and apparently secure, but with cause for long-term concern (usually more than 100 occurrences).
5 = Demonstrably widespread, abundant, and secure.
H = Historical occurrence (i.e., formerly part of the native biota with the implied expectation that it might be rediscovered).
? = Not yet ranked.

Q.5 DESCRIPTION OF MEASURES PROPOSED TO AVOID OR REDUCE ADVERSE IMPACTS TO SPECIES

OAR 345-021-0010(1)(q)(C) *For each species identified under (A), a description of measures proposed by the applicant, if any, to avoid or reduce adverse impact;*

Response: Several measures were implemented while planning the Facility to avoid and minimize impacts to native habitat and special status plants and animals. These included the following:

- Mapping of land cover and wildlife habitats. Existing disturbed habitats were selected for placement of the Facility wherever feasible, reducing the impacts to native habitats.

- Pre-construction biological surveys were conducted in 2005 and 2008-2010 to document rare plant populations, unique habitats and vertebrate wildlife use.

- The Facility was designed to avoid impacts to sensitive species, riparian areas, and shrub-steppe habitat wherever feasible by utilizing existing roads to the maximum extent possible and burying collector cables underground in previously disturbed area wherever feasible.

During construction, the following measures will be implemented to further avoid and minimize potential impacts to listed species:

- An Erosion and Sediment Control Plan will be developed.

- An environmental training course for contractors will be developed that provides information on sensitive species present onsite and all measures needed to work in their proximity with a minimum of disturbance.

- Construction work will avoid all wetlands and all except 0.43 acres of Category 2 habitat.

- An onsite compliance manager will insure compliance with protective measures and coordination with regulatory agencies.

Q.6 FINDINGS THAT THE PROPOSED FACILITY COMPLIES WITH ODA PROTECTION AND CONSERVATION PROGRAM

OAR 345-021-0010(1)(q)(D) *For each plant species identified under (A), a description of how the proposed facility, including any mitigation measures, complies with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3);*

Response: Field surveys were conducted for all rare plant species with potential to occur in the analysis area, including the species in Table Q-1. These surveys covered all areas potentially impacted by the Facility footprint. No populations were identified by the surveys; thus, no Facility-related impacts to any federal or state listed, proposed or candidate plant

and wildlife species are anticipated. No specific protection and conservation measures exist for the plant species listed in Table Q-1.

Q.7 DESCRIPTION OF MEASURES PROPOSED TO AVOID OR REDUCE ADVERSE IMPACTS TO SPECIES

OAR 345-021-0010(1)(q)(E) *For each plant species identified under paragraph (A), if the Oregon Department of Agriculture has not adopted a protection and conservation program under ORS 564.105(3), a description of significant potential impacts of the proposed facility on the continued existence of the species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species;*

Response: Field surveys were conducted for all rare plant species with potential to occur in the analysis area, including the species in Table Q-1. These surveys covered all areas potentially impacted by the Facility footprint. No populations were identified by the surveys; thus, no Facility-related impacts to any federal or state listed, proposed or candidate plant and wildlife species are anticipated. No specific protection and conservation measures exist for the plant species listed in Table Q-1. No species-specific mitigation measures are proposed at this time because no direct Facility-related impacts to any federal or state listed, proposed or candidate plant and wildlife species are anticipated.

Q.8 FINDINGS THAT THE PROPOSED FACILITY WILL NOT LIKELY CAUSE A SIGNIFICANT REDUCTION IN THE LIKELIHOOD OF SURVIVAL OR RECOVERY OF THE FISH AND WILDLIFE SPECIES IDENTIFIED

OAR 345-021-0010(1)(q)(F) *For each animal species identified under (A), a description of significant potential impacts of the proposed facility on the continued existence of such species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species;*

Response: In compliance with these requirements, Section Q.4 of this Exhibit described the potential impacts of the proposed Facility on the continued existence of state and federal species and on the suitable habitat for these species. The mitigation measures described in Section Q.5 were designed to avoid and/or minimize any adverse impacts to the listed wildlife species. Through utilization of these mitigation measures, the construction, operation and maintenance of the proposed Facility will not likely cause a significant reduction in the survival or recovery of any listed species.

Q.9 MONITORING PROGRAM

OAR 345-021-0010(1)(q)(G) *The applicant's proposed monitoring program, if any, for impacts to threatened and endangered species;*

Response: No monitoring for listed species is proposed, since no significant impacts to these species from the proposed Facility have been identified. Monitoring will occur to track future operational impacts to other taxa, including avian and bat mortality monitoring. Other general post-construction monitoring will include:

- Preparation of a Revegetation and Weed Control Plan to maintain and reestablish native plant communities. The plan will include revegetation monitoring.

- A wildlife habitat conservation easement will be established on a parcel of native habitat in the analysis area for conservation/restoration to offset temporary and permanent habitat impacts. This parcel will meet or exceed Oregon Habitat Standards.

Q.10 REFERENCES

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EXHIBIT R

SCENIC AND AESTHETIC VALUES

OAR 345-021-0010(1)(r)

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R.1 INTRODUCTION

OAR 345-021-0010(1)(r) *An analysis of significant potential impacts of the proposed facility, if any, on scenic resources identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0080, including:*

Response: Pursuant to OAR 345-022-0080(1) "the Council must find the design, construction and operation of the Facility taking into account mitigation, are not likely to result in significant adverse impact to scenic resources and aesthetic identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area described in the project order."

R.2 METHOD

The method for evaluating potential impacts to significant or important scenic and aesthetic values follows a pragmatic approach, using a combination of literature review, computer analyses, and fieldwork. The investigators reviewed applicable local land use plans and federal land management plans to identify, describe, and map resources identified as significant or important within the analysis area, which extends 20 miles from the site boundary per the Project Order. No tribal land management plans or visual quality objectives were identified. A description of significant or important scenic and aesthetic values follows in this exhibit. Resources are mapped in Figure R-1.

A visibility analysis was conducted for the analysis area using Geographic Information Systems (GIS) technology and US Geological Survey (USGS) Digital Elevation Models (DEMs). Computer modeling techniques were used to determine areas from which the proposed Facility (i.e., any part of any turbine or transmission tower) would potentially be visible. This analysis focused on turbines and transmission towers, which are the dominant elements in the Facility, though the towers have much lesser impact than the turbines. The DEMs used in the analysis have 10-meter resolutions, meaning the ground is represented by a grid of squares that are 10 meters by 10 meters, and each square is assigned a single elevation. As such, the resolution of the DEMs is the limiting factor in the precision of these analyses. The models used in these analyses do not include vegetation or structures, and do not account for variable climatic conditions. Therefore, it should be noted that these analyses generally overestimate areas of visibility.

An initial visibility analysis was performed to determine the Zone of Visual Influence (ZVI) of an original proposed turbines layout. The initial analysis indicated that several turbines may potentially result in adverse impacts to the Deschutes River Canyon. Accordingly, the Applicant revised the turbine layout, reduced the number of turbines from 167 to 87, and changed turbine types to further reduce potential impacts. A second visibility analysis was performed on the revised proposed turbine layout. The results of this second analysis are presented later in this exhibit and are the basis for the discussion on project impacts.

Visual simulations were prepared using Google Earth Pro and Arc2Earth software to illustrate potential visibility of the Facility from key viewpoints along the Deschutes River.

Viewpoint locations were determined based on the visibility analysis and fieldwork to reflect "worst case" conditions when viewed from important or significant scenic and aesthetic resources. In other words, these viewpoints include locations with relatively high use (based on ease of access and presence of developed recreational facilities) and positions from which turbines would be most visible.

Fieldwork was conducted August 30 and 31, 2009.

R.3 LOCAL, TRIBAL AND FEDERAL PLANS

OAR 345-021-0010(1)(r)(A) *A list of the local, tribal and federal plans that address lands within the analysis area.*

Response: The analysis area for Exhibit R includes the area within the site boundary and extends 20 miles beyond the site boundary in Oregon and Washington. The following local, tribal, and federal land management plans apply to the analysis area:

- Management Plan for the Columbia River Gorge National Scenic Area, September 1992, revised May 10, 2004
- Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement, October, 1990
- Lower Deschutes River Management Plan and Final Environmental Impact Statement, January 1993 (Record of Decision issued February 1993)
- White River National Wild and Scenic River Management Plan, Decision Notice, and Finding of No Significant Impact, 1994
- John Day Proposed Management Plan, Two Rivers and John Day Resource Management Plan Amendments and Final Environmental Impact Statement, June 2000 (Record of Decision issued February 2001)
- Two Rivers Resource Management Plan Final Environmental Impact Statement, September 1986
- Lewis and Clark National Historic Trail Comprehensive Plan and Management and Use, January 1982
- Management and Use Plan Update Final Environmental Impact Statement Oregon National Historic Trail and Mormon Pioneer National Historic Trail, August 1999
- Spokane Resource Management Plan and Record of Decision, May, 1987
- Comprehensive Plan for Wasco County [Oregon]
- Hood River County Comprehensive Land Use Plan [Oregon]

- Comprehensive Plan for Land Use in Gilliam County, Oregon, May, 1977 (Amended 1987)
- Sherman County [Oregon] Comprehensive Land Use Plan, 1994, (Updated 2007)
- Klickitat County [Washington] Comprehensive Plan, August, 1977
- Comprehensive Plan for the City of Dufur, Oregon, 1977
- City of the Dalles Comprehensive Plan, December, 1982
- Maupin Comprehensive Land Use Plan, 1980
- Moro Comprehensive Land Use Plan, July, 1978
- Rufus Comprehensive Land Use Plan, June, 1978
- Wasco Comprehensive Land Use Plan, May, 1978
- Grass Valley Comprehensive Land Use Plan, April, 1978
- Goldendale [Washington] Comprehensive Land Use Plan, 1999

R.4 IDENTIFICATION AND DESCRIPTION OF SCENIC RESOURCES IDENTIFIED AS SIGNIFICANT OR IMPORTANT

OAR 345-021-0010(1)(r)(B) *Identification and description of the scenic resources identified as significant or important in the plans listed in (A).*

Response: Significant or important scenic or aesthetic resources identified in the applicable plans are illustrated in Figure R-1. In some cases, multiple plans govern the same resource. For example, the Lower Deschutes River is designated a federal Wild and Scenic River and a State Scenic Waterway, the rim-to-rim area is designated an Area of High Visual Quality by the Bureau of Land Management (BLM). In such cases, the management boundaries for from each plan are shown in Figure R-1; however, the resource is later discussed as a single entity ("Lower Deschutes River Canyon") for purposes of determining and analyzing potential impacts to the resource.

The following plans did not identify significant visual or aesthetic resources within the analysis area:

- Lewis and Clark National Historic Trail Comprehensive Plan and Management and Use, January 1982
- Spokane Resource Management Plan and Record of Decision, May 1987
- Hood River County Comprehensive Land Use Plan

- Klickitat County [Washington] Comprehensive Plan
- Comprehensive Plan for Land Use in Gilliam County, Oregon
- Goldendale [Washington] Comprehensive Land Use Plan, 1999

The following significant or important scenic resources in the analysis area have been identified in the applicable management plans:

R.4.1 Columbia River Gorge National Scenic Area

The Columbia River Gorge National Scenic Area is managed for an "unparalleled combination of scenery, geology, plants, wildlife, and multicultural history" (Columbia River Gorge Commission et al. 1992). Key viewing areas (KVAs) are identified as important viewpoints open to the public offering opportunities to view the gorge. KVAs within the analysis area include Interstate 84, Historic Columbia River Highway, Washington State Route 14 (SR-14), Rowena Plateau and Nature Conservancy Viewpoint, and the Columbia River. Scenic travels corridors within the analysis area include I-84 and SR-14.

R.4.2 Lower Deschutes River Canyon

The lower Deschutes is a designated federal Wild and Scenic River, recreational classification, and Oregon State Scenic Waterway. The Lower Deschutes River Canyon provides a dramatic and diverse landscape, while the green riparian vegetation "creates a stark contrast to the often barren and broken reddish and brown cliffs and hillsides of the canyon" (USDI 1993). The river corridor is popular for its diverse recreational opportunities including fishing and rafting. A railroad corridor (to the west) and roadway (to the east) parallel the river within the canyon. Recreational development occurs in several areas throughout the canyon.

The BLM and Oregon Department of Fish and Wildlife (ODFW) administer the majority of public lands within the canyon. The Lower Deschutes Management Plan Record of Decision states the BLM management in the Lower Deschutes River Canyon shall provide "protection and enhancement to the river's outstandingly remarkable values while providing adequate levels of recreation use and diversity of opportunities (USDI, 1993).

The Two Rivers Resource Management Plan identifies the Deschutes River Canyon (the rim-to-rim area) as an "area of high visual quality" and as a Special Management Area, thus it "will continue to be protected while allowing other compatible uses in the same area (USDI, 1986).

R.4.3 White River Canyon

The White River is a designated federal Wild and Scenic River. The US Department of Agriculture Forest Service and BLM jointly administer lands in the area: "the river's scenery is regionally important and widely appreciated in all seasons" (USDA 1994). The river corridor is divided into segments A-F in the White River National Wild and Scenic River Management Plan. River segments E and F occur within the analysis area. Opportunities to

view the river corridor within segments E and F inside the analysis area occur primarily from State Highway 216 (Hwy 216) and at White River Falls State Park.

R.4.4 John Day River Canyon

The John Day River system includes more than 500 river miles and is one of the longest free-flowing river systems in the continental United States (USDI 2001). The landscape within the analysis area features high desert communities of sagebrush and juniper with intermingled private ranches adding visual interest along the river (USDI 2000). The John Day River Canyon (i.e., the area rim-to-rim) is also identified as an "area of high visual quality" (USDI 1986) and managed as a VRM Class II resource (USDI 2000).

Beginning at Tumwater Falls near river mile 10 upstream through the analysis area, the river is a designated Federal Wild and Scenic River (WSR) and classified as Recreational, meaning that at the time of designation, the segment was readily accessible by road or railroad, may have some shoreline development, and may have undergone some impoundment or diversion in the past. Outstanding remarkable values in this segment include "scenic, recreation, fish, wildlife, geological, paleontological, and archaeological" values; botanical and ecological values are also deemed significant (USDI 2001). The segment is also designated as a State Scenic Waterway.

The Two Rivers Resource Management Plan Record of Decision identifies two Special Management Areas relevant to this Exhibit: the Oregon Trail Historic Site McDonald Crossing and the John Day River Canyon. For McDonald Crossing, "the unusual qualities of these sites will be maintained and protected" (USDI 1986). For the canyon, "areas of high visual and natural quality will continue to be protected while allowing other compatible uses in the same area" (USDI 1986).

R.4.5 Mt. Hood National Forest

The Mt. Hood National Forest includes over 1.1 million acres and is administered by the USDA Forest Service (FS). The Forest straddles the Cascade Mountain Range and varies in elevation from 65 feet above sea level along the Columbia River to the summit of Mount Hood at an elevation of 11,235 feet. The Forest's natural environment includes a number of attractions such as mountain lakes and streams, diverse wildlife and habitats, and multiple recreational opportunities. The Forest offers "a number of magnificent scenic vistas, a snowcapped mountain, spectacular waterfalls, crystal streams, blue lakes, and meadows of many-colored flowers. These visual resources attract tourists from all parts of the nation, as well as nearby residents" (USDA 1990). The Forest area within the analysis area includes a variety of Scenic Viewsheds that span FS Visual Management System (VMS) Visual Quality Objectives (VQOs) including Preservation, Retention, Partial Retention, Modification, and Maximum Modification.

R.4.6 Oregon National Historic Trail High-Potential Sites

The Oregon National Historic Trail was authorized by congress in 1978, to provide for this significant historic route's preservation, interpretation, public use, and understanding. The management plan is a coordinating document that provides broad based policies, guidelines,

and standards for administering the trail (and others of the western U.S) in such a manner as to ensure the protection of trail resources, their interpretation, and their appropriate public use (USDI 1999). The plan identifies four High-Potential Sites within the analysis area, based on "historic significance, presence of visible historic remnants, scenic quality, and relative freedom from intrusion" (USDI 1999). The four sites are the Deschutes River Crossing, The Dalles Complex, Tygh Valley, and Biggs Junction. The Plan does not identify specific scenic or aesthetic resources beyond these.

R.4.7 Journey Through Time Scenic Byway

The Journey Through Time Management Plan is administered through Oregon Department of Transportation Scenic Byway Program. It is included in the exhibit because it is referenced in the Sherman County Comprehensive Plan. The Comprehensive Plan provides no additional guidance regarding the management of scenic or aesthetic resources associated with the Byway. Although the Journey Through Time Management Plan and the Sherman County Comprehensive Plan do not identify significant visual or aesthetic resources, the Byway has been included in this exhibit for the sake of completeness.

The Journey Through Time Management Plan describes the rural heritage and history of the 286-mile route through north central Oregon. The plan defines four goals: create jobs; maintain rural lifestyles; protect important values (i.e., historic attractions and an emphasis on education); and build identity in the region. Within the analysis area, the plan identifies the following points of interest: Maryhill Museum of Art, the Sherman County Museum, the communities of Wasco, Biggs Junction, Moro, and Grass Valley, and the Historic Oregon Trail and Barlow Road.

R.4.8 Wasco County Resources

The Wasco County Comprehensive Plan (WCCP) identifies the following scenic highways within the analysis area: Interstate 84 (I-84) east of The Dalles city limits; OR Hwy 197 between I-84 and just north of the town of Dufur; and a second segment of Hwy 197 beginning at the summit of Tygh Ridge and continuing south approximately thirteen miles before leaving the analysis area. The WCCP has designated these highway segments due to their being "adjacent to or passing through scenic areas in State or Federal parks, historic sites, or in areas of natural beauty…designated by the Scenic Area Board" (Wasco County 1993).

In addition to several scenic resources discussed elsewhere in this exhibit (i.e., Columbia River Gorge), the Comprehensive Plan for Wasco County identifies Pine Hollow Lake and surrounds as an outstanding scenic and recreational area.

R.4.9 Sherman County Resources

The Sherman County Comprehensive Plan states Goal VI is to "Encourage preservation of the rural nature of the Sherman County landscape. Policy VII of the section states "trees should be considered an important feature of the landscape and therefore the County Court shall encourage the retention of this resource when practical" (Sherman County 2007). Trees within the analysis area are sparsely distributed and occur primarily along the riparian

corridor of the Lower Deschutes River and in developed rural communities (i.e., Moro and Dufur).

R.4.10 City Resources

Comprehensive Plans for the communities of Moro, Rufus, Grass Valley, and Wasco all include land use policy statements regarding the preservation of trees as valued resources to be protected. In addition, the City of Moro Plan further identifies Barnum Canyon Creek; the Rufus Plan identifies the Columbia River frontage; the Wasco Plan identifies Spanish Hollow Creek all as valued resources to be protected. Other communities, such as Maupin, Dufur, and The Dalles have stated land use goals calling for the conservation of open space to preserve their rural or scenic character. Because the proposed Facility is not located within any city limits and would therefore not impact trees or other site-specific resources within the surrounding communities, such as Barnum Canyon Creek, the Columbia River frontage near Rufus, and Spanish Hollow Creek, these resources have not been carried forward for further consideration.

R.5 POTENTIAL ADVERSE IMPACTS TO SCENIC RESOURCES

OAR 345-021-0010(1)(r)(C) *A description of the potential adverse impacts to the scenic resources identified in (B), including, but not limited to, impacts such as*:

(i) Loss of vegetation or alteration of the landscape as a result of construction or operation; and

Response: The Facility will result in conversion of dry land wheat agricultural lands to access roads, turbine pads, and their appurtenances. The design, construction, operation, and retirement of the Facility are not anticipated to impact trees or rock outcroppings. Therefore, there will be no significant adverse impacts to vegetation or alteration of the landscape.

(ii) Visual impacts of facility structures or plumes.

Response: A detailed analytical approach including computer modeling and digital visibility analyses, visual simulations, and field investigation was used to determine potential visual impacts from the proposed Facility.

R.5.1 Federal Aviation Administration Lighting

The Federal Aviation Administration (FAA) will require aircraft safety lighting which will include lights that flash red, synchronized, at night. FAA will determine the actual number of lights required after reviewing the final Facility plans. Given the distance between scenic and aesthetic resources in the analysis area and the proposed Facility, FAA lighting should not affect any of the scenic or aesthetic resources identified in this exhibit with the exception of the Lower Deschutes River, which is relatively close to the proposed Facility. Potential FAA lighting impacts to the Deschutes River are discussed below.

R.5.2 Computer Modeling Results

The results of visibility analyses are illustrated in Figure R-1. In considering these results, it is important to note that the proposed Facility would be located on private lands beyond the jurisdiction of many of the agencies administering public lands in the analysis area. The proposed Facility is beyond the jurisdiction of the Oregon State Scenic Waterways Act (see ORS 390.805(1), 390.845(2)e; see also OAR 736-040-0015(5) and (10)); it is also beyond the jurisdiction of the federal Wild and Scenic River Act because the proposed Facility is outside the WSR boundary and local land use plans do not place additional restrictions of development based on the WSR designation.

Visual simulations are shown in Figures R-2 through R-6. In some cases, the quality of the visual simulations is limited by the quality of the available digital imagery and the resolution of the USGS DEMs.

R.5.3 Determination of Significance of Potential Impacts

Potential impacts to the significant or important scenic or aesthetic resources are as follows:

R.5.3.1 Columbia River Gorge National Scenic Area

The visibility analysis indicates some portion of the proposed Facility (i.e., turbines and/or transmission towers) would be visible from the eastern portion of the CRGNSA within the analysis area (see Figure R-1). Much of the visible area identified in the visibility analysis is not publicly accessible; there are limited roads and most land is held in private ownership. Modeling results and field investigation indicate that the proposed Facility would not be visible from I-84, Historic Columbia River Highway, Rowena Plateau and Nature Conservancy Viewpoint, and the Columbia River. The most likely locations from which to view the Facility occur along Washington SR-14 in the vicinity of Wishram, Washington.

Turbines and transmission lines would be located more than 11 and 12 miles, respectively, from SR-14. Given the viewing distance, it is questionable whether transmission towers would be discernable to the naked eye. Where visible, the Facility would be subordinate to the landscape setting that typically includes significant man-made development such as interstate and rail transportation corridors, extensive wind turbine development, transmission corridors, radio and cellular towers, and urban and rural development in the foreground and middleground.

Given the relative amount of existing encroachment in the foreground and middleground views, that proposed turbines (or portions of turbines) would likely be visible in the background, viewing distances, and limited opportunities to view turbines, the proposed Facility would result in minimal impacts, if any, to the CRGNSA.

R.5.3.2 Lower Deschutes River Canyon

As discussed in Section R.2 Methods, the visibility analysis was first performed on an original turbine layout that featured 167 turbines. The results of that analysis indicated that portions of multiple turbines would be visible and some highly visible along the Deschutes River generally between Macks Canyon and Game Commission Camp. The investigators'

initial assessment of this analysis was that the proposed turbine layout may potentially result in adverse impacts to the Lower Deschutes River Canyon, which includes the Deschutes Federal Wild and Scenic River, Deschutes State Scenic Waterway, and is designated as an Area of High Visual Quality by the BLM. Based on this assessment, the Applicant then removed 80 turbines from the proposed layout including those most likely to be visible from the river. Though the new turbines are larger, they are sited farther from the river and able to generate more megawatts per turbine than the originally proposed turbines.

A second visibility analysis was performed on the revised turbine layout, the results of which are shown in Figure R-1. The second visibility analysis indicates portions of turbines may still be visible from the Deschutes River, but to a much lesser degree than the original turbine layout. Transmission towers would be visible from a few isolated canyon rims near the mouth of the river, but not from the canyon interior or river shorelines. Because some turbines will be visible from the Deschutes River, five simulations have been prepared to illustrate potential future conditions. These simulations are included as Figures R-2 through R-6; the viewpoints these simulations represent are shown on Figure R-1. The simulations use the best available mapping and imagery information, but still are conservative in nature. For example, it is beyond the resolution of the data to accurately reflect the effects riparian vegetation may have in screening some views. While the model results indicate turbines would be visible from Heritage Landing and the Deschutes River State Recreation Area, field investigation verifies that riparian vegetation would substantially screen views of turbines from the campgrounds and developed recreation site associated with these facilities. Further, turbines viewed from these developed recreation sites, if visible, would be viewed at distances generally greater than ten miles.

Viewpoints along the Deschutes River used for the simulations are near Game Commission Camp, Bedsprings, Snake-in-the-Box, Box Elder Canyon, and Cedar Island. Table R-1 indicates the distance from the viewpoint to the turbines.

Table R-1. Approximate Distance from Viewpoints to Turbines

Viewpoint	Direction and Distance from Viewpoint to Turbine (miles)
1 – Near Game Commission Camp	4 miles (SE)
2 – Bedsprings	2 miles (S)
3 – Snake-in-the-Box	2.25 miles (W)
4 – Box Elder Canyon	2.5 miles (NW)
5 – Cedar Island	2 miles(NW)

The simulations confirm that portions of turbines will be intermittently visible from various locations along the Deschutes River. Visible portions of turbines may include turbine blades, nacelles, and in some cases, portions of the tower. It is possible that several turbines visible from the Deschutes River will require FAA lighting, thus increasing impacts to the night sky. Generally, views of turbines would be limited to views of blades at distances of two or more

miles. While turbines will be visible from the river, they would not dominate views and would generally be subordinate to the surrounding landscape. Therefore, turbines would not result in significant adverse impacts to the Deschutes River Canyon.

R.5.3.3 White River Canyon

Computer modeling results and field investigation indicate that the proposed Facility would not be visible from White River Falls State Park. Portions of turbines may be visible at distances greater than ten miles from the higher canyon walls of the White River, but access to these locations, and thus the opportunity to view turbines or portions of turbines is extremely limited. Portions of turbines may be intermittently visible at distances greater than 7.5 miles to the north from Hwy 216. White River is south of Hwy 216, so turbines would not interfere with views of the canyon from Hwy 216. Transmission towers would not be visible from the canyon rim or Hwy 216.

Given the viewing distances, limited opportunities to view turbines, and that proposed turbines would only be intermittently visible in the background, the proposed Facility would not impact the White River Canyon.

R.5.3.4 John Day River Canyon

Computer modeling results indicate that the proposed Facility would not be visible from the John Day River and only potentially visible from extremely small portions of the higher canyon walls at distances of over 18 miles. Therefore, the proposed Facility would not impact the John Day River Canyon.

R.5.3.5 Mt. Hood National Forest

Though computer modeling results suggest the proposed Facility would be visible from Mt. Hood National Forest, these results are likely false because views toward the Facility would be generally screened by forest vegetation. The scenic resources in the Forest and in the analysis area include forest stands with a retention or preservation VQO. The purpose of these VQOs is to limit logging activity and other anthropocentric development within these units and thus maintain the units' scenic quality. Access to these areas is also rather limited and viewing distances to the proposed Facility are greater than 15 miles. Given these considerations, the proposed Facility would not impact the Mt. Hood National Forest.

R.5.3.6 Oregon National Historic Trail High-Potential Sites

Computer modeling and field investigations indicate that the proposed Facility would not be visible from the identified High-Potential Sites (Deschutes River Crossing, The Dalles Complex, Tygh Valley, and Biggs Junction). Therefore, the proposed Facility would not impact these resources.

R.5.3.7 Journey Through Time Scenic Byway

Computer modeling results indicate portions of turbines would be visible in the background along portions of the Byway, generally between the towns of Wasco and Grass Valley. Transmission towers would not be visible. The Facility would be compatible with the

Journey Through Time Scenic Byway's stated goals (Wetter, 1996). Any subject turbines that would be visible from the Byway would be visible in the background, and would be subordinate to the surrounding landscape that includes extensive turbine development in the foreground and middleground views. Therefore, the proposed Facility would not impact the Journey Through Time Scenic Byway.

R.5.3.8 Wasco County Resources

The computer modeling results indicate that the Facility would not be visible from Pine Hollow Lake and would therefore not impact the resource. Portions of turbines and transmission towers would be intermittently visible from the scenic highway segments at distances of at least 7.6 miles and 1.8 miles, respectively. Given the viewing distances, the presence of existing transmission facilities in the vicinity, and the fact that the turbines and towers would be subordinate to the surrounding landscape, the Facility would have minimal impacts, if any, to the scenic highway segments in the analysis area.

R.5.3.9 Sherman County Resources

The proposed Facility is located outside of Sherman County and will not impact trees in Sherman County. Therefore, the proposed Facility will not impact Sherman County resources.

R.6 OPPORTUNITY FOR MITIGATION

OAR 345-021-0010(1)(r)(D) *The measures the applicant proposes to avoid, reduce, or otherwise mitigate any significant adverse impacts.*

Response: Although no significant adverse impacts to scenic and aesthetic resources have been identified, the Applicant will incorporate best management practices to minimize the proposed Facility's visual effects. The following measures will be incorporated into Facility design to ensure an attractive appearance and good integration into its landscape setting:

- Implementation of active dust suppression measures during the construction period to minimize the creation of dust clouds;
- Use of wind turbine towers, nacelles, and rotors that are locally uniform and that conform to high standards of industrial design to present a trim, uncluttered, aesthetic appearance;
- Use of low-reflectivity, neutral gray, white, or off-white finishes for the towers, nacelles, and rotors to minimize contrast with the sky backdrop, to minimize the reflections that can call attention to structures in the landscape, and to minimize FAA lighting requirements;
- Use of neutral gray, white, off-white, or earth-tone finishes for the small cabinets containing pad-mounted equipment that might be located at the base of each turbine, to help the cabinets blend into the surrounding ground plane;

- Restriction of exterior lighting on the turbines to the aviation warning lights required by FAA, which will be kept to the minimum required number and intensity to meet FAA standards;

- Placement of as much of the Facility's electrical collection system underground as practicable, minimizing the system's visual impacts;

- Use of a low-reflectivity finish for the exterior of the O&M building to maximize its visual integration into the surrounding landscape;

- Restriction of outdoor night lighting at the O&M building and the substation to the minimum required for safety and security; sensors and switches will be used to keep lighting turned off when not required, and all lights will be hooded and directed to minimize backscatter and offsite light trespass;

- Use of a low-reflectivity finish for substation equipment to minimize its visual salience;

- Use of dull gray porcelain insulators to reduce insulator visibility;

- Use of fencing with a dull finish around the substation to reduce the fence's contrast with the surroundings.

R.7 MAP

OAR 345-021-0010(1)(r)(E) *A map or maps showing the location of the scenic resources described under (B).*

Response: Scenic and aesthetic resources located within the analysis area are illustrated in Figure R-1.

R.8 MONITORING

OAR 345-021-0010(1)(r)(F) *The applicant's proposed monitoring program, if any, for impacts to scenic resources.*

Response: The Facility would not result in significant adverse impacts to scenic resources, and therefore, the Applicant does not propose an active monitoring program specific to the monitoring for impacts to scenic resources. For those impacts to vegetation on CRP lands that will be mitigated as described in Exhibit P, monitoring, if any, will occur pursuant to Exhibit P. With respect to the Applicant's efforts to incorporate best management practices such as using neutral color matte finishes for the turbines, no ongoing monitoring is proposed for such practices.

R.9 REFERENCES

R.9.1.1 Website/Document References

Columbia River Gorge Commission and USDA Forest Service, National Scenic Area, September, 1992. Management Plan for the Columbia River Gorge National Scenic Area.

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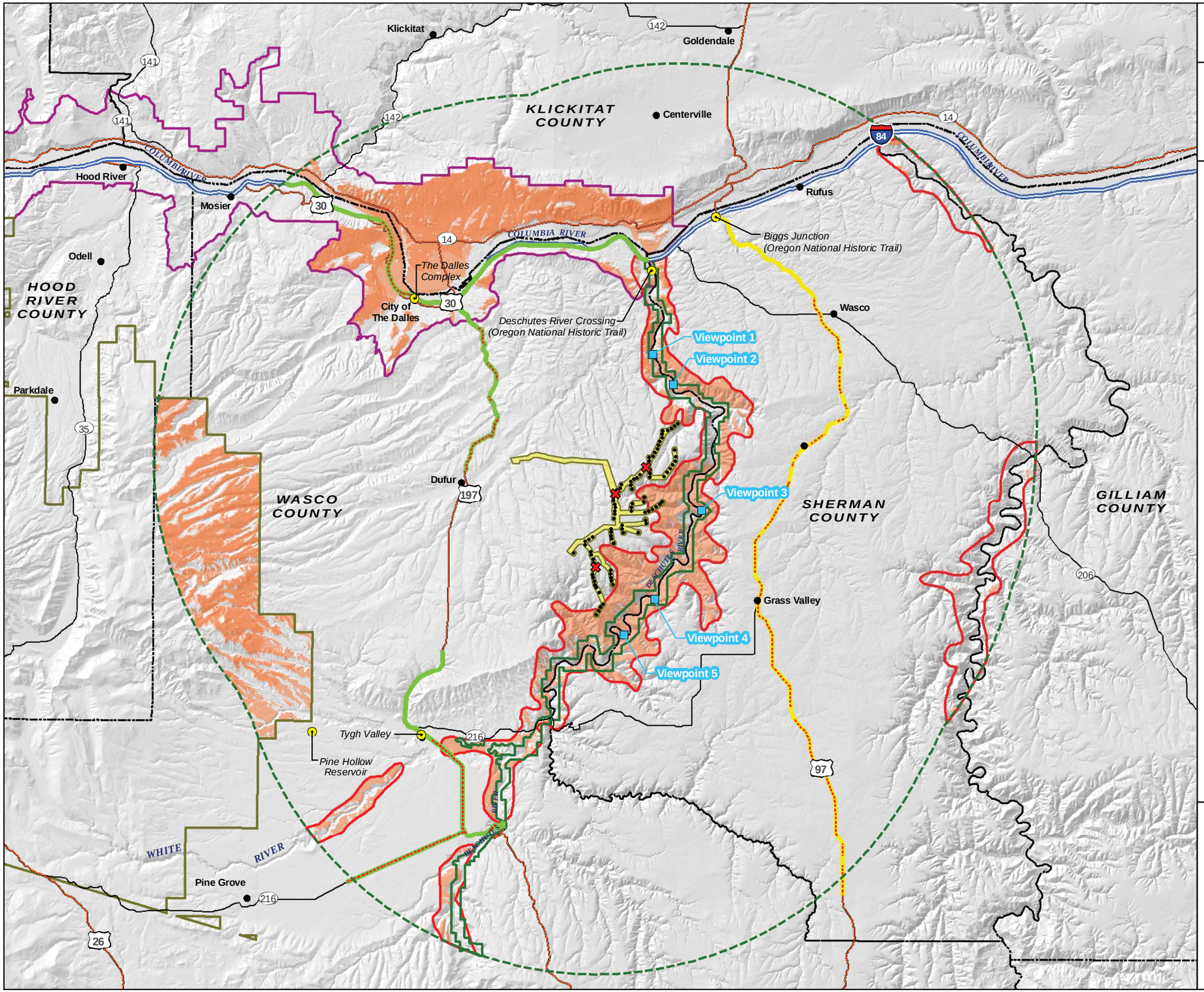
FIGURES



LotusWorks - Summit Ridge I, LLC

Figure R-1
Visibility Analysis for Scenic and Aesthetic Values

Legend

- Site Boundary
- Interstate Highway
- Other Highway
- Major Road
- Proposed Met Tower Locations
- Proposed Turbine Locations
- Simulation Viewpoint Location
- Areas Where Proposed Turbines Likely Visible *(shown only in Scenic and Aesthetic Resource Boundaries)*

Scenic Area

- Scenic and Aesthetic Values Analysis Area (20 miles)
- Scenic Highways with Turbines Likely Visible
- Wasco County Scenic Highways
- Journey Through Time Scenic Byway (US 97)
- Federal Wild and Scenic Rivers
- BLM Area of High Visual Quality
- Mt. Hood National Forest
- Columbia River Gorge National Scenic Area
- Site-Specific Visual Resources

N

0 5 10 15
Miles

Data Sources:

Bureau of Land Management
LotusWorks, 2009
Oregon Geospatial Enterprise Office (GEO)
Two Rivers Resource Management Plan, Record of Decision, June 1986
US Forest Service

LotusWorks Summit Ridge I

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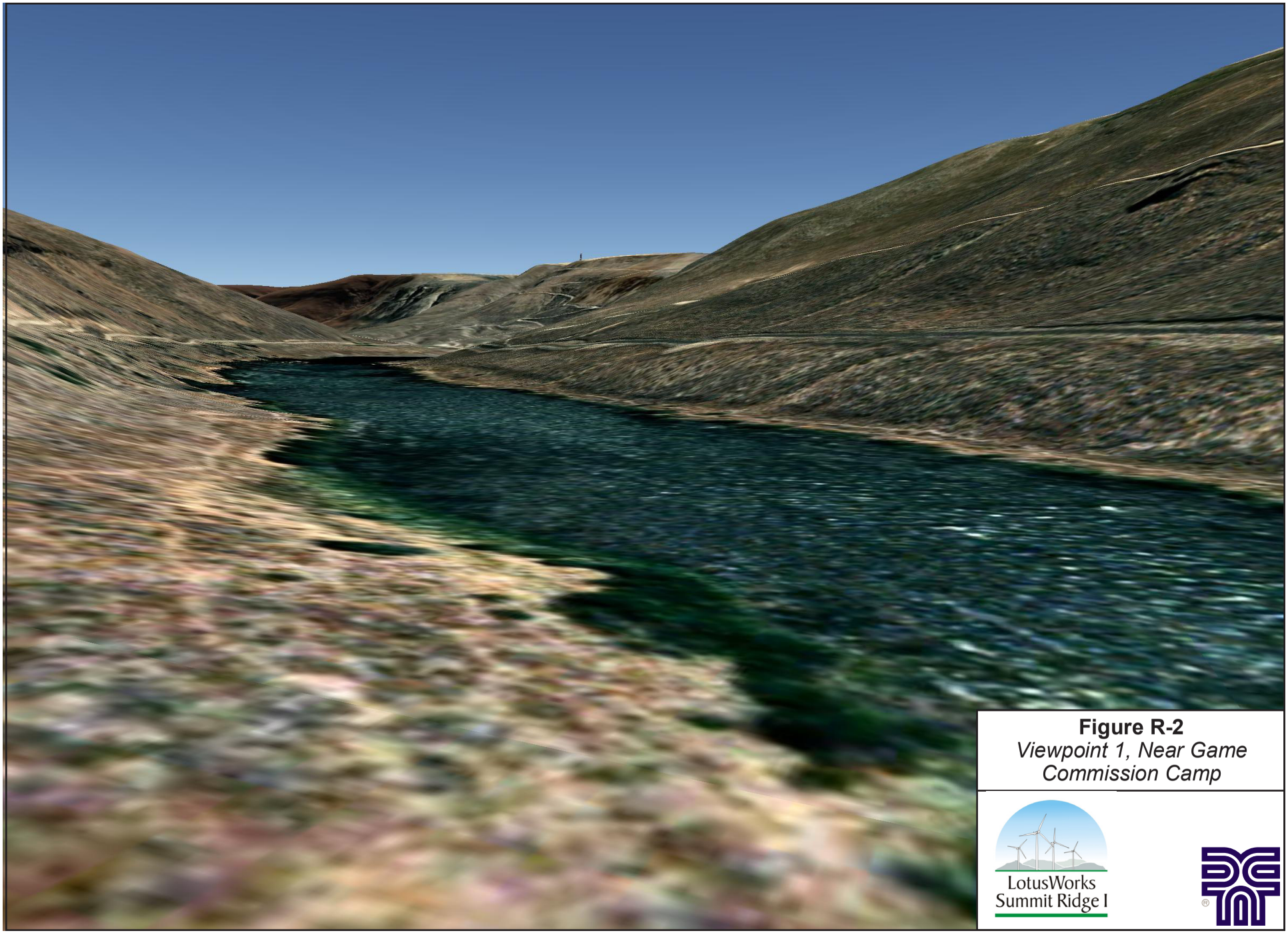

Figure R-2
Viewpoint 1, Near Game Commission Camp

LotusWorks
Summit Ridge I

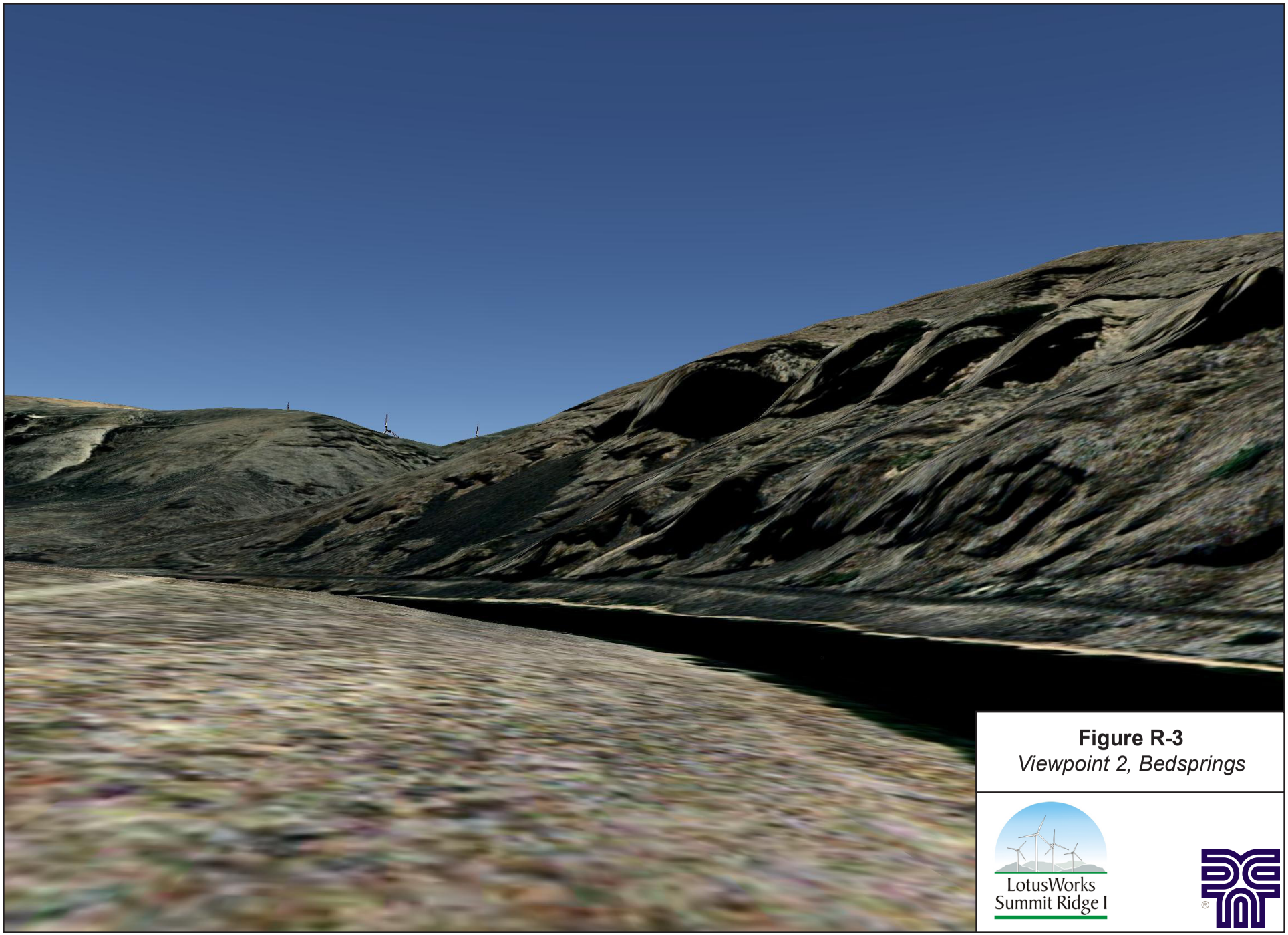

Figure R-3
Viewpoint 2, Bedsprings

LotusWorks
Summit Ridge I

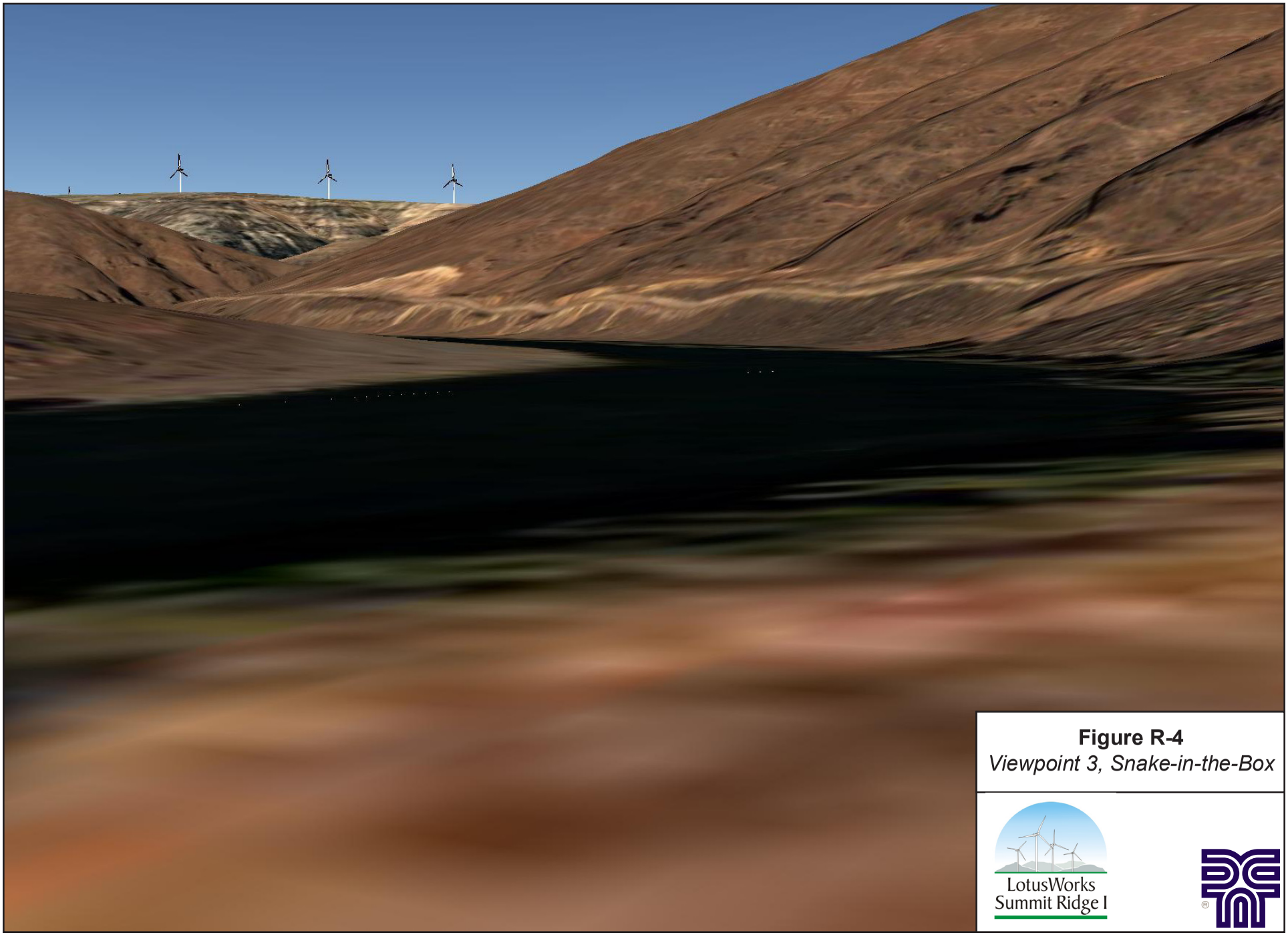

Figure R-4
Viewpoint 3, Snake-in-the-Box

LotusWorks
Summit Ridge I

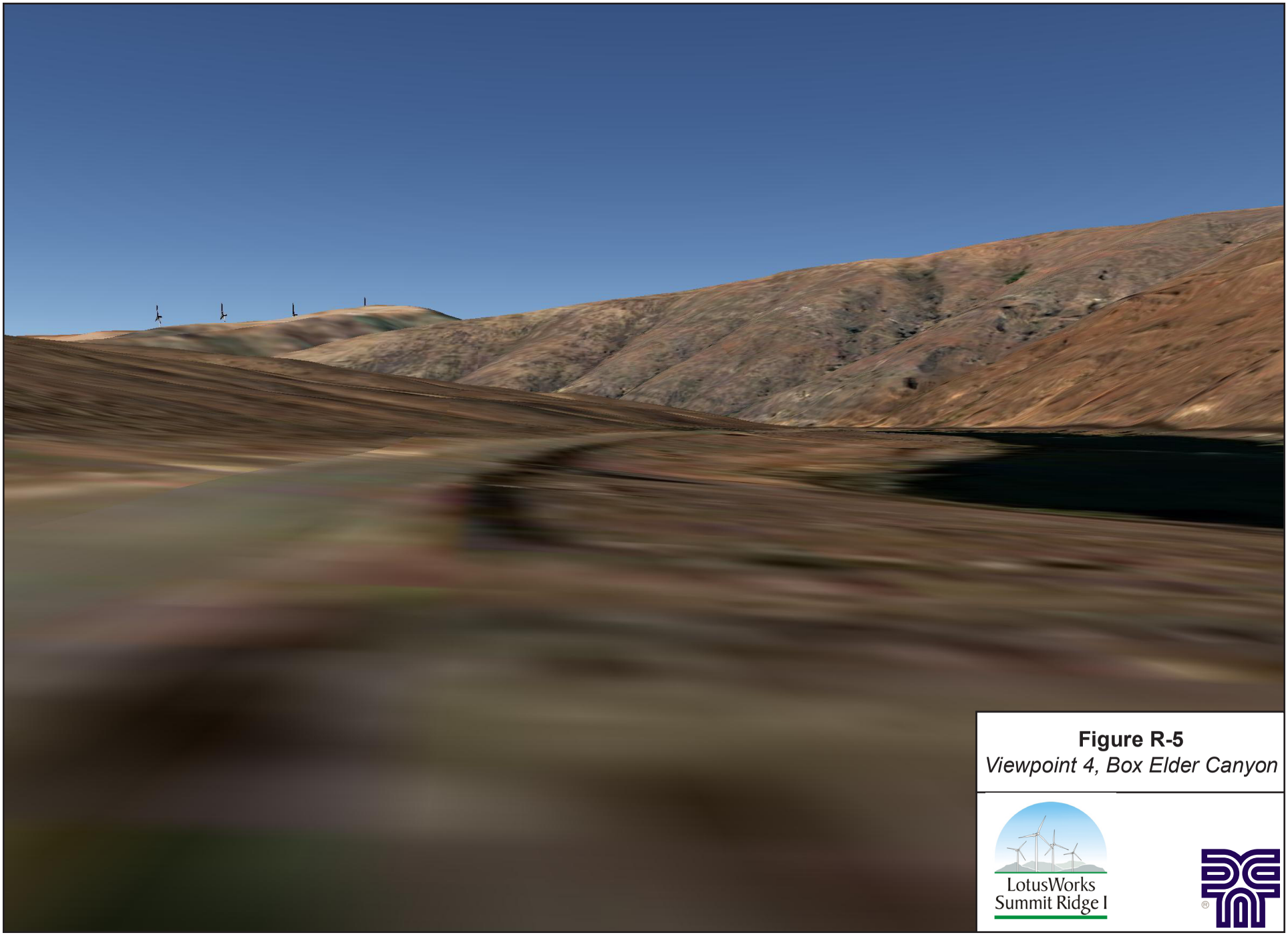

Figure R-5
Viewpoint 4, Box Elder Canyon

LotusWorks
Summit Ridge I

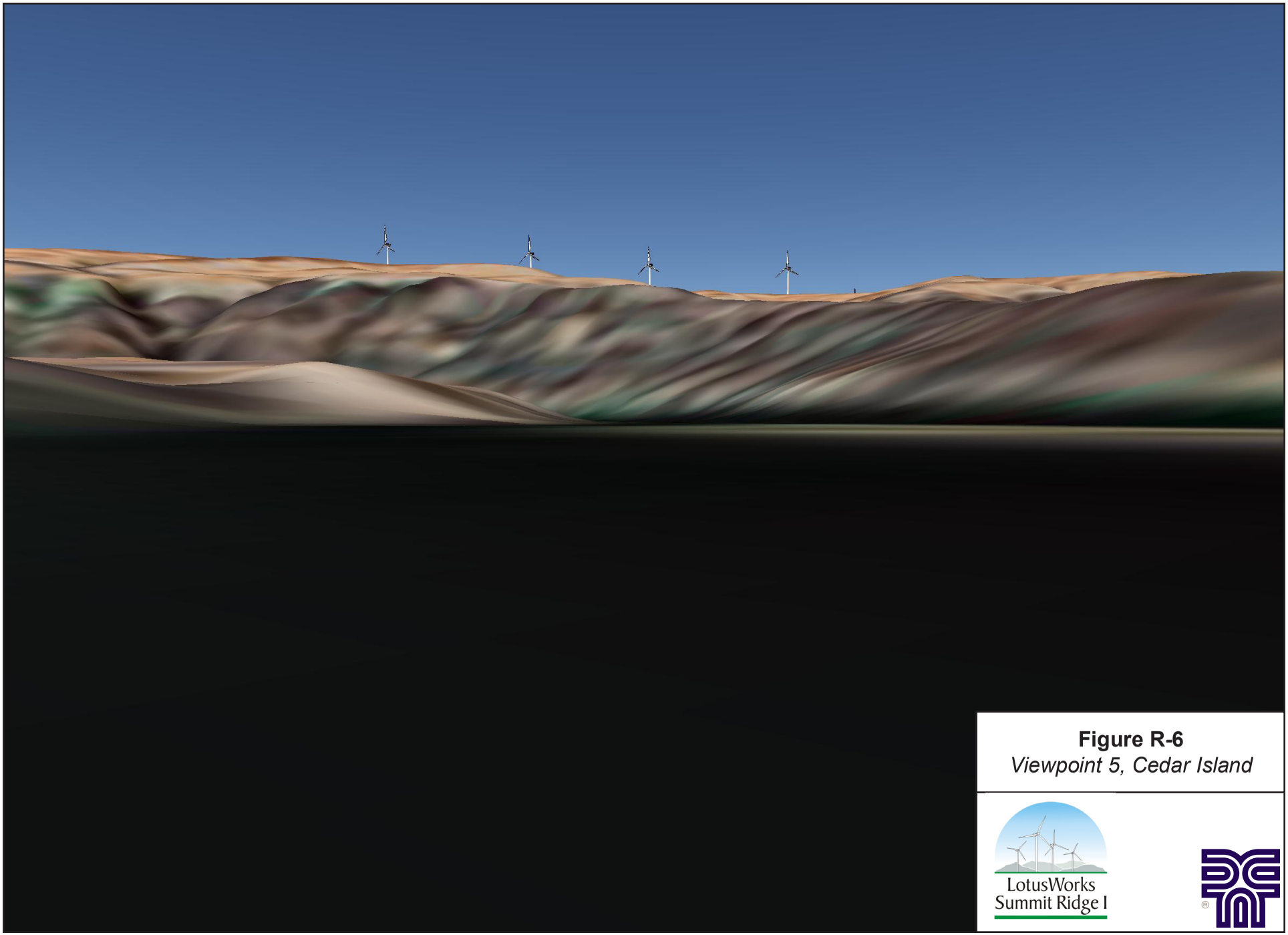

Figure R-6
Viewpoint 5, Cedar Island

LotusWorks
Summit Ridge I

EXHIBIT S

HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

OAR 345-021-0010(1)(s)

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ATTACHMENT

S.1. MONITORING PLAN

S.1 INTRODUCTION

OAR 345-021-0010(1)(s) *Information about historic, cultural, and archaeological resources providing evidence to support a finding by the Council as required by OAR 345-022-0090, including:*

Response: For EFSC to issue a site certification for the proposed wind turbine facility, OAR 345-022-0090 requires that the construction, operation, and retirement of the proposed Facility not result in significant adverse impacts to historic, cultural and archaeological resources.

The Facility area for cultural resources was defined as the construction area of the proposed wind turbine facility, which includes the turbine corridors and connector lines, and the new transmission line. All of these Facility components are situated within Township 1 South, Range 15 East, Sections 11, 12, 13, 14, 15, 19, 20, 22, 23, 24, 26, 27, 28, 29, 32, 33, 34, and 35; Township 2 South, Range 15 East, Sections 2, 3, 4, 5, 7, 8, 9, 10, 17, 18, 19, 20, 29, 30, 31, and 32; and Township 1 South, Range 14 East, Sections 16, 21, 22, 23, and 24, Willamette Meridian.

Analysis included a record search, literature review, and a pedestrian field survey. Representatives of the Confederated Tribes of the Warm Springs Indian Reservation (Warm Springs), Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Siletz, and the Confederated Tribes of the Grande Ronde Community of Oregon were contacted. Tribal representatives of the Warm Springs government expressed an interest in the results of the cultural resources investigations. The tribal representatives will be kept informed of the results of the project cultural resources investigations for the proposed wind turbine facility. Complete results of the analysis can be found in the cultural resource report, which has been sent to the appropriate agencies.

Historic and cultural resources within the analysis area that have been listed, or would likely be eligible for listing, on the National Register of Historic Places; Response: There are no historic or cultural resources listed on the National Register of Historic Places (NRHP) within the analysis area. During the archaeological survey for the Facility, 19 prehistoric archeological sites, 1 historic archaeological site, 30 isolated finds, and 5 historic buildings/building complexes were documented. Fourteen of the prehistoric archaeological sites are significant and possibly eligible for listing on the NRHP. These include: 35SW465, 35SW466, 35SW467, 35SW468, 35SW469, 35SW470, 35SW471, 35SW472, 35SW473, 35SW474, SR43, SR45, SR46, and SR48 (State Trinomial site numbers are not yet available for the sites labeled SR##). One historic building, the Center Ridge Schoolhouse was possibly eligible for NRHP listing.

Sites, 35SW467, 35SW468, 35SW469, 35SW470, 35SW471, SR43, SR45, and SR46 are large lithic scatters with potential for subsurface deposits. Sites, 35SW465, 35SW466, 35SW472, 35SW473, and 35SW474, are rock alignments or cairns. Site SR48 features both a rock alignment and lithic scatter.

S.2 ARCHAEOLOGICAL OBJECTS AND SITES ON PRIVATE LANDS WITHIN THE ANALYSIS AREA

(B) For private lands, archaeological objects, as defined in ORS 358.905(1)(a), and archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area;

Response: There are 20 archaeological sites located on private lands (Table 1). Complete site details can be found in the Archaeological Survey for the Summit Ridge Wind Farm, Wasco County, Oregon (AMEC, 2009) and Addendum 1: Transmission Line Corridors (AMEC, 2009), copies of which have been submitted confidentially as allowed by ORS 192.503(4) or ORS 192.501(11) to Golder Associates, SHPO, and the Oregon Department of Energy on April 28, 2010.

Table 1. Sites Located on Private Lands

Site Number	Site Type
35SW465	Cairn
35SW466	Rock Alignment
35SW467	Lithic Scatter
35SW468	Lithic Scatter
35SW469	Lithic Scatter
35SW470	Lithic Scatter
35SW471	Lithic Scatter
35SW472	Cairn
35SW473	Cairn
35SW474	Cairn
35SW475	Lithic Scatter
35SW476	Lithic Scatter
35SW477	Historic Transmission Line
SR43	Lithic Scatter
SR44	Lithic Scatter
SR45	Lithic Scatter
SR46	Lithic Scatter
SR47	Lithic Scatter
SR48	Lithic Scatter/Rock Alignment
SR52	Lithic Scatter

S.3 ARCHAEOLOGICAL OBJECTS AND SITES ON PUBLIC LANDS WITHIN THE ANALYSIS AREA

(C) For public lands, archaeological sites, as defined in ORS 358.905 (1)(c) , within the analysis area;

Response: There are no known cultural resources sites located on public lands within the construction impact area for the proposed wind turbine facility.

S.4 SIGNIFICANT POTENTIAL IMPACTS OF CONSTRUCTION, OPERATION, AND RETIREMENT OF THE FACILITY ON HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

(D) The significant potential impacts, if any, of the construction, operation, and retirement of the proposed facility on the resources described in paragraphs (A), (B), and (C) and a plan for protection of those resources that includes at least the following:

S.4.1 Methodology

(i) A description of any discovery measures, such as surveys, inventories, and limited subsurface testing work, recommended by the State Historic Preservation Officer and the National Park Service of the U.S. Department of Interior for the purpose of locating, identifying, and assessing the significance of resources listed in paragraphs (A), (B), and (C);

Response: A pedestrian survey of the turbine locations, connector corridor was conducted. A 400-foot wide corridor was surveyed. This corridor covered 200 feet on either side of the proposed turbine locations. An additional survey was completed for a transmission line that will tie in the wind farm with the existing BPA grid. The transmission line corridor was 1000 feet wide, covering 500 feet on either side of the proposed centerline. The survey work was completed in accordance with the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation. The inventory included a pedestrian survey without subsurface investigation. Ground visibility was generally very good, with mineral soil visible in most places. The project area was inspected on foot by archaeologists who walked transects spaced 20 meters apart. Sites were designated by the presence of 10 or more artifacts or by the presence of one or more archaeological features. All sites were recorded on State of Oregon Archaeological Site Forms, sketched, and photographed with a digital camera. The locations of all isolated artifacts and sites were recorded using a handheld global positioning system (UTM, Zone 10, NAD 1983).

S.4.2 Survey and Inventory Results

(ii) The results of surveys, inventories, and subsurface testing work recommended by the state and federal agencies listed in subparagraph (i), together with an explanation by the applicant of any variations from the survey, inventory, or testing recommended;

Response: Nineteen prehistoric archaeological sites, one historic archaeological site, and 30 isolated finds were identified during the survey. All sites were considered to be significant, and the Facility was redesigned for avoidance. Isolate finds are not significant. The report that provides details regarding the results of the cultural resource surveys were provided to the Department of Energy and the Oregon State Historic Preservation office on a confidential basis as allowed by ORS 192.503(4) or ORS 192.501(11).

S.4.3 Measures Designed to Prevent Destruction of Historic, Cultural, and Archaeological Resources

(iii) A list of measures to prevent destruction of the resources identified during surveys, inventories, and subsurface testing referred to in subparagraph (i) or discovered during construction; and

Response: All sites listed above (section S.4) will be avoided by the design of the Facility. A 100-foot avoidance buffer will be placed around the lithic scatter sites, and a 200-foot avoidance buffer around all rock features. The design of the Facility will require slight relocation of wind turbines and modification to the access road layout. All of this will be accomplished within the 400-foot or 1000-foot corridor that was surveyed. The buffer

zones around each site will be flagged/barricaded to prevent disturbance during construction.

S.4.4 Permit Application

(iv) A completed copy of any permit applications submitted pursuant to ORS 358.920. Notwithstanding OAR 345-021-0000(4), the applicant shall include copies of the permit applications as part of the site certificate application. If the same information required by subparagraphs (i) through (iii) above is contained in the permit applications, then the applicant may provide cross-references to the relevant sections of the permit applications in substitution.

Response: All sites will be avoided. Permits are not required.

S.5 PROPOSED MONITORING PROGRAM

(E) The applicant's proposed monitoring program, if any, for impacts to historic, cultural, and archaeological resources during construction, operation and retirement of the proposed facility;

Response: The proposed Facility has been designed to avoid impacts to cultural resources. It is possible that unidentified properties may be exposed during construction, or known sites may be inadvertently affected despite precautions for avoidance, so in order to avoid such impacts a monitoring program is attached.

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1976e Cultural Resource Site Record for 35SH98. On file at the office of the Oregon State Historic Preservation Office.

1976f Cultural Resource Site Record for 35SH99. On file at the office of the Oregon State Historic Preservation Office.

1976g Cultural Resource Site Record for 35SH100. On file at the office of the Oregon State Historic Preservation Office.

1976h Cultural Resource Site Record for 35WS53. On file at the office of the Oregon State Historic Preservation Office.

1976i Cultural Resource Site Record for 35WS77. On file at the office of the Oregon State Historic Preservation Office.

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1976l Cultural Resource Site Record for 35WS48. On file at the office of the Oregon State Historic Preservation Office.

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ATTACHMENT

S-1 MONITORING PLAN

Archaeological Monitoring Plan
For the Summit Ridge Wind Turbine Project
Wasco County, Oregon

Submitted to:
LotusWorks
9611 NE 117th Avenue, Suite 2830
Vancouver, Washington 98662

Submitted by:

Lara C. Rooke, R.P.A., M.A.
AMEC Earth & Environmental, Inc.
11810 North Creek Parkway N
Bothell, Washington 98011

March 24, 2010

AMEC Project No. 9-915-16682-0

1.0 INTRODUCTION

LotusWorks proposes to construct a 200.1 Megawatt (Mw) wind energy facility, called the Summit Ridge Wind Project, in Wasco County, southeast of The Dalles, Oregon. The proposed wind project is located on ridges west of the Deschutes River in Wasco County, Oregon. Turbine corridors and connector lines cover approximately 25 linear miles. The land is currently a mix of dry land farms, CRP grassland, undeveloped grassland, and rim rocks.

2.0 PLAN FOR ARCHAEOLOGICAL MONITORING SERVICES

There are 19 documented archaeological sites and 30 isolated finds within the corridor (Rooke 2009: See Appendix E, Figure 1), and the potential to encounter unknown and significant sites exists in areas with deep soils. All sites located during the archaeological survey were considered significant, and the project was redesigned for avoidance. The archaeological monitor should be present when working near these archaeological sites. In addition, along the ridge tops where deep soils are present, an archaeological monitor should be on site to ensure the protection of inadvertent discoveries.

The recommendations for monitoring are as follows:

- The contractor will ensure that all archaeological sites are identified within “no-work zones”; these zones will be staked with lathing or fencing to ensure protection of the resources;
- All rock alignments or cairn sites will be protected with a 200-foot buffer;
- All other archaeological sites will be protected with a 100-foot buffer; and
- All high probability areas will be monitored; these include any excavations in Sections 11 through 14, 22 through 24, and 26 through 28 of Township 1 South, Range 15 East, of the Willamette Meridian.

The archaeological contractor will review the archaeological report to develop an understanding of the resources located in the project area. This will aid their understanding of the project, facilitating recognition of potential cultural deposits.

The archaeological contractor will monitor all construction excavations within the areas defined as high probability for archaeological materials. An archaeologist will watch closely for any cultural materials, signs of soil oxidation, lithic or bone artifacts, or animal or human bones. The monitor also will be alert to the potential for historic materials that may be associated with early Euro-American settlement activities.

3.0 INADVERTENT FINDS

If possible artifacts or other potential archaeological deposits are observed, the archaeological monitor will direct the operator to temporarily cease excavations while the monitor conducts a close inspection. The archaeological monitor may from time to time request a temporary construction halt in order to document archaeological materials. Such documentation usually takes a few minutes (photographs, written descriptions) but may take longer. The archaeologist

will give an estimate of the amount of time needed to document materials to the equipment operator and/or foreman and will update them of any changes to the estimate.

If potentially significant archaeological deposits are discovered during construction, the monitor will direct the construction team to cordon off the area within 30 feet of the discovery and initiate documentation and evaluation of the materials. If the finds are considered to be significant, work should cease and the project manager should contact Dennis Griffin (State Archaeologist) at the Oregon SHPO to determine how the materials should be treated.

If human remains are encountered, the area should be cordoned off and all work should cease in that area. The construction contractor's project manager should call the local law enforcement and county coroner and notify them of the discovery. If the coroner determines that the burial is Native American and is not a recent crime victim, SHPO and the tribal representatives will confer to determine an appropriate treatment for the remains.

4.0 HEALTH AND SAFETY

The archaeological contractor will comply with the health and safety plan of the excavation contractor. Staff will attend the contractor's morning safety meeting, review the safety plan and will at all times comply with it.

5.0 DOCUMENTATION AND REPORTING

Documentation and reporting will include maintenance of a daily log, digital photography of the excavation areas, and draft and final reports of the conduct and findings of the monitoring effort. Depending on the nature of archaeological observations, artifact forms, feature forms, and archaeological profile drawings may also be required.

Monitoring Log. The archaeological monitor will complete a monitoring log each day to document time in the field, the day's progress and findings, and any difficulties encountered and actions proposed or taken to alleviate them.

Communication with LotusWorks. The principal investigator of this effort will communicate with the LotusWorks project manager, and provide periodic updates on the progress of monitoring work at the project site. This communication will consist of a (minimum) weekly report by email, describing work completed, any geologic or archaeological observations, and an assessment of whether work is adhering to the expected level of effort. Telephone contact will also be made, as needed.

Monitoring Report. Following the close of monitoring activities, the archaeological contractor will prepare a report describing the conduct and findings of this work effort. That report will include a discussion of the project, the methods used in monitoring, and observations about geology, environmental history, and any cultural resources that are observed. Photographs, sketches, or maps may be included, as needed. This report will not exceed 30 pages of text and will include not more than 10 photographs and five line drawings. The report will be submitted to the client for review and comment. The client may review the document and submit one set of collated comments to the archaeological contractor for use in preparing the final report.

6.0 REFERENCES

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EXHIBIT T

RECREATIONAL OPPORTUNITIES

OAR 345-021-0010(1)(t)

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FIGURE *(located after text)*

ATTACHMENT

T-1 Summary of Important Recreational Opportunities

T.1 INTRODUCTION

OAR 345-021-0010(1)(t) *Information about the impacts the proposed facility would have on recreational opportunities in the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0100, including:*

T.2 RECREATIONAL OPPORTUNITIES IN THE ANALYSIS AREA

OAR-345-021-0010(1)(t)(A) *A description of important recreational opportunities in the analysis area considering the criteria in OAR 345-022-0100 including information on the factors listed in OAR 345-022-0100(1).*

Response: The analysis area for impacts to recreational opportunities includes the area within the site boundary and extends five miles beyond the site boundary in Oregon as shown in Figure T-1. In general, recreational activities within the study area include upland bird and big game (i.e., deer) hunting, rafting, boating, fishing, sightseeing, nature and wildlife photography, camping, and bicycling. Horseback riding and hiking also occur on a limited basis. Water-based recreation activities occur on the Deschutes River. Recreational opportunities within the site boundary are generally limited to "access by permission only" upland bird and deer hunting on private property.

OAR 345-022-0100 prescribes criteria used to evaluate a recreational opportunity's relative importance: any special designation or management, degree of demand, outstanding or unusual qualities, availability or rareness, and irreplaceability or irretrievability of the opportunity. The following potentially important recreational opportunity areas have been identified in the analysis area:

- Deschutes River Corridor,
- Lower Deschutes River Wildlife Area,
- Macks Canyon Archeological and Recreation Area,
- Wasco County Scenic Highway segment,
- Lower Deschutes Back Country Byway (Bureau of Land Management road),
- Hunting (upland bird and deer)

These potentially important recreational opportunity areas have been evaluated against criteria prescribed in OAR 345-022-100, a summary of which is included in Attachment T-1. In some cases, multiple plans or management designations govern the same resource. For example, the Lower Deschutes River is designated a federal Wild and Scenic River and a State Scenic Waterway. The Lower Deschutes River Wildlife Area also occurs along the lower river. In such cases, the management boundaries from relevant management plans or special designations are shown in Figure T-1; however, the resource is later discussed as a single entity ("Lower Deschutes Corridor") for purposes of determining and analyzing

potential impacts to the resource. Based on this evaluation summarized in Attachment T-1, four important recreational opportunity areas have been identified within the analysis area.

T.2.1 Deschutes River Corridor

The Deschutes River within the analysis area is designated as a federal Wild and Scenic River (WSR), classified as a recreational river area, and a State Scenic Waterway. The federal WSR boundary varies with an average width of approximately ¼-mile on either side of the river. The boundary exists to "protect or enhance the outstandingly remarkable values that caused the river to be designated" (USDI 1993). The goals of the Lower Deschutes Wildlife Area are to protect, enhance, and restore aquatic and riparian habitats to benefit native fish and wildlife and desired game species; to protect, enhance, and manage upland habitats to benefit native wildlife and desired game species; and to provide and promote fish and wildlife oriented recreational and educational opportunities to the public which are compatible with the first two goals (ODFW 2009).

Public access within the analysis area is generally gained via the Lower Deschutes River Back Country Byway, which follows Bureau Land Management road along the east bank of the River ending at Mack's Canyon. Very limited access on the west side of the river is provided by county roads. Otherwise access is limited to boat, foot, horseback, or mountain bike, via a series of trails on the east side of the River originating at Deschutes River State Recreation Area (which is outside the analysis area). The canyon character is naturally appearing, though numerous developed campgrounds (i.e., a single pit restroom and cleared camp spots) and primitive campsites dot both sides of the river throughout the canyon. An active railroad corridor follows the western bank. Primary recreational uses include boating, rafting, fishing and hiking. Secondary uses include upland bird hunting, sightseeing, and nature/wildlife photography. Use levels are generally moderate to high, varying throughout the year with peaks during rafting and fishing seasons.

T.2.2 Mack's Canyon Archeological and Recreational Site

Mack's Canyon was identified as a Special Management Area for its unusual prehistoric significance in the Two Rivers Resource Management Plan (USDI, 1986). The area contains the evidence of winter dwellings of native peoples. Round pit–house remnants were unearthed and documented in the late 1960s (USDI, 2009).

T.2.3 Lower Deschutes Back Country Byway

This BLM road winds along the east bank of the Deschutes from near the town of Maupin northward, terminating at Mack's Canyon Recreation Area. The narrow gravel road is a popular river-access point for anglers and boaters. Other recreational uses include wildlife viewing, hiking, and upland bird hunting access. There are no developed viewpoints or waysides in the analysis area.

T.2.4 Wasco County Scenic Highway Segment

The Comprehensive Plan for Wasco County identified portions of several highways within the county. These scenic highways corridors are those "adjacent or passing through scenic areas in State or Federal parks, historic sites, or any area of natural beauty that has been

designated a scenic area by the Scenic Area Board" (Wasco County 1983). A portion of one scenic highway occurs within the recreation analysis area: Highway 197 between Fivemile Creek and the town of Dufur. This segment winds along undulating hills of wheat and fallow agricultural fields and passes through the community of Boyd. The primary recreational use includes road touring. There are no developed viewpoints along this portion of the highway.

T.3 POTENTIAL ADVERSE IMPACTS TO THE OPPORTUNITIES IDENTIFIED

OAR 345-021-0010(1)(t)(B) *A description of significant potential adverse impacts to the opportunities identified in (A) including, but not limited to, potential impacts such as*:

(i) Direct or indirect loss of an opportunity as a result of construction or operation.

Response: No turbines would be located within public recreational areas identified as the Deschutes River Recreational Lands, nor would the proposed facility impede the access to any recreational opportunities identified above. Therefore, there would be no direct or indirect loss of recreational opportunities as a result of facility construction, operations, or maintenance.

(ii) Noise resulting from facility construction or operation.

Response: A detailed description of noise resulting from the proposed facility is included in Exhibit X. Noise analysis conducted for the proposed Facility indicates that the proposed facility would be inaudible from all recreational opportunities in the analysis area. Therefore, noise resulting from facility construction or operation would not impact recreational opportunities.

(iii) Increased traffic resulting from facility construction or operation.

Response: A detailed description of traffic resulting from facility construction and operation is included in exhibit U.

The primary route of construction-related traffic is to take I-84 to US 197 to various local roads providing access to the Facility between The Dalles and Dufur. Construction traffic may also approach the site from the south on US 197. From US 197, construction-related traffic will use a series of local Wasco County roads to access private land where the construction staging areas and turbine strings will be located. In areas where there are no existing roads to access wind turbine strings or proposed facilities, new access roads will be constructed as described in Exhibit U.

Primary access to the Deschutes River occurs along the river's east bank, either from the north via the Deschutes River State Recreation area—which is located outside the analysis area—or via the Lower Deschutes Back Country Byway. Thus, temporary impacts due to facility construction are not anticipated to impact access to recreation opportunities. Long-term impacts to recreation opportunities are not anticipated because the O&M facility would employ approximately 26 staff.

The remaining recreational opportunities are located at enough distance from the proposed facility that they would not be affected by increased traffic. Therefore, increased traffic

resulting from facility construction or operation would not adversely impact important recreational opportunities in the analysis area.

(iv) Visual impacts of facility structures or plumes.

Response: A detailed discussion of potential impacts to the Lower Deschutes Corridor, including Mack's Canyon and other resources within the river canyon is included in Exhibit R. Visual simulations confirm that portions of turbines will be intermittently visible from various locations along the Deschutes River, including areas along the Deschutes Backcountry Scenic Byway that parallels the river between Maupin and Mack's Canyon. Portions of some turbines may be visible in the vicinity of Mack's Canyon Archeological and Recreational Area. The Mack's Canyon Archeological and Recreational Area itself is not managed for scenic quality as described in the Two Rivers Resources Management Plan, but instead for the remnants of prehistoric dwellings. Visible portions of turbines may include turbine blades, nacelles, and in some cases, portions of the tower. It is possible that several turbines visible from the Deschutes River will require FAA lighting, thus increasing impacts to the night sky. Generally, views of turbines would be limited to views of blades at distances of two or more miles. While turbines will be visible from the river, they would not dominate views and would generally be subordinate to the surrounding landscape. Therefore, turbines would not result in significant adverse impacts to the Deschutes River Canyon.

The computer modeling results presented in Exhibit R indicate that turbines would be intermittently visible from the Wasco County Scenic Highway within the analysis area at distances of at least eight miles. Given the viewing distances and the fact that the turbines would be subordinate to the surrounding landscape, the proposed Facility would have minimal impacts, if any, to the scenic highway in the analysis area.

In conclusion, visual impacts from the design, construction, and operation of the proposed Facility would not significantly impact important recreational facilities and opportunities identified in the analysis area.

T.4 MITIGATION MEASURES

OAR 345-021-0010(1)(t)(C) *A description of any measures the applicant proposes to avoid, reduce, or otherwise mitigate the adverse impacts identified in (B).*

Response: Because the proposed Facility would not result in significant adverse impacts to important recreational opportunities, no mitigation is proposed.

T.5 MAP OF ANALYSIS AREA

OAR 345-021-0010(1)(t)(D) *A map of the analysis area showing the locations of important recreational opportunities identified in (A).*

Response: Figure T-1 shows the analysis area for recreational opportunities and the location of important recreational opportunity areas identified pursuant to OAR 345-021-0010(t)(A).

T.6 MONITORING PROGRAM

OAR 345-021-0010(1)(t)(E) *The applicant's proposed monitoring program, if any, for impacts to recreational opportunities.*

Response: Because no significant impacts have been identified and because no mitigation is warranted or proposed, a monitoring plan is not proposed.

T.7 REFERENCES

Columbia River Gorge Commission and USDA Forest Service, September, 1992. National Scenic Area. Management Plan for the Columbia River Gorge National Scenic Area.

ODFW, April, 2009. Final Draft Lower Deschutes Wildlife Area Management Plan.

USDI Bureau of Land Management, June, 1986. Two Rivers Resource Management Plan, Record of Decision.

USDI Bureau of Land Management, February, 1993. Lower Deschutes River Management Plan Record of Decision.

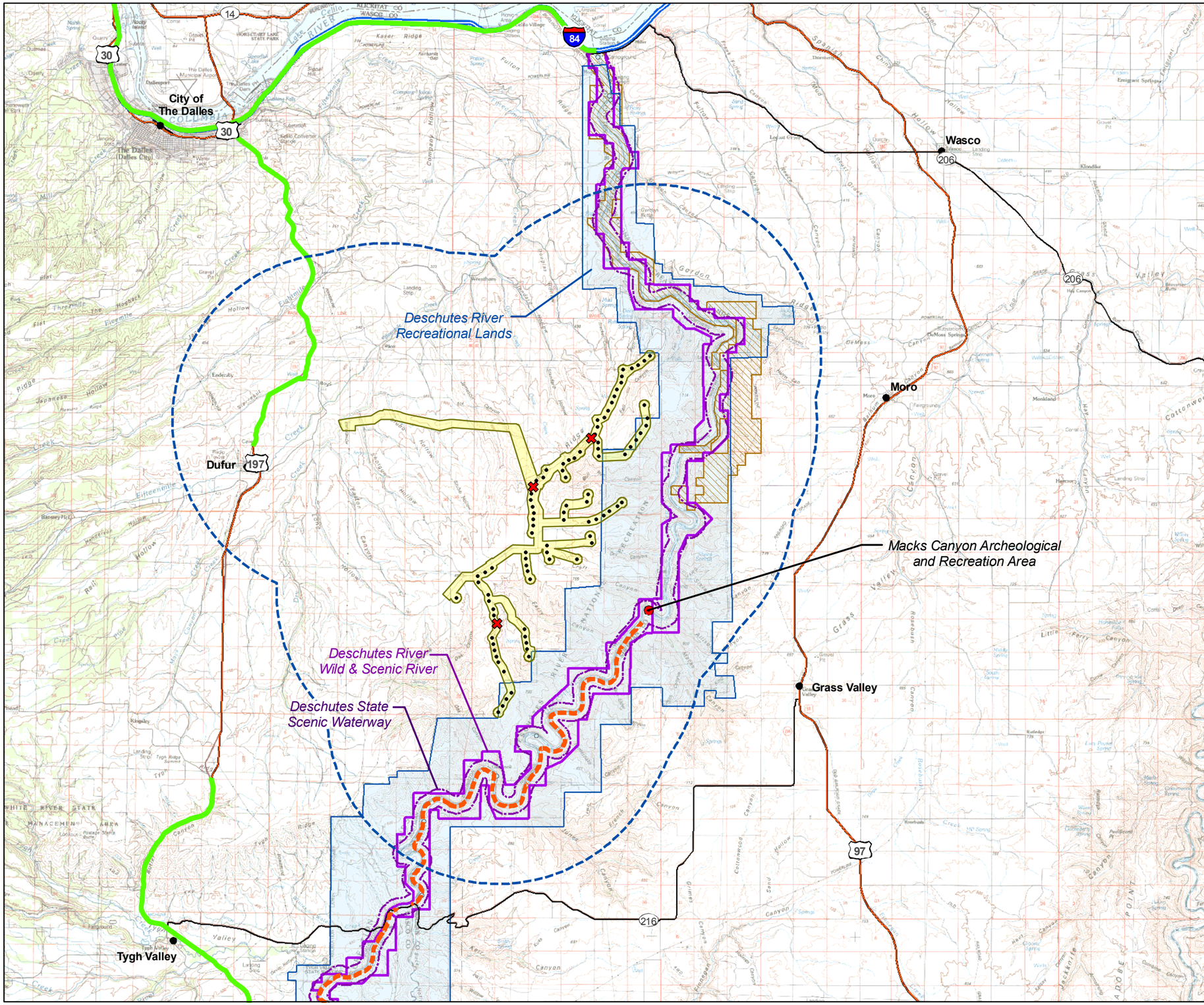
USDI Bureau of Land Management. Cultural Heritage, "Macks Canyon" (Accessed Sept. 11, 2009) http://www.blm.gov/or/resources/heritage/culmackcanyon.php

Wasco County, Oregon, October, 1983. Comprehensive Plan for Wasco County, Oregon.

FIGURE

LotusWorks - Summit Ridge I, LLC

Figure T-1
Important Recreational Opportunities



Legend

- Site Boundary
- Interstate Highway
- Other Highway
- Major Road
- Proposed Met Tower Locations
- Proposed Turbine Locations

Recreational Areas

- Recreational Areas Analysis Area (5 Mi)
- Lower Deschutes Back Country Byway
- Wasco County Scenic Highways
- Deschutes River, Wild & Scenic River
- Deschutes State Scenic Waterway
- Lower Deschutes Wildlife Area
- Deschutes River Recreational Lands
- Recreation Sites

N

0 3 6 9
Miles

Data Sources:

Bureau of Land Management

LotusWorks, 2009

SGS 30x60 Ortho Quadrangles: (Oregon) Condon, Goldendale, Hood River, and Mt. Hood

LotusWorks Summit Ridge I

File: P:\L\LOTW00000001\0600INFO\GS\arcmap\REVISED_NOV2009\Fig_T-1_Recreation_REV_032410.mxd
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ATTACHMENT T-1

ATTACHMENT T-1
Summary of Important Recreational Opportunities

	Criteria					
Recreational Opportunity/Area	**Special Designation/Mgmt**	**Degree of Demand**	**Outstanding / Unusual Quality**	**Availability / Rareness**	**Irreplaceability / Irretrievability**	**Important?**
Deschutes River Corridor including Lower Deschutes River Wildlife Area	Federal Wild and Scenic River (Recreational) State Scenic Waterway State Wildlife Area State Recreation Area *Lower Deschutes River Management Plan* *Two Rivers Resource Management Plan* *Lower Deschutes Wildlife Area Plan*	High	Outstanding scenic, recreation, fish, wildlife, geological, paleontological, and archaeological; significant ecological, botanical[1]	Uncommon	Irreplaceable	Yes
Macks Canyon Archeological and Recreational Area	*Two Rivers Resource Management Plan: Special Management Area*	Moderate	Outstanding prehistoric archeological remains of winter house-pit village of native peoples	Uncommon	Irreplaceable	Yes
Lower Deschutes Back Country Byway	BLM Back Country Byway	Moderate	The road follows the bank of the Deschutes River, providing scenic, recreational and wildlife viewing opportunities	Uncommon	Irreplaceable	Yes
Wasco County Scenic Highway	Wasco County Comprehensive Plan	Moderate	Adjacency to scenic areas, historic sites, or or areas of natural beauty[2]	Somewhat uncommon	Replaceable	Yes
Hunting (upland bird and deer)	ODFW hunting regulations	Low to Moderate	Not outstanding	Common	Replaceable / retrievable	No

[1] Record of Decision, Lower Deschutes River Management Plan, 1993; Record of Decision, John Day River Management Plan, Two Rivers, John Day, and Baker Resource Management Plan Amendments, February 2001.
[2] Comprehensive Plan for Wasco County, Oregon. October 1983.

EXHIBIT U

PUBLIC SERVICES

OAR 345-021-0010(1)(u)

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FIGURES *(located after text)*

ATTACHMENTS

U-1 Letter dated July 22, 2010, from City of The Dalles Public Works
U-2 Letter dated July 9, 2009, from Wasco County Sheriff
U-3 Letter dated July 24, 2009, from City of Dufur Fire and Ambulance Service

U.1 INTRODUCTION

OAR 345-021-0010(1)(u) *Information about significant potential adverse impacts of construction and operation of the proposed facility on the ability of public and private providers in the analysis area to provide the services listed in OAR 345-022-0110, providing evidence to support a finding by the Council as required by OAR 345-022-0110. The applicant shall include:*

Response: Under OAR 345-022-0110(1), the Council must find that the construction and operation of the proposed Facility, taking into account mitigation, are not likely to result in significant potential adverse impacts to the ability of the public and private providers in the analysis area described in the project order to provide: sewers and sewage treatment, water, storm water drainage, solid waste management, housing, traffic safety, police and fire protection, health care and schools.

U.2 IMPORTANT ASSUMPTIONS USED TO EVALUATE POTENTIAL IMPACTS

OAR 345-021-0010(1)(u)(A) *The important assumptions the applicant used to evaluate potential impacts*;

Response: In undertaking this analysis, the Applicant made the following estimates:

A. Facility construction is anticipated to take about sixteen months and employ an estimated 250 workers at peak construction periods. Construction workers will include locally hired workers for road and turbine pad construction as local expertise and availability permits; the remaining workers will be from outside the local area. When feasible, preferences will be given to local workers. On average, 80 percent of the construction workers will come from the local area.

B. During the anticipated 30-year useful life of the proposed Facility, Operation and Maintenance (O&M) will employ approximately 26 full-time and part-time employees. Of these, six are expected to be from the local area, and 20 would be in-migrants.

C. The analysis area includes twelve incorporated communities in Oregon and three incorporated communities in Washington with a combined 2008 population of 30,925, or 44.4 percent of the combined population for Gilliam, Hood River, Sherman, Wasco, and Klickitat counties. Unemployment rates in May 2009, as reported by the Oregon Employment Department, range from 9.3 percent in Gilliam County to 11.3 percent in Wasco County; Sherman County has an unemployment rate of 9.8 while Hood River County recorded 10.2 percent unemployment. The Washington State Employment Security Department reported an unemployment rate of 11.4 percent during the same period for Klickitat County. Based on existing unemployment in the analysis area, it is assumed that approximately 40 percent of the full-time and part-time operational employees (8 employees) would be hired from within the analysis area, and 60 percent (12 employees) would be hired from outside the area (in-migrant).

D. Existing capacities of public services were used to estimate the current level of service for the communities within the analysis area.

E. The Applicant will lease land for the Facility from local landowners. Land lease payments will be made quarterly.

U.3 PUBLIC AND PRIVATE PROVIDERS IN THE ANALYSIS AREA

OAR 345-021-0010(1)(u)(B) *Identification of the public and private providers in the analysis area that would likely be affected*;

Response: Responses are provided in Sections U.3.1 and U.3.2 below.

U.3.1 Population within Analysis Area

While the Facility itself is entirely within Wasco County, the analysis area includes portions of Gilliam, Hood River, Sherman, Wasco, and Klickitat (WA) counties and incorporated communities with a 30-mile radius of the project site. Incorporated communities within the 30-mile analysis area are: Arlington, Condon, Dufur, Grass Valley, Hood River, Maupin, Moro, Mosier, Rufus, Shaniko, The Dalles, and Wasco in Oregon, and Bingen, Goldendale, and White Salmon in Washington. The 2008 population for all of these communities is 30,925, which accounts for approximately 44 percent of the entire population for Gilliam, Hood River, Sherman, Wasco, and Klickitat counties. The largest community in the analysis area is The Dalles, with a 2008 population of 13,170 people, located northwest of the proposed Facility in Wasco County.

Table U-1. Population of Incorporated Communities within the Analysis Area

	Population			Percent Change	
	2008	**2000**	**1990**	**2000-2008**	**1990-2008**
Gilliam County	**1,885**	**1,915**	**1,717**	**-1.6%**	**9.8%**
Arlington	610	524	425	**16.4%**	43.5%
Condon	780	759	635	**2.8%**	22.8%
Hood River County	**21,625**	**20,411**	**16,903**	**5.9%**	**27.9%**
Hood River	6,850	5,831	4,632	**17.5%**	47.9%
Sherman County	**1,845**	**1,934**	**1,918**	**-4.6%**	**-3.8%**
Grass Valley	170	171	160	**-0.6%**	6.3%
Moro	385	337	292	**14.2%**	31.8%
Rufus	275	268	295	**2.6%**	-6.8%
Wasco	420	381	374	**10.2%**	12.3%
Wasco County	**24,170**	**23,791**	**21,683**	**1.6%**	**11.5%**
Dufur	655	588	527	**11.4%**	24.3%
Maupin	490	411	456	**19.2%**	7.5%
Mosier	470	410	244	**14.6%**	92.6%
Shaniko	40	26	26	**53.8%**	53.8%
The Dalles	13,170	12,156	11,021	**8.3%**	19.5%
Klickitat County	**20,100**	**19,161**	**16,616**	**4.9%**	**21.0%**
Bingen	680	672	645	**1.2%**	5.4%
Goldendale	3,725	3,760	3,324	**-0.9%**	12.1%
While Salmon	2,205	2,193	1,861	**0.5%**	18.5%
Total City Population	*30,925*	*28,487*	*24,917*		
Total County Populaiton	*69,625*	*67,212*	*58,837*		
Percent of Five Counties	*44.4%*	*42.4%*	*42.3%*		

Between 1990 and 2008, communities in the analysis area added population at varying rates, with the highest percent change occurring in Mosier, which has nearly doubled its population from 244 to 470 residents. Upon closer observation, however, most of that growth occurred between 1990 and 2000. Other growing communities include Arlington, Condon, Dufur, Hood River, Maupin, Moro, Shaniko, The Dalles, and Wasco, which grew from between approximately 8 percent and 54 percent between 1990 and 2008.

Since 1990, The Dalles and Hood River have added 2,149 and 2,218 people, respectively. Other communities have also added residents, as described above, but not to the degree of the two largest communities within the analysis area. The two eastern counties, Sherman County and Gilliam County, have both lost population since 2000, with Sherman County recording losses since 1990. Klickitat County and Hood River County have both experienced the strongest growth of any of the counties in the analysis area, increasing in population by 21.0 percent and 27.9 percent, respectively, since 1990.

It is likely that full-time, operational in-migrant employees would relocate to one of the above communities within the 30-mile radius of the proposed Facility. In-migrants could also potentially relocate to Washington because there is a bridge over the Columbia River near US 97 that would provide a direct connection to the Oregon portion of the Facility site. There are also small unincorporated communities (where localized census data are not available) within the analysis area boundary. It is possible that workers moving to the area may choose to relocate to one of these communities or choose to live in a rural area outside of a town or city where the residences would likely have private wells and septic systems.

U.3.2 Public and Private Providers

Table U-2 identifies the public service and utility providers for the affected communities in the analysis area that provide the essential governmental services listed in OAR 345-022-0110(1). The following is a description of the current public service providers by community in the analysis area.

Table U-2. Public Service Providers in the Analysis Area

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Sewers and Sewage Treatment	Condon: City of Condon. Lagoon treatment system with 0.13 mgd capacity. Treatment system built in 1997.	In the process of upgrading wastewater collection system. Have completed portions of the new system. Improvements are ongoing as funds are available.
	Arlington: City of Arlington. Activated sludge plant with a capacity of 85,000 gallons per day. No other information available.	Unknown
	Hood River: City of Hood River. The wastewater treatment plant capacity of 3 million gallons per day. Current average daily summertime flows are approx. 1 million gallons.	The sewer system has been expanded in response to rapid urban development. Wintertime flows may increase significantly due to inflow and infiltration
	Bingen (WA): City of Bingen. Activated sludge oxidation ditch with 0.8 mgd capacity. Infiltration and inflow occurs in winter.	No need to expand within next 20 years.
	Goldendale (WA): City of Goldendale. Biolac Treatment System. Treats approximately 1.1 mgd. Plant was upgraded in 2003. Drains year-round in the Little Klickitat River.	Changes in Environmental Protection Agency policies required changing the previous treatment system of holding ponds to the new Biolac system, allowing for year around discharge into the Little Klickitat River.
	White Salmon (WA): City of Bingen. Activated sludge oxidation ditch with 0.8 mgd capacity. Infiltration and inflow occurs in winter.	See City of Bingen above.
	Grass Valley: City of Grass Valley. No other information available.	Unknown
	Moro: City of Moro. Lagoon treatment system with 0.05 mgd capacity. Stores effluent during winter months and then disperses on city owned land or evaporates in lagoons.	A fourth lagoon will be added to increase winter storage needs and comply with DEQ requirements. The entire wastewater collection system will be replaced as funds are available.
	Rufus: City of Rufus. Lagoon treatment system with 0.40 mgd capacity. Effluent drains to an underground drip system.	Treatment plant recently upgraded and in compliance with DEQ. City has switched from using drainage ditches to sprinklers for effluent removal.
	Wasco: City of Wasco. Lagoon treatment capacity 0.04 mgd/average use 0.024 mgd. Stores effluent during winter months and then applies it to privately owned pasture land.	The City recenty completed construction on a new storage pond. The new capacity will meet the city's needs and compliance issues with DEQ.
	Dufur: City of Dufur. 13 acre-foot pond irrigation pump. Treatment capacity unknown. Releases effluent during winter and spring to 15-Mile Creek. Irrigates alfalfa during the summer on city owned land.	Recently installed a third lagoon for storage and built an irrigation system to disperse effluent to city owned land during the summer.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Sewers and Sewage Treatment (Cont.)	The Dalles: City of The Dalles. Treatment capacity 4.14 mgd/average use: 2 to 2.5 mgd. Drains to Columbia River below boat basin. Serves entire city UGB.	Master Plan completed recently. The $7 million upgrade to the treatment facility was completed recently.
	Shaniko: On site individual septic tanks and drain fields.	Lagoon at hotel no longer operates while hotel is closed
	Maupin: City of Maupin. Treatment capacity of 1.00 mgd. Drains to Deschutes River.	Preliminary improvement plans underway.
	Mosier: Treatment capacity is 0.085 mgd.	Construction on major updrades to wastewater system are ongoing. Aging system is undersized. Chlorination issues.
Water	Condon: City of Condon. Wells within city limits, providing 0.50 mgd. Water stored in reserviors.	In the process of upgrading water pipe lines. Have completed portions of the new system and upgrade on average approximately 1,000 feet per year. Improvements are ongoing as funds are available.
	Arlington: City of Arlington. Two wells within city limits have a capacity of 0.70 mgd and provides storage for 1.3 million gallons of water and 1,000 gallons per minute.	System upgraded four years ago.
	Hood River: City of Hood River. Groundwater source comes from three springs located on the slopes of Mt. Hood: Cold Spring, Stone Spring I, and Stone Spring II. It is estimated that the springs can continously provide at least 10 million gallons of water per day. Currently, it provides 5 million gallons per day carried from the source to the City's primary 5 million gallon reservoir through 14-inch steel transmission main.	The City has prepared construction plans and will build a new 24-inch transmission main in five one-year phases. Construction of Phase One is currently scheduled for spring and summer of 2009.
	Bingen (WA): City of Bingen. Operates from 3 separate wells with a combined capacity of 400 gallons/minute.	No issues identified
	Goldendale (WA): City of Goldendale. Springwater source 13 miles from city. Five spring collection areas and four well sources. One well structure within city limits that is not a potable source. Water stored in two reservoirs with 2.6 million gallon capacity	No issues identified
	White Salmon (WA): City of White Salmon. Operates 2 large wells.	City is constructing a new water filtration plant that will treat Buck Creek water
	Grass Valley: No information available.	Unknown
	Moro: City of Moro. Three wells provide 100 percent of the city's water. Capacity unknown. Third well is capable of 450 gallons per minute. A 65 foot reservoir holds 350,000 gallons of water.	Prior to drilling the third well, water rationing was required but with the addition of the third well drilled recently, the city has adequate capacity without rationing.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Water (Cont.)	Rufus: City of Rufus. Operates three wells within the city limits, providing 0.40 mgd. Stores water in one 300,000 gallon reservior.	None. The system was completely reconstructed recently.
	Wasco: City of Wasco. Two wells provide 100 percent of the city's water. Storage capacity is approximately 0.30 mgd. Well capacity unknown.	The City rebuilt its water system in 2002 and recently updated the #2 well to meet current construction standards. No issues to date.
	Dufur: City of Dufur. Two wells provide 100 percent of the city's water. Capacity is approximately 0.30 mgd	Closest facilty to the proposed Facilty site. Future plans are to build a line from the well directly to the reservoirs rather than the existing on-demand system.
	Maupin: City of Maupin. Source is artesian springs. Capacity is 1.30 mgd.	Major reservoir renovation and bypass piping project underway.
	Mosier: City of Mosier. Water stored in three reservoirs. Source is from two groundwater wells. Capacity is 158 mgd. Treatment consists of disifectant.	Engineer study completed in 2006. Mosier aquifer is declining steadily and USGS is currently investigating the cause. Mosier watershed is closed to new well drilling.
	The Dalles: City of The Dalles. 23,000 acre surface watershed provides 80 to 85 percent of municipal water. Three city wells provide remaining needs during peak times. Live flow permit for 2 cfs and a live flow surface water right at the point of diversion. Earthen dam stores 950 acre feet of water with constrolled realease.	A new Water Master Plan was completed in June 2005 that includes a 20 year capital improvement plan.
	Shaniko: City of Shaniko. City obtains its water from two springs to 120,000 gallon reservoir, then its clorinated and pumped to city.	None
Storm Water	Condon: City of Condon. The City has a limited stormwater system.	None
	Arlington. The City of Arlington. The City has storm drains that drain to China Creek. No other information available.	Some streets are curbed and guttered.
	Hood River: City of Hood River. The system consists primarily of catch basins, manholes and underground piping except in some of the older sections of town and in areas recently annexed into the City where drainage ditches still exist.	None
	Bingen (WA): City of Bingen. Operates a limited system.	None
	Goldendale (WA): The City of Goldendale. The City has a stormwater distribution system that supplies water to most of the community and it receives natural treatment.	Unknown
	White Salmon (WA): Unknown	Unknown
	Grass Valley: Unknown	Unknown

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Storm Water (Cont.)	Moro: City of Moro. Conveyance only, no treatment. The City has storm drains that discharge directly into Dry Creek. Provides coverage for entire city.	Some drainage off roofs to sewer ponds.
	Rufus: No system.	N/A
	Wasco: No system.	N/A
	Dufur: Stormwater system goes down Main Street and drains to 15-mile Creek.	N/A
	Maupin: No storm drains.	Improvements on system with treatment ponds planned for 2008.
	Mosier: No storm system or utility.	Isolated storm improvements.
	The Dalles: City of The Dalles provides collection and conveyance. The City also operates 4 out of the 23 oil/water separators.	Completed a Stormwater Master Plan recently.
	Shaniko: No storm drains	N/A
Solid Waste Management	Condon: Waste Connections Inc., trucked to a transfer station.	See below
	Arlington: City of Arlington. The City provides collection service for the entire city. Trucked to a waste management regional landfill south of town.	None
	Hood River: Hood River Garbage Service	None
	Bingen (WA): Allied Waste, Bingen Garbage Service	Rabanco Landfill, east Klickitat County, handles waste from Seattle
	Goldendale (WA): Allied Waste.	The Facility is outside of the service area
	White Salmon (WA): City of White Salmon	None
	Grass Valley: Sunrise Disposal and Recycling	See below
	Moro: The Dalles Disposal Company	See below
	Rufus: The Dalles Disposal Company	See below
	Wasco: The Dalles Disposal Company	See below
	Dufur: Mel's Sanitary Service	See below
	Maupin: Mel's Sanitary Service.	See below
	Mosier: The Dalles Disposal Company	See below
	The Dalles: The Dalles Disposal Company	See below
	Shaniko: Madras Sanitary	None
	Wasco County Landfill	Owned by Waste Management, the landfill is projected to have approximately 50 years left with its current configuration.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Solid Waste Management (Cont.)	Columbia Ridge Recycling and Landfill/ Chemical Waste Management of the Northwest	None. The landfill and recycling portion of the operation serves Oregon, Washington, Idaho, Alaska, Montana, and British Columbia and has approximately 56 years left with the current configuration. The hazardous waste facilties have the same service area, but also accept some materials from other sources nationwide.
	Mel's Sanitary Service: Provides garbage/recycling services to the Summit Ridge project location.	The company currently delivers 1½ -yard containers to the area but have capacity for 6-yard containers. They can also provide up to two 20-yard drop boxes for construction.
	The Dalles Disposal Company: Provides garbage and recycling services to all of Sherman County and portions of Gilliam County.Sherman County facility is located in Moro. Also operates a transfer facility located in The Dalles that is open to the public twice a month. All refuse is transferred to Columbia Ridge Landfill in Arlington and all recycling is sent to Metro Recying in Portland.	No hazardous waste pickup is provided except twice a year at the facility located in The Dalles. Many residents bury paint and pesticides rather than disposing of them appropriately.
Police	Condon: Condon City Police Department. One full-time officer, one reserve staff.	None
	Arlington: Gilliam County Sheriff's Department	None: The Gilliam County Sheriff's Department patrols Gilliam County and provides police service to the City of Arlington. The Sheriff's Department has five full time officers, one office deputy, and one administrative assistant. The station is located in the City of Condon. Staff is adequate to meet the county's needs.
	Hood River: Hood River Police Department. Provides police service within Hood River city limits. Department consists of 15 certified police officers. The Hood River County Sheriff's Office provides service to unincorporated areas.	Facility site is outside of service area.
	Bingen (WA): Bingen-White Salmon Police Department. Interlocal agreement with White Salmon for police protection. Department consist of 6 officers, although they are budgeted for 8. Bingen City Hall serves as base of operation. The department has 9 police vehicles in the fleet.	Facility site is outside of service area. Department is not fully funded to enable full contingent of officers.
	Goldendale (WA): Goldendale Police Department. Provides police service within Goldendale city limits.	Facility site is outside of service area.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Police (Cont.)	White Salmon (WA): Bingen-White Salmon Police Department. Interlocal agreement with White Salmon for police protection. Department consist of 6 officers, although they are budgeted for 8. Bingen City Hall serves as base of operation. The department has 9 police vehicles in the fleet. One station in White Salmon.	See Bingen, above
	Grass Valley: Sherman County Sheriff's Department Moro: Sherman County Sheriff's Department Rufus: Sherman County Sheriff's Department City of Wasco: Sherman County Sheriff's Department	None. The Sherman County Sheriff's Department patrols Sherman County and provides police service for the cities of Grass Valley, Moro, Rufus, and Wasco. The Sheriff's Department has five full time officers and one sheriff. The station is located in Moro. Staff is adequate to meet the county's needs.
	Dufur: Wasco County Sheriff's Department Maupin: Wasco County Sherrif's Department. Mosier: Wasco County Sheriff's Department.	None: The Wasco County Sheriff's Department patrols Wasco County and also provides police service to the City of Dufur. The Sheriff's Department has 17 full time officers, including the sheriff. The station is located in The Dalles. Staff is adequate to meet the county's needs.
	The Dalles: The Dalles Police Department. Provides police service within The Dalles city limits. The Wasco County Sheriff's Department provides service to unincorporated areas.	Facility site is outside of service area.
	Shaniko: Wasco County Sheriff's Department; Oregon State Police	See the Wasco County Sheriff's Department, above
Fire Protection and Emergency Response	Condon: City of Condon Fire Department. Serves the city of Condon and outlying areas. 20 volunteer staff. One station with two fire trucks plus rural fire equipment. South Gilliam Rural Fire Protection District also assists.	None
	Arlington: North Gilliam County Rural Fire Department	Unknown
	Hood River: Hood River Fire Department. One station in Hood River. Career staff of 27. The department has one full time Advanced Life Support ambulance for Hood River County.	Facility site is outside of service area.
	Bingen (WA): Bingen Fire Department. Department operates out of one station with 16 volunteers, 3 engines, 1 tender, 2 brush trucks and 1 rescue vehicle.	Facility site is outside of service area.
	Goldendale (WA). City of Goldendale Volunteer Fire Department.	Facility site is outside of service area.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Fire Protection and Emergency Response (Cont.)	White Salmon (WA): White Salmon Fire Department. Department operates from one station with 27 volunteers, 2 engines, 1 tender, 1 brush truck, and 1 light rescue vehicle.	Facility site is outside of service area.
	Grass Valley: South Sherman Fire Department	Unknown
	Moro: City of Moro Rural Fire Protection District. The district serves Moro and outlying areas with fire and ambulance service. The district also provides ambulance service for the North Sherman Fire Protection District. Facilities include one fire station with 11 volunteers, one fire chief and one assistant fire chief. One station with one engine, one tender, two brush rigs, one rescue vehicle, and a command rig.	Facility site is outside of service area.
	Rufus: City of Rufus. The City has a volunteer fire department with a single station and two volunteers that serves the city and nearby areas.	Facility site is outside of service area.
	Wasco: North Sherman Fire Protection District (NSFPD). Serves North Sherman County and the proposed Golden Hills Wind Farm. 10 volunteers, one fire chief, one assistant fire chief, two lieutenants. One station in Wasco. Two engines, two tenders, one tanker truck, and one jeep.	Facility site is outside of service area. Existing wind projects in Sherman County create new challenges that local fire and emergency services are not adequately equipped to handle. A primary issue is not having enough volunteers available during the day.
	Dufur: City of Dufur Fire and Ambulance. Serves the City and surrounding areas, as needed. 10 to 12 fire volunteers, 15 ambulance volunteers. One station, two fire trucks, one rescue vehicle, and one ambulance.	Dufur Fire and Ambulance would be first responder in case of medical emergency with assistance provided by Mid Columbia Fire and Rescue. The extent of needed resources is unknown.
	Maupin: City of Maupin Fire Department.	Facility site is outside of service area.
	Mosier: Mosier Volunteer Fire Department. Two volunteers. Mid-Columbia Fire and Rescue provides support and responds to emergencies.	Facility site is outside of service area.
	The Dalles: Mid Columbia Fire and Rescue. Serves The Dalles and northern Wasco County. One station in The Dalles. One fire chief, one assistant chief, one fire marshall, one administrative assistant, one finance officer, three captains, three lieutenants and 12 engineers. 36 volunteers. Provides fire and ambulance service.	Positioned to provide assistance, if needed, to the Facility site.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Fire Protection and Emergency Response (Cont.)	Shaniko: Shaniko Fire Department. Shaniko and Antelope are closely located and respond to each other's fire calls. Each community has a small building for its fire equipment. The department has 8-10 volunteers, one 750 gallon engine, and two brush rigs	The Facility site is outside of service area.
	Columbia Rural Fire District	Comprised of a loosely formed group of wheat farmers and landowners, the district includes the project site. Given limited resource, the district would be ill-equipped in case of a major emergency at Facility site.
Health Care (Regional Facilities)	Mid-Columbia Medical Center: Regional Medical Center (The Dalles). Full service facility providing emergency and surgery services.	None. Mid-Columbia Medical Center is a regional full service facility. Emergency services would be able to accommodate emergency situations.
	Providence Hood River Memorial Hospital (Hood River). 25-bed Critical Access Hospital with 469 employees and 67 staff members.	Facility recently underwent a $50 million expansion.
	Klickitat Valley Hospital (Goldendale, WA). 15-bed hospital and a 7-member clinic that serves all of Central and Eastern Klickitat County. Offers inpatient care and some minor surgical procedures.	This is a small facility. Patients would be directed to Mid Columbia Medical Center first.
	Skyline Hospital (White Salmon, WA). Licensed as a 32-bed Acute Care Hospital with over 100 employees	None
Education	Condon: Condon School District #25. One K-8 and one high school. Approximately 151 students.	Enrollment has declined consistently for the last 10 years. No facilities issues, but a loss of revenue from fewer students reduces overall revenue for the school district.
	Arlington: Arlington School District #3. One K-8 and one high school. Approximately 124 students.	Enrollment is steady now but was declining in the past. Loss of students equates to a loss of revenue for the school district. There are no outstanding facility issues, other than reduced revenue for upkeep.

Type of Service	Provider by Jurisdiction	Relevant Issues/Concerns:
Education (Cont.)	Hood River: Hood River County School District. One high school, two middle schools, and five elementary schools. Total enrollment is 3,888 students.	School enrollment forecasts between 2004 and 2015 projected continued increases in enrollment.
	Bingen (WA): White Salmon Valley School District. One high school, one middle school, one elementary school with combined enrollment of approximately 1,250 students.	School enrollment bottomed during the 2007/08 school year, added students in 2008/09. Enrollment appears to have stablized and is projected increase modestly during the next few years.
	Goldendale (WA): Goldendale School District 404	Serves the City of Goldendale and surrounding areas. The district has one high school serving approximately 415 students in grades 9 to 12, one middle school serving approximately 415 students in grades 5 to 8, and one primary school serving approximately 415 students in grades kindergarten to 6. In 2006 total student enrollment was 1,108. All facilties are located in Goldendale.
	White Salmon (WA): White Salmon Valley School District. One high school, one middle school, one elementary school with combined enrollment of approximately 1,250 students.	School enrollment bottomed during the 2007/08 school year, added students in 2008/09. Enrollment appears to have stablized and is projected increase modestly during the next few years.
	Grass Valley: Sherman County School District Moro: Sherman County School District Rufus: Sherman County School District Wasco: Sherman County School District	Sherman County School District serves the entire county. The district has one high school with grades 7 to 12 located in Moro. There are two elementary schools located in Wasco and Grass Valley. There are approximately 270 students although enrollment has decreased in the last several years. The district has adequate capacity and there are no facility needs.
	Dufur: Wasco School District #29: One K-12 school located in Dufur.	School enrollment has grown in the last five years to approximately 280 students. The district recently increased its classroom size and built a new gymnasium. There are no facility or capacity issues.
	The Dalles: North Wasco County School District #21. One high school (three campuses), one middle school, four elementary schools (including the charter school). Various sports facilities throughout district. Total enrollment is 2,826 students. Mosier: N. Wasco County School District #21. Mosier Community School is a K-6 charter school that has 128 students.	Recently merged with Chenowith School District and replaced The Dalles School District #12. Facilities not considered adequate. The high schools have parking and food service issues. No new facilities planned, howerver beginning a facilities master plan. Upgrades to track facilties are completed and are now completing deferred maintenance issues. Projecting 1 to 3 percent growth annually for the next ten years.
	Maupin: South Wasco County School District #1. Shaniko: South Wasco County School District #1.	Approximately 264 students.

U.4 SERVICE PROVIDERS IN COMMUNITIES

OAR 345-021-0010(1)(u)(C) *A description of any likely adverse impact to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0110;*

Response: Responses are provided in Sections U.4.1 through U.4.11 below.

U.4.1 Economic and Demographic Impacts

U.4.1.1 Population

During operations, the Facility will employ 26 full and part-time workers. It is the Applicants intent to hire as many local workers that meet requisite qualifications for the job as possible. The remainder of the operations staff hired non-locally will most likely be relocated to the area.

Limited in-migration for construction-related employment as well as permanent O&M employment is expected to occur as a result of the proposed Facility, having a beneficial impact on businesses in the nearby communities from increased patronage of area motels, restaurants, and other supporting services. Temporary construction-related jobs filled from outside of the analysis area are anticipated to last approximately six months, but during that time workers will likely stay in one of the area motels, eat at local restaurants, and purchase other amenities such as gas and groceries, all having a beneficial impact on the local economy. To the extent practicable, residents from the local communities would fill the six permanent full-time and part-time O&M jobs. In-migrant operational staff and their families would not have a significant impact on local population. Approximately 50 new residents would be added (20 new employees x 2.47 average persons per household) to Wasco County's population, assuming all relocated within the county and not in another county.

U.4.1.2 Economic Activity

During the sixteen month construction period there will be an average of 25 employees on site. During periods of peak activity, the number of employees may increase to around 250. The number of employees that are local depends on how many contractors and skilled laborers are in the local area and their availability to do the work. Based on previous projects, it is expected that, during the average construction period, 87 percent of the employees would be hired locally. The remainder of the employees would be employees of the general contractor and subcontractors that temporarily relocate to the area for construction. During the peak construction period, the employment composition is expected to be 20 percent local hires, and 80 percent outside hires.

An earlier and unrelated wind power facility in Sherman County (Klondike I, 24 megawatts) was shown to not have any adverse impacts to public and private service providers in the area. In contrast, revenue generated for the local economy has been a boon for public services, including schools and other services Sherman County provides for its residents (Ourderkirk and Pedden, 2004). While Gilliam, Hood River, Klickitat and Sherman Counties would not gain revenue from the site operation through tax payments, residents from communities within those counties may be employed during the construction or operation phases of the proposed Facility. Income earned by those individuals as a result of the proposed Facility would contribute to the local economy indirectly through local purchases. In addition, the proposed Facility itself would purchase goods and services from

local and regional businesses, from facility maintenance services to office equipment to business services. Lease payments to local landowners will also benefit the local economy because it is likely that a portion of the lease payments will be spent in nearby communities. All of this would result in a net inflow of dollars into the local economy that would have a beneficial effect beyond that of the new employment.

U.4.1.3 Tax Revenues

As with other wind power facilities in the region, the proposed Facility would be a major new source of revenue to local government. This injection of additional tax revenue and/or in-lieu contributions would contribute to the provision of improved roads, quality education, police, fire, and other municipal needs that would benefit the entire community, particularly because the proposed Facility has shown to have no adverse impacts to existing public facilities, as described below.

No adverse impacts on County tax revenues are expected. Rather, annual property tax revenues to the County will increase as a result of the Facility. In addition, development of the Facility will lead to increased value of other properties because of the increase in wages and overall economic activity in the analysis area.

U.4.2 Sewers and Sewage Treatment

The proposed Facility is not located within or near a municipal wastewater treatment system. The nearest systems serve the cities of Dufur, located approximately eight miles west of the nearest turbine, and Moro located approximately seven miles east of the nearest turbine. The proposed Facility would not adversely affect sewer and sewage treatment service or providers within the analysis area because it would not be connected to any existing system identified in the analysis area.

Jurisdictions within the analysis area provide wastewater collection and treatment (within the city limits). Smaller jurisdictions such as Condon, Moro, Rufus, Wasco, and Dufur utilize lagoon facilities. Residents of Shaniko have individual septic tanks. The Dalles and Arlington operate activated sludge plants. Goldendale operates a recently completed Biolac facility that drains into the Little Klickitat River. Several improvements to existing systems within these communities have recently occurred or are planned in the near future. The cities of Condon, Goldendale, Hood River, Moro, Rufus, Wasco, Dufur, Maupin and Mosier have added capacity or will add capacity to meet Department of Environmental Quality (DEQ) standards for wastewater. Noncompliance of these systems with DEQ standards has generally involved leaking lagoons or capacity issues that required the plants to prematurely discharge effluent into local waterways. Improvements to these systems have included constructing additional lagoons for storage and improving dispersion techniques. The Hood River sewer system is undergoing expansion with completion or near completion of an upsized sanitary sewer main in the downtown vicinity and pending construction of a sanitary lift station at Indian Creek. Most of the jurisdictions have, or will have enough storage for winter months and then will irrigate city-owned land with the gray water stored throughout the winter. The City of Wasco stores effluent during the winter months and then applies it to privately owned pasture land.

Residents living outside of incorporated communities use private subsurface sewage disposal systems. The new O&M facility will include construction of a new subsurface system.

Installation of the system will require compliance with any applicable Wasco County and DEQ requirements.

During Facility construction, a local provider will supply portable toilets to the site, which would be treated at a local treatment facility chosen by the toilet provider. No impacts from using the portable toilets are anticipated because the toilet provider will be required to dispose wastewater in an appropriate manner.

The proposed O&M facility will not be connected to a local wastewater collection system because it will have its own septic system. Wasco County and/or DEQ review and approval will be required prior to installation of the septic system. No significant adverse impacts are anticipated as a result of the septic system installation.

It is assumed that temporary construction and permanent employees will use existing wastewater or private septic systems, and would have no additional impact on facilities in the analysis area. Temporary employees from outside the area would likely stay in one of the area's motels or RV parks and use those facilities, which are adequately sized to provide wastewater service. Permanent employees moving to the area would likely reside in existing dwellings already connected to a public wastewater or private septic system and would not increase need for or have an adverse impact to wastewater collection or treatment systems in the analysis area.

U.4.3 Water

Although the nearest municipal water system serves the City of Dufur, located approximately seven miles from the nearest turbine, the City of The Dalles will provide water to the Applicant during construction. Based on Attachment U-1 (City of The Dalles Public Works letter dated July 30, 2009), the City of The Dalles has the capacity and is willing to provide water to the construction site, which is expected to require 90,000 gallons during peak daily usage.

To serve the Facility during operations, a new well will be drilled near the O&M facility. The well will pump less than 5,000 gallons per day. Wells of this size are exempt from local and state permitting requirement because of their limited output (see Exhibit O).

Most jurisdictions in the analysis area rely or partially rely upon wells for drinking water. The Dalles uses surface water resources to meet approximately 85 percent of its water need. Three wells meet the remaining water need, although those wells are generally only used during peak summer use periods. Goldendale uses a series of springs in addition to its four well sources. Hood River's groundwater source comes from three springs located on the slopes of Mount Hood. Other towns that utilize spring water include Maupin, Mosier, and Shaniko.

Existing facilities are generally adequate to meet municipal water needs. The City of Moro recently drilled a third well to meet demand. Prior to the addition of the third well, the City required water rationing during summer months, but with the addition of the well, rationing is no longer required. Other jurisdictions with proposed improvements include the City of Condon, which is in the process of upgrading its water pipelines (as funding allows) and the City of Dufur, which plans to build a water line from its wells directly to the reservoir. The City of Arlington upgraded its system four years ago. The cities of Rufus and Wasco have rebuilt their system recently and have no plans for any future improvements. The City of Maupin has a major reservoir renovation and a bypass piping project underway. The City of

Mosier has been experiencing groundwater level declines from the basalt aquifers in the Mosier Creek Basin since the 1960s. To address this problem, the City completed an engineering study in 2006 and the USGS is currently investigating the cause. Finally, the City of Hood River will construct a new 24-inch transmission main in five one-year phases.

Residents living outside of incorporated communities use private wells. The proposed Facility will be located outside of these service areas and, therefore, will not affect these providers.

U.4.4 Storm Water

The proposed Facilty is not within any jurisdiction's storm water system and would have no impact to existing storm water systems or providers. Exhibit V describes the proposed stormwater management for the proposed Facility.

Jurisdictions that provide storm water service generally provide conveyance only and do not offer treatment (except for The Dalles). Jurisdictions that provide conveyance include the cities of Condon (limited), Arlington, Bingen, Goldendale, Hood River, Moro, Dufur (down Main Street) and The Dalles. The Dalles provides some storm water treatment for industrial uses, but does not treat storm water for the entire city. The Dalles recently completed a storm water master plan.

Construction-related storm water impacts could occur during the construction of the proposed Facility, likely from road, turbine foundation, and staging area construction. Erosion control measures would be developed to mitigate these potential impacts (see Exhibit I).

U.4.5 Solid Waste Management

Mel's Sanitary Service, located in Tygh Valley, will provide solid waste service to the Summit Ridge Facility site. The company has capacity for delivering 6-yard containers, plus up to two 20-yard drop boxes for construction.

Following pickup, Mel's Sanitary Service delivers refuse to the Wasco County Landfill south of The Dalles. The Wasco County Landfill is a large regional facility that accepts refuse from the north central Oregon region. Mel's Sanitary Service provides hazardous waste pickup on an on-call basis provided contractors on the construction site are licensed to properly handle and disposed of waste in lined boxes. Hazardous waste disposal is available at Chemical Waste Management of the Northwest, a facility located adjacent to the Columbia Ridge Recycling and Landfill facility located near Arlington. Waste Management, Inc. operates both landfill facilities. The company accepts delivery of recycling material at their location in Tygh Valley but does not currently pick up recycling material on-site. If a large amount of recycling material is expected to be generated during construction phase, mutual agreement with the Mel's Sanitary Service would need to be negotiated for on-site pick-up.

Temporary and permanent population increases for construction and operation of the proposed Facility are minimal compared to the population of the affected communities. The proposed Facility would have no adverse impact on the ability of Mel's Sanitary Service to provide solid waste collection services.

Solid waste generated in the construction and operation of the proposed Facility is described in Exhibit V. Non-hazardous construction waste will consist of concrete, wood, and scrap

steel from turbine construction; and erosion control materials such as straw bales, silt fencing, etc.; and leftover packaging materials from electrical equipment and turbine parts. During operation, office waste will be the primary solid waste produced and includes food scraps, food packaging materials, and paper. Some materials used for maintenance, such as empty lubricant bottles, cleaning supplies, and oily rags will be generated and disposed of in accordance with all laws (see Exhibit G – Materials Analysis). In addition, other incidental solid waste will be generated from repair or replacement of turbine parts.

All solid waste generated during construction and operation of the Facility will be sorted for recycling and transported by Mel's Sanitary Service to the Wasco County Landfill. It is anticipated that the Facility will generate approximately one dumpster per day of solid waste, mainly construction debris, and therefore would not adversely affect capacity at the regional landfill.

The Wasco County Landfill is not projected to reach capacity for at least 50 years and conversations with DEQ officials did not specify any concerns regarding solid waste generation from construction or operation of the proposed Facility.

Other providers in the analysis area include The Dalles Disposal Company, which provides solid waste service for all of Sherman County and portions of Gilliam County. The Dalles Disposal Company also operates a transfer station that is open to the public on the second and fourth Saturdays of each month. Waste Connections, Inc. provides service for The City of Condon and City of Arlington and Mel's Sanitary Service provides sanitary service for the cites of Dufur and Maupin. Allied Waste provides refuse and recycling service for Goldendale and Madras Sanitary provides services to Shaniko. The proposed Facility will be located outside of these service areas and, therefore, will not affect these providers.

U.4.6 Housing

Housing availability and supply in the affected communities is described in Table U-3. There were 12,956 housing units recorded in the 2000 census in the affected communities in the analysis area, representing approximately 45 percent of all housing units within Gilliam, Hood River, Sherman, Wasco, and Klickitat counties. Housing vacancy rates in the analysis area average approximately 9.5 percent for the fifteen communities in the analysis area. Maupin (Wasco County) and Grass Valley (Sherman County) have among the highest vacancy rates within the analysis area. Shaniko recorded a vacancy rate of over 57 percent.

Table U-3. Housing Supply and Availability in Communities within the Analysis Area

Jurisdiction	Total Housing Units			Vacancy Rate
	Occupied	Vacant	Total	Percent
Gilliam County	819	224	1,043	21.5%
Arlington	*228*	*50*	*278*	*18.0%*
Condon	*357*	*65*	*422*	*15.4%*
Hood River County	7,248	570	7,818	7.3%
Hood River	*2,432*	*225*	*2,657*	*8.5%*
Sherman County	797	138	935	14.8%
Grass Valley	*74*	*20*	*94*	*21.3%*
Moro	*132*	*12*	*144*	*8.3%*
Rufus	*128*	*34*	*162*	*21.0%*
Wasco	*171*	*28*	*199*	*14.1%*
Wasco County	9,401	1,250	10,651	11.7%
Dufur	*254*	*23*	*277*	*8.3%*
Maupin	*194*	*69*	*263*	*26.2%*
Mosier	*183*	*24*	*207*	*11.6%*
Shaniko	*11*	*15*	*26*	*57.7%*
The Dalles	*4,928*	*318*	*5,246*	*6.1%*
Klickitat County	7,473	1,160	8,633	13.4%
Bingen	*288*	*39*	*327*	*11.9%*
Goldendale	*1,525*	*180*	*1,705*	*10.6%*
White Salmon	*878*	*71*	*949*	*7.5%*

Source: U. S. Census Bureau, 2000 Summary File 3.

The demand for permanent housing in the analysis area is not anticipated to increase significantly because the proposed Facility would employ about 26 full-time and part-time employees. Only 20 new employees are assumed to move into the area, with the remainder hired locally. Employees hired from the local community would not require new housing and, given the small number of in-migrant households and the housing vacancy rate in the affected communities, there would be no adverse impact in terms of finding permanent housing.

U.4.6.1 Temporary Housing

Although an average of 25 employees are expected to be on the Summit Ridge site during the sixteen month construction period, the number of employees could increase to approximately 250 during peak activity. During these phases of peak construction, approximately 80 percent of the construction workers will likely be hired from outside of the area, identifying a need for temporary housing. There are several potential temporary housing options within the analysis area. There are also several motels and other temporary housing opportunities located in The Dalles. It is expected that most temporary employees would use these facilities during the construction period. As a result, there would be no adverse impact to temporary housing and lodging in the analysis area.

U.4.7 Traffic Safety

Although the Facility area is equidistant to US 97 to the east and US 197 to the west, the lack of bridges crossing the Deschutes River situated east of the Facility site essentially blocks access to US 97, leaving US 197 as the primary access route linking the Facility site to the rest of Oregon and Washington. Running north-south, US 197 provides direct access to I-84 east of The Dalles with bridge crossings over the Columbia River available either at The Dalles or further east at Biggs Junction (US 97). The highway provides access to the nearby commercial centers of The Dalles and Portland via Interstate 84. A third highway, OR 216, runs east-west to the south of the analysis area and connects US 97 and 197. Construction-related traffic as a result of the proposed Facility will use public roads to access the construction staging areas and construct the turbine strings that are located on private property.

The assumed route of construction-related traffic is to take I-84 to US 197 to various local roads providing access to the Facility between The Dalles and Dufur. Workers traveling from Washington would take US 97 south across the Columbia River bridge at Biggs Junction, then merge onto I-84 west toward The Dalles. Construction traffic may also approach the site from the south on US 197. US 197 is a two-lane paved highway with pavement conditions rated between poor to fair. The planned turbine corridors either intersect with or are near county roads which will be used for wind farm construction and operation access.

From US 197, construction-related traffic will use a series of local Wasco County roads to access private land where the construction staging areas and turbine strings will be located. State designated rural collectors such as Emerson Loop Road and Boyd Loop Market Road could potentially be used for access into northern and southern portions, respectively, of the Facility area. Local roads are generally gravel rural roadways with little traffic other than local agricultural and residential traffic. Portions of local roads that will be used include: Fifteen Mile Road, Roberts Market Road, Summit Ridge Market Road, Center Ridge Market Road, Old Tygh Market Road, Wrentham Market Road, and Long Hollow Market Road.

The Facility will require construction of approximately 25 miles of new access roads and renovation/improvement of approximately six miles of existing roads. Planned new roads, road improvements, and access improvements are shown in Exhibit C.

Existing unpaved roads within the Facility boundaries will be utilized to the extent practicable to reduce the need for new road construction. Where needed, the existing roads that provide site access for construction equipment such as erector cranes, will be widened to 40 feet—consisting of 20-foot-wide graveled surfaces and 10-foot compacted shoulders. Erosion control and drainage best management practices will be included in the design of all roads. After the completion of construction, the road shoulders, which are needed during construction to accommodate the cranes, will be un-compacted and restored to farmable condition. The 20-foot width of the graveled surface will generally be left to facilitate operation of the Facility and for the convenience of area farmers, unless removal is requested. All areas temporarily disturbed during road construction will be restored to its existing condition and contours. There will be no separate "crane paths" constructed to allow the construction crane access from string to string.

In areas where there are no existing roads to access wind turbine strings or proposed facilities, new access roads will be constructed to the dimensions described above. Permanent turnaround areas will be situated at or near the end of each turbine string.

Construction-related traffic may cause short-term traffic delays when trucks deliver construction-related equipment and the turbines, but those delays will be temporary and are not anticipated to have an adverse impact on highways or overall traffic movement in the Facility area. Construction-related traffic delays on local roadways could occur but are anticipated to be limited due to very low use of these local roadways. Several local roadways will be improved to accommodate construction-related traffic. The proposed improvements will have a beneficial long-term impact by improving the quality of the road for all users.

Truck traffic during operations will be considerably lighter than during construction. On an average day there will usually be two or three pickup trucks moving around the site to perform routine services and maintenance on the turbines. Infrequently, larger delivery vehicles will be on site to deliver replacement parts to the turbines or the O&M facility.

Permanent staff for the proposed Facility, approximately 26 employees, will use the improved local road system. Because the traffic generated from these employees is small and existing usage is low, no adverse impacts to the road system as a result of new permanent staff are anticipated.

U.4.8 Police

Some local jurisdictions provide their own police service, while others rely on the county sheriff for police service. The cities of The Dalles, Hood River, Bingen-White Salmon, Goldendale, and Condon provide their own police service within the analysis area.

The Wasco County Sheriff's Office provides police service for all of Wasco County outside the City of The Dalles. Therefore, the County Sheriff's Office service area includes the proposed location of the Summit Ridge Wind Farm. Other sheriff's departments within the analysis area include the Gilliam County Sheriff's Office, Sherman County Sheriff's Office, and the Hood River County Sheriff's Office. The Wasco County Sheriff's is the largest of the four Oregon departments, with 17 full-time officers, due to the much larger population it serves. Sherman and Gilliam Counties employ five full-time officers. All three departments have agreements to provide backup service for each other if needed. The Klickitat Sheriff's Department provides law enforcement for Klickitat County and employs 17 patrol and command staff in addition to jail and detective branches. The Facility is outside of the Klickitat Sheriff's Department service area.

In the event response is required at the Facility, sheriff services can be accommodated with existing sheriff's department resources. Based on a phone conversation with the Wasco County Sheriff plus written correspondence (see Attachment U-2), no adverse impacts to the sheriff's department are anticipated as a result of the proposed Facility.

U.4.9 Fire Protection and Emergency Response

The southern half of the site is not covered by either a rural fire protection district or a city's fire department. Protection for non-structural fires in this area is provided by United States Forest Service (USFS), Bureau of Land Management (BLM) or Oregon State Forestry Department (ODF). Additional support is available from other adjacent fire protection districts, the most near being City of Dufur, when necessary. Wasco County Sheriff's Office

operates a 911 Communication Center for all of Wasco County for police, fire or medical emergencies. The Dufur Fire District contracts with Mid Columbia Fire and Rescue (The Dalles) and the Dufur Volunteer Ambulance to provide ambulance service to areas adjacent to the site.

Northern areas of the Facility site lie within the Columbia Rural Fire District – a non-tax fire district comprised of approximately 75 landowners, mainly wheat farmers. Typically lacking any traditional firefighting resources, members of the district rely on available farm equipment, mainly 100-gallon water tanks placed in the back of trucks, for fire suppression. The landowners occasionally receive assistance from outside the district. The Oregon Department of Forestry maintains a mutual aid agreement with the district and BLM sometimes responds.

The North Sherman Fire Protection District based in Wasco, provides fire protection and has trained EMT volunteers, although the District does not provide ambulance service. The District contracts with the Moro Rural Fire Protection District to provide ambulance service. Although close in proximity to the Summit Ridge Facility site, the district's ability to respond to an incident would be limited due to lack of access across the Deschutes River, which forms the boundary between Wasco and Sherman counties.

Based on the City of Dufur Fire and Ambulance Service (Dufur Fire) in a letter dated July 24, 2009 (see Attachment U-3), the Columbia Rural Fire District would be the fastest to respond to a potential ground fire while Dufur Fire would be the first responder for a structure fire. Dufur Fire would also be the first responder in the event of a medical emergency occurring in the Summit Ridge area. However, the districts ability to provide medical service is currently limited to ground rescue. Dufur's Emergency Medical Team is not equipped or trained for rope rescue operations.

Beyond the Facility, there are fourteen other fire departments or districts that provide, at minimum, fire protection. Those that provide only fire service contract with other districts that have ambulance service. Communities that provide their own fire service include the cities of Condon, Bingen, Goldendale, White Salmon, Hood River, Moro, Rufus, Dufur, The Dalles, Maupin and Mosier. Rural fire districts serving other parts of the analysis area include the North Gilliam County Rural Fire District, the South Sherman Rural Fire District, and Klickitat Rural Fire District #7, which provides service for portions of Klickitat County. Gilliam and South Sherman Rural Fire districts provide fire and emergency response for Arlington and Grass Valley, respectively, as well as for rural county areas.

To minimize the potential of fires starting from construction-related activities, roads would be established prior to construction to minimize vehicle contact with dry grass; idling vehicles in grassy areas would be avoided; and open flames, such as cutting torches, would be kept away from grassy areas. Staging areas will be graveled to minimize fire potential; in addition, a water truck will be available on site to respond to any potential fire incidents.

In the event of a critical injury, helicopter service could be dispatched to the Facility. Accident victims would be transported to the Mid-Columbia Medical Center in The Dalles.

U.4.10 Health Care

The Mid-Columbia Medical Center, located in The Dalles, is the only full service medical facility located within the analysis area. The Center provides emergency services as well as surgery. If an accident were to occur at the site, ambulance service from the Moro Rural

Fire Protection District would transport patients to the hospital. Evacuation via helicopter is also available, if needed.

Other area hospitals include Providence Hood River Memorial Hospital, located in Hood River, is a 25-bed critical access hospital located within the analysis area. Klickitat Valley Hospital in Goldendale serves all of Central and Eastern Klickitat County. The hospital offers inpatient care and some minor surgical procedures, but is a small facility and any accidents would likely be directed to Mid-Columbia Medical Center first. Finally, Skyline Hospital in White Salmon, WA is licensed as a 32-bed facility.

The proposed Facility would not adversely impact medical services in the analysis area. Staffed with approximately 90 physicians with available Life Flight services if needed, hospital staff from Mid-Columbia Valley Medical Center indicated that the facility would be capable of providing services for construction and operational employees in case of an emergency.

U.4.11 Schools

The Dufur, South Wasco, and North Wasco school districts are the closest to the proposed Facility. Dufur School District #29 comprises one K-12 facility that houses approximately 280 students. The South Wasco County School District #1 consists of approximately 260 students and includes students from Shaniko. The North Wasco County School District #21 (The Dalles) consists of one high school, one middle school, and four elementary school that together house an enrollment of approximately 2,800 students.

The Sherman County School District serves all of Sherman County. The school district operates one high school (grades 7 to 12) in Moro and two elementary schools (kindergarten through 6th grade) in Grass Valley and Wasco. The district serves approximately 270 students, although enrollment has declined in recent years due to a lack of employment opportunities in the area.

Other school districts in the analysis area include the Condon School District #25, Arlington School District #3, Goldendale School District #4, Hood River County School District, White Salmon Valley School District, and Chenowith School District #9. The Condon and Arlington school districts each operate one kindergarten through 8th grade facility and one 9th grade through 12th grade facility. The Goldendale School District operates one kindergarten through 6th grade, one 7th through 8th grade middle school, and one 9th through 12th grade high school. The Hood River County School District operates one high school, two middle schools, and five elementary schools. White Salmon Valley School District consists of one high school, one middle school, and one elementary school.

The North Wasco County, Hood River County, and Dufur school districts are the only three districts within the analysis area that are experiencing growth in the student population. The North Wasco County School District expects student enrollment to increase approximately one to three percent annually. Facilities are generally inadequate to accommodate the projected number of students, although the district recently merged with the Chenowith School District and is now in the process of completing deferred maintenance for former Chenowith district facilities. Dufur School District administrators also said their enrollment is growing, primarily because of the district's proximity to The Dalles. The Dufur School District recently expanded its classrooms and built a new gymnasium to accommodate existing and projected student growth. No additional facilities are planned. Enrollment

forecasts for the Hood River County School District project continued increases through to 2015.

No adverse impact to local schools is anticipated to occur as a result of the construction and operation of the proposed Facility. No demand on school facilities is expected from the construction of the proposed Facility because the portion of the construction work force that might temporarily live in the area is not expected to include any families. Therefore, temporary increases in the analysis area population caused by in-migration of construction workers would result in little to no increase in the student population.

The number of in-migrant operational staff is anticipated to be small, creating approximately 20 new households that might have school-age children. Consequently, there would be no significant increase in the student population. Interviews with local school districts indicated that the small number of potential new students would not have a significant adverse impact on the school districts and all districts would be able to accommodate students with existing capacity. All school districts said that an increase in the number of students would have a beneficial impact on school districts because each additional student would increase revenue for the district without having to add new services or facilities.

U.5 EVIDENCE THE ADVERSE IMPACTS ARE NOT LIKELY TO BE SIGNIFICANT TO SERVICE PROVIDERS

OAR 345-021-0010(1)(u)(D) *Evidence that adverse impacts described in (C) are not likely to be significant, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts; and*

Response: Responses are provided in sections U.5.1 through U.5.12, below.

U.5.1 Economic and Demographic Impacts

U.5.1.1 Population

Limited in-migration for construction-related employment as well as permanent O&M employment is expected to occur as a result of the proposed Facility and would have a beneficial impact on businesses in the nearby communities from increased patronage of area motels, restaurants, and other supporting services. No significant adverse impacts as a result of temporary construction activities are anticipated. In-migrant operational staff and their families would not have a significant impact on local population.

U.5.1.2 Economic Activity

The proposed Facility would not have significant adverse economic impacts to the analysis area. On the contrary, revenue generated for the local economy as a result of the Facility may improve Wasco County's ability to provide public services, including schools and others services the County provides for its residents. Increased employment opportunities, both temporary and permanent, may increase the amount of money spent at local businesses. Landowners who receive payments for permitting the location of turbines on their property may also see an increase in income and as a result spend a portion of that at local businesses.

U.5.1.3 Tax Revenues

No adverse impacts on County tax revenues are expected. Rather, annual property tax revenues or in lieu payments to the County will increase as a result of the Facility. In addition, development of this Facility will lead to increased value of other properties because

of the increase in wages and overall economic activity in the analysis area. The additional revenue generated by the Facility will increase the County's resources for providing roadways, police and fire protection, and other services to its citizens.

U.5.2 Sewers and Sewage Treatment

The proposed Facility is not located within any wastewater facility treatment area; therefore, the proposed Facility would have no impact to existing wastewater treatment facilities or collection systems. During construction, a local provider will supply portable toilets to the site, which would be treated at a local treatment facility chosen by the toilet provider. No impacts from using the portable toilets are anticipated because the toilet provider will be required to dispose wastewater in an appropriate manner.

The proposed O&M facility will not be connected to a local wastewater collection system because it will have its own septic system. Wasco County and/or DEQ review and approval will be required prior to installation of the septic system. No significant adverse impacts are anticipated as a result of the septic system installation.

It is assumed that temporary construction and permanent employees will use existing wastewater or private septic systems, and would have no additional impact on facilities in the analysis area. Temporary employees from outside the area would likely stay in one of the area's motels or RV parks and use those facilities, which are adequately sized to provide wastewater service. Permanent employees moving to the area would likely reside in existing dwellings already connected to a public wastewater or private septic system and would not increase need for or have an adverse impact to wastewater collection or treatment systems in the analysis area.

U.5.3 Water

The proposed Facility is not within the service area of any water system. During construction, water will be trucked in via tanker supplied to Applicant by the City of The Dalles. With peak daily usage estimated to reach 90,000 gallons per day, the City Public Works Department has indicated that they have the capability and willingness to provide water during construction (see Attachment U-2). The proposed O&M facility will have its own well for its water needs. The well will provide less than 5,000 gallons per day, and because of its limited output, is not required to obtain a state water withdrawal permit (see Exhibit O). No adverse impacts to the local water supply are anticipated.

U.5.4 Storm Water

No significant adverse impacts to existing storm water facilities are anticipated. Construction-related storm water drainage impacts could occur during the construction of the proposed Facility, likely from road, turbine foundation, and staging area construction. Erosion control measures would be implemented as needed to meet any applicable local regulations and reduce the potential for project-related erosion (see Appendix I-2). Once constructed, the Facility will generate stormwater that has little potential to accumulate pollutants, due to the low traffic volume and the nature of the proposed Facility. The stormwater will sheet flow off of roads into surrounding soils.

U.5.5 Solid Waste Management

Mel's Sanitary Service provides solid waste service and has adequate capacity to accommodate construction-related debris and service to the new Facility. The proposed

Facility would have no adverse impact on the ability of Mel's Sanitary Service to provide these services.

Solid waste generated in the construction and operation will require offsite disposal. The nearest landfill is the Wasco County Landfill, which is not projected to reach capacity for at least 50 years. Solid waste taken from the site by Mel's Sanitary Service will be delivered to the Wasco County Landfill. Conversations with DEQ did not specify any concerns regarding solid waste generation from construction or operation of the proposed Facility. While the proposed Facility will generate some solid waste, the amount would not have a significant adverse impact on landfill operations that provide solid waste management services in the area.

U.5.6 Housing

No adverse impacts to housing in the analysis area are anticipated as a result of the proposed Facility. Employees hired from the local community would not require new housing and, given the small number of in-migrant households and the housing vacancy rate in the affected communities, adequate housing is available.

Temporary employees hired from outside the area will likely stay in nearby motels. While the majority of those are concentrated in The Dalles, there are other accommodations (motels, RV parks) in other communities that will meet temporary housing needs. Although not all of these would likely be available at one time, there are many temporary-housing possibilities within these communities compared to the relatively small number of in-migrant construction workers. There would be adequate motel and camping/trailer facilities to accommodate the short-term needs for in-migrant construction workers.

There would be no adverse impact to temporary or permanent housing in the analysis area. On the contrary, businesses would experience a beneficial impact from construction workers renting accommodations and permanent in-migrant workers purchasing homes.

U.5.7 Traffic Safety

Construction-related traffic may cause short-term traffic delays when trucks deliver construction-related equipment and the turbines, but those delays will be temporary and are not anticipated to have an adverse impact on highways in the Facility site. Construction-related traffic delays on local roadways could occur but are anticipated to be limited due to very low use of these local roadways. Several local roadways will be improved or completely reconstructed to accommodate construction-related traffic. The proposed improvements will have a beneficial long-term impact by improving the quality of the road for all users. A construction phase traffic management plan will be developed in consultation with the local community.

Permanent staff for the proposed Facility, assumed to be approximately 26 employees, will use the improved local road system. Because the traffic generated from these employees is small and existing usage is low, no adverse impacts to the road system as a result of new permanent staff are anticipated

Improvements will remain when construction is complete for local residents to use. While short-term construction-related impacts, primarily traffic delays, may occur, those impacts will be temporary and would not constitute a significant adverse impact.

U.5.8 Police

The small population increase attributed to the proposed Facility would not have a significant adverse impact on local police services. The majority of calls to the Facility area involve game violations. Discussions with the Wasco County Sheriff's Office did not identify any concerns about the in-migrant construction workers or any need for increased patrols near the proposed Facility, either when it is under construction or when it is operational. Therefore, the proposed Facility would not have a significant adverse impact on police service.

U.5.9 Fire Protection and Emergency Response

The only adverse impact noted by Dufur Fire (see July 24, 2009 letter in Attachment U-3) is the inability to conduct a rope rescue due to lack of training and equipment. To mitigate this, the Applicant will have trained staff and appropriate equipment on site to respond to events that cannot be handled by the fire departments. Mitigation measures to address this need are described in U.5.12.

U.5.10 Health Care

The proposed Facility would not adversely impact medical services in the analysis area. The Mid-Columbia Valley Medical Center in The Dalles, with back-up from outlying hospitals in Hood River and White Salmon would be capable of providing services for construction and operational employees in case of an emergency.

U.5.11 Schools

No significant adverse impact to local schools is anticipated to occur. No short-term demand on school facilities is expected from the construction of the proposed Facility because the portion of the construction work force that might temporarily live in the area is not expected to include any families. The number of in-migrant operational staff is anticipated to be small, creating few new households with school-age children. Consequently, there would be no significant increase in the student population. Interviews with local school districts indicated that any new students would not have a significant adverse impact on the school district. To the contrary, most school districts in the analysis area have lost students; an increase in the student population would have a beneficial impact on school districts because each additional student increases revenue for the district.

U.5.12 Mitigation Measures

The Applicant proposes the following mitigation measures:

1. During construction, a local provider will supply portable toilets to the site, which would be treated at a local treatment facility chosen by the toilet provider.
2. Erosion control measures would be implemented as needed to meet any applicable local regulations and reduce the potential for Facility related erosion (see 1200-C permit application, Appendix I-1).
3. The Applicant will work with Wasco County and local communities, particularly the City of The Dalles where construction vehicles may collect water that the City may sell to the Applicant for construction, to develop a construction traffic management plan to minimize construction-related impacts from the additional truck traffic.

4. The Applicant will coordinate response protocols with the Columbia Rural Fire District, Dufur Fire, and BLM. The Applicant will also work closely with the area fire districts to address the potential incidents that may arise from construction related traffic.
5. The Applicant will have trained staff and appropriate equipment on site to respond to events, such as high angle rescue, that cannot be handled by the fire departments. The nature of the training and equipment will be decided after consultation with the above-mentioned responders.
6. During operation of the Facility, the Applicant will ensure that all on-site employees receive annual fire prevention and response training by qualified instructors or members of the local fire department and that all employees are instructed to keep vehicles on roads and off dry grassland, except when off-road operation is required for emergency purposes.
7. During operation of the Facility, the Applicant will maintain built-in fire prevention measures in each turbine that would shut down the turbine automatically before mechanical problems create excess heat or sparks.
8. During construction and operation of the Facility, the Applicant will develop and implement fire management plans in consultation with local fire control authorities to minimize the risk of fire and to respond appropriately to any fires that occur on the Facility site. In developing the fire management plans, the Applicant will take into account the dry nature of the region and should address risks on a seasonal basis.
9. During construction and operation of the Facility, the Applicant will ensure that each on-site company vehicle contains a fire extinguisher, water spray can, shovel, emergency response procedures book, and two-way radio for immediate communication with the O&M facility.
10. During construction of the Facility, the Applicant will clear vegetation from a lay-down area adjacent to each wind turbine where welding, cutting, grinding, or other flame- or spark-producing operations are likely to occur.
11. Upon beginning operation of the Facility, the Applicant will provide to all local fire departments maps of the Facility site. During operation of the Facility, the Applicant will provide to all local fire departments the names and telephone numbers of Facility personnel available to respond on a 24-hour basis in case of an emergency on the Facility site.

U.6 MONITORING PROGRAMS

OAR 345-021-0010(1)(u)(E) *The applicant's proposed monitoring program, if any, for impacts to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0010;*

Response: No monitoring program is proposed.

U.7 CONCLUSION

As demonstrated above in response to OAR 345-021-0010(1)(u), the Facility's design, construction, and operation, taking into account mitigation, will not result in significant adverse impacts to public services and facilities within the site boundary.

Economic and Demographic Impacts

Limited in-migration for construction-related employment as well as permanent O&M employment is expected to occur as a result of the proposed Facility and would have a beneficial impact on businesses in the nearby communities. Revenue generated from increased patronage of area motels, restaurants, and other supporting services would benefit the local economy.

Sewers and Sewage Treatment

The proposed Facility will not be connected to a local wastewater collection system because it will have its own septic system. The proposed Facility is not located within any wastewater facility treatment area; therefore, the proposed Facility would have no impact on existing wastewater treatment facilities or collection systems. Wasco County and/or DEQ review and approval will be required prior to installation of the septic system. No significant adverse impacts are anticipated as a result of the septic system installation.

Water

No adverse impacts to the local water supply are anticipated. During construction, water will be purchased and trucked in from offsite via tanker from the City of The Dalles. They have documented via a letter attached as Attachment U-1 that they have adequate capacity for the Facility's construction needs. The proposed Facility is not within the service area of any water system. The proposed O&M facility will have its own well for its water needs. The well will provide less than 5,000 gallons per day, and because of its limited output, is not required to obtain a state water withdrawal permit.

Storm Water

The proposed Facility is not within any jurisdiction's storm water system and, therefore, would have no impact to existing storm water facilities. Potential storm water drainage impacts during construction will need to be monitored.

Solid Waste Management

Mel's Sanitary Service has adequate capacity to accommodate construction-related debris and service to the new Facility. The proposed Facility would have no adverse impact on the ability of Mel's Sanitary Service to provide these services.

Solid waste generated in the construction and operation will require offsite disposal. The nearest landfill is the Wasco County Landfill, which is not projected to reach capacity for at least 50 years. While the proposed Facility will generate some solid waste, the amount would not have a significant adverse impact on landfill operations that provide solid waste management services in the area.

Housing

No adverse impacts to housing in the analysis area are anticipated as a result of the proposed Facility. Employees hired from the local community would not require new housing and, given the small number of in-migrant households and the housing vacancy rate in the affected communities, adequate housing is available.

Temporary employees hired from outside the area will likely stay in nearby motels. While the majority of those are concentrated in The Dalles, there are other accommodations (motels, RV parks) in nearby communities that will meet temporary housing needs.

Although not all of these would likely be available at one time, there are many temporary-housing possibilities within these communities compared to the relatively small number of in-migrant construction workers. There will be adequate motel and camping/trailer facilities to accommodate the short-term needs for in-migrant construction workers.

Traffic Safety

Construction-related traffic may cause short-term traffic delays when trucks deliver construction-related equipment and the turbines, but those delays will be temporary and are not anticipated to have an adverse impact on highways in the Facility area. Construction-related traffic delays on local roadways could occur but are anticipated to be limited due to very low use of these local roadways. Several local roadways will be improved to accommodate construction-related traffic. The proposed improvements will have a beneficial long-term impact by improving the quality of the road for all users. Improvements will remain when construction is complete for local residents to use. While short-term construction-related impacts, primarily traffic delays, may occur, those impacts will be temporary and would not constitute a significant adverse impact.

Police

The small population increase attributed to the proposed Facility would not have a significant adverse impact on local police services. Discussions with the Wasco County Sheriff's Department did not identify any concerns about the in-migrant construction workers or any need for increased patrols near the proposed Facility, either when it is under construction or when it is operational.

Fire Protection and Emergency Response

The only adverse impact noted by Dufur Fire is their inability to conduct a rope rescue due to lack of training and equipment.

Health Care

The proposed Facility would not adversely impact medical services in the analysis area. The Mid-Columbia Valley Medical Center in The Dalles, with back-up from outlying hospitals in Hood River and White Salmon would be capable of providing services for construction and operational employees in case of an emergency.

Schools

No short-term demand on school facilities is expected from the construction of the proposed Facility because the portion of the construction work force that might temporarily live in the area is not expected to include any families. The number of in-migrant operational staff is anticipated to be small, creating few new households with school-age children. Consequently, there would be no significant increase in the student population. Most school districts in the analysis area have lost students and an increase in the student population would have a beneficial impact on school districts because each additional student increases revenue for the district.

Therefore, for these reasons and the reasons set forth in the responses to OAR 345-021-0010(1)(u), the Facility will not result in significant adverse impacts to public services and the Council may find that OAR 345-022-022-0022 is satisfied.

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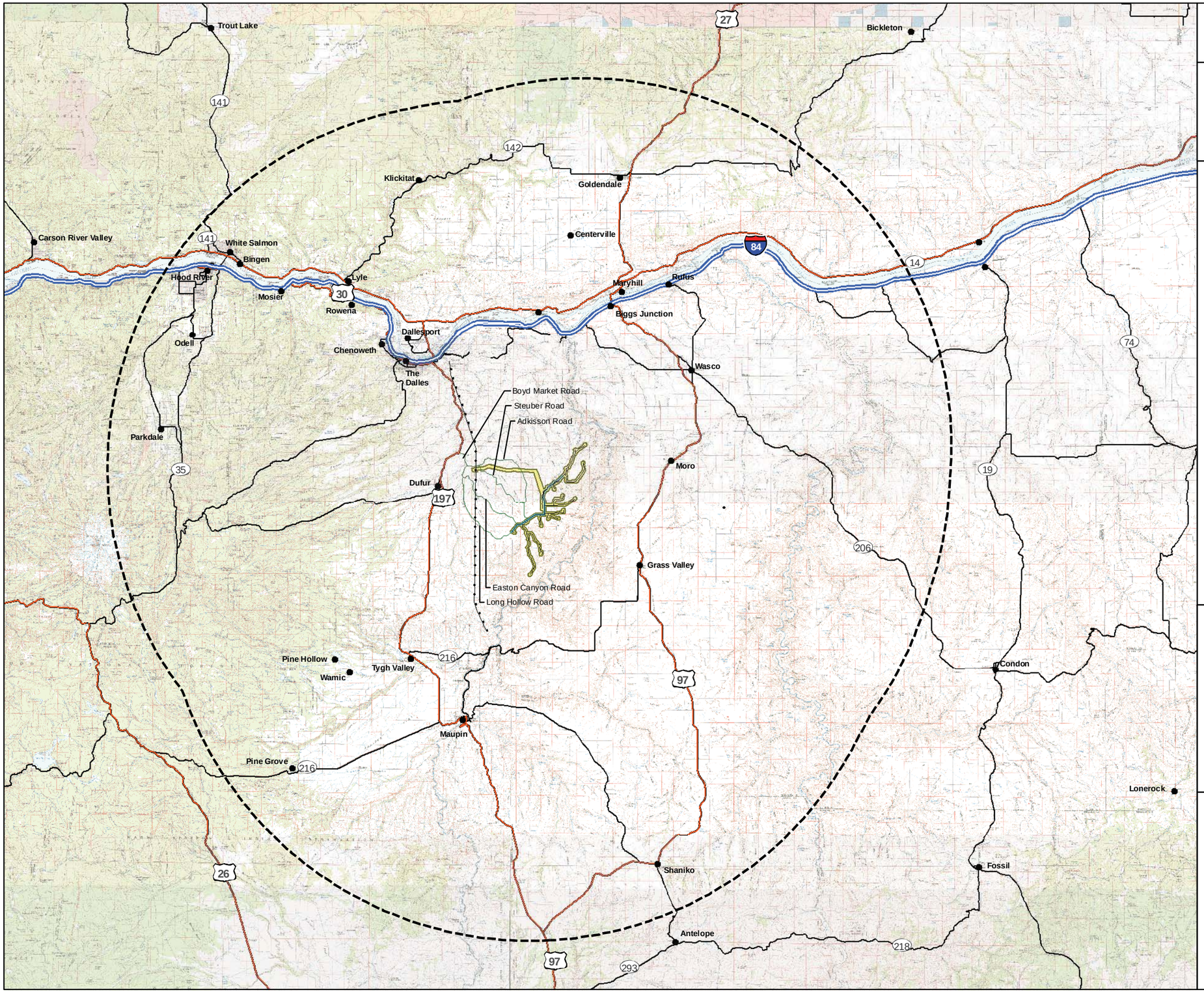
FIGURES



LotusWorks - Summit Ridge I, LLC

Figure U-1
Transportation Routes and Analysis Area

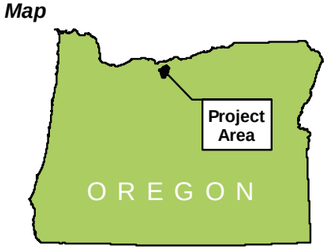
Legend

- Site Boundary
- Interstate Highway
- Other Highway
- Major Road
- Analysis Area (30 Miles)
- Bonneville 230 KV Line
- Existing Access Roads (from US 197)
- Proposed WTG Access Road

N

0 8 16 24
Miles

Location Map



Data Sources:

LotusWorks, 2009
Wasco County, Oregon, January 2006

LotusWorks Summit Ridge I

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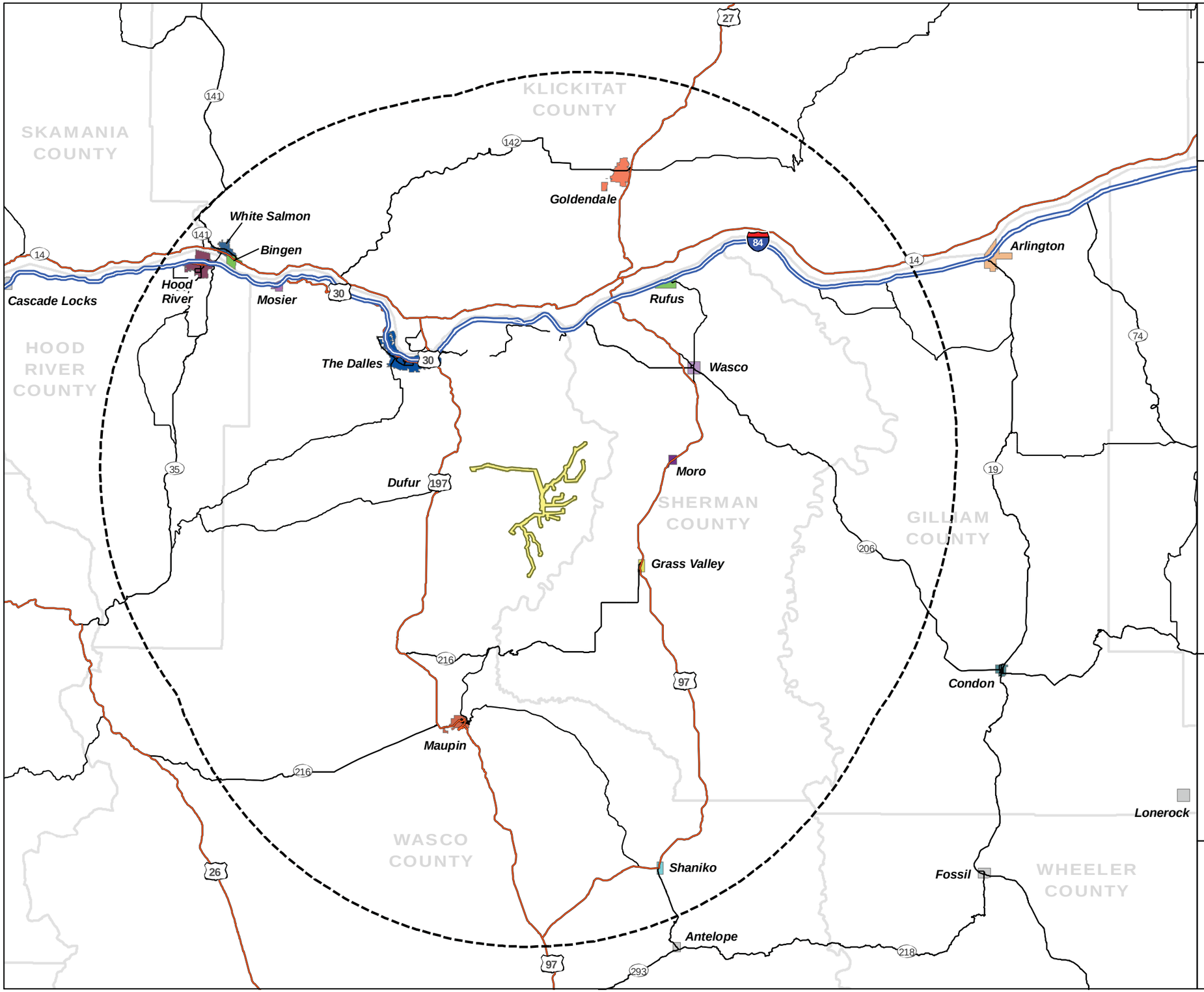
LotusWorks - Summit Ridge I, LLC

Figure U-2
Jurisdictions



Legend

- Site Boundary
- Analysis Area (30 Miles)
- Interstate Highway
- Other Highway
- Major Road

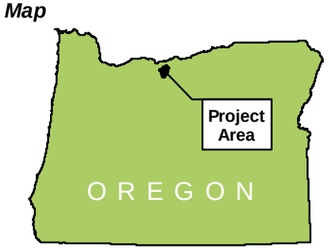
Jurisdictions

- Arlington
- Condon
- Dufur
- Grass Valley
- Hood River
- Maupin
- Moro
- Mosier
- Rufus
- Shaniko
- The Dalles
- Wasco
- Bingen
- Goldendale
- White Salmon

N

0 8 16 24
Miles

Location Map



LotusWorks Summit Ridge I

Data Sources:

LotusWorks, 2009
Wasco County, Oregon, January 2006

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ATTACHMENT U-1
LETTER DATED JULY 22, 2010, FROM CITY OF THE DALLES PUBLIC WORKS

City of The Dalles
Public Works
1215 W 1st h Street
The Dalles, OR 97056

Ray Johnson, Water Division
Water Distribution Manager
Ph. 541-296-5401-2012
Fax: 541-296-4346
e-mail rjohnson@ci.the-dalles.or.us

July 22, 2010

To:
Steven A. Ostrowski, Jr.
President
CM Division – LotusWorks
9611 NE 117th Ave
Suite 2840
Vancouver, WA 98662
P 360.737.9692
F 360.737.9835
C 360.910.7625
sostrowski@lotusworks.com
www.lotusworks.com

The City of The Dalles has the capability and is willing to provide construction water to Lotus Works for the Lotus-Summit Ridge 1 project as detailed below. All current water usage fees will be applied at time of service request.

Project name: Lotus-Summit Ridge I
Location: Wasco County about 10 miles south of The Dalles
Construction Start:
Early start – October 2010
Late start - September 2011
Construction Complete:
December 2012
Total water needs: 12-15 million gallons (estimated)
Anticipated peak daily usage: 90,000 gallons (estimated)
Delivery method: Via tanker supplied by LotusWorks

Signed:
Ray Johnson 7/22/10
Ray Johnson

ATTACHMENT U-2
LETTER DATED JULY 9, 2009, FROM WASCO COUNTY SHERIFF

WASCO COUNTY

SHERIFF

511 Washington Street
The Dalles, Oregon 97058
Phone (541) 506-2580
Fax (541) 506-2581

July 9, 2009

John R. Wiebke, AICP
Project Manager / Senior Planner
David Evans and Associates, Inc.
2100 SW River Parkway
Portland, OR 97201
Ph: (503) 223-6663
Fx: (503) 223-2701

Mr. Wiebke,

The Summit Ridge project is within the Wasco County Sheriff Office jurisdiction. I do not foresee any conflicts or problems that would result from this project being placed on the east side of Wasco County. If you need any further assistance please do not hesitate to contact the Sheriff Office.

Sincerely,

Rick Eiesland
Sheriff Wasco County

ATTACHMENT U-3
LETTER DATED JULY 24, 2009, FROM CITY OF DUFUR FIRE AND AMBULANCE SERVICE

City of Dufur

P.O. BOX 145
DUFUR, OREGON 97021

PHONE 541-467-2349
FAX 541-467-2353
TTY 1-800-735-2900

July 24, 2009

John R. Wiebke, AICP
Project Manager/Senior Planner
David Evans and Associates, Inc.
2100 SW River Parkway
Portland, OR. 97201

Dear John:

In regards to your email to Dufur Fire and Ambulance Service regarding the construction of Summit Ridge Wind Farm and our concerns. I broke this down into two sections - Fire and EMS.

Fire: We feel that for a ground fire Columbia Rural would be the fastest to respond and Dufur would also respond. A structure fire, Dufur Fire would be first to respond. When Dufur responds outside the Dufur city limits, it is on a contract or billable to the land owner or their insurance company. Dufur bills according to State Fire Marshal Standardized Cost Schedule.

EMS: (Ambulance) Dufur would be the first to respond as Summit Ridge Wind Farm is in our service district area. Our concern is any rope rescue that would need to be done. Dufur EMT's are not trained or equipped to do any type of rope rescue. Dufur will provide all medical response to anyone on the ground.

Sincerely,

Dufur Volunteer Fire and Ambulance Service.

John Frakes Jr.

John (Jack) Frakes, Jr.
Dufur Volunteer Fire Chief

Larry Clark

Larry Clark
EMS Director

This institution is an equal opportunity provider.

EXHIBIT V

WASTE MINIMIZATION

OAR 345-021-0010(1)(v)

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V.7 EVIDENCE THAT ADVERSE IMPACTS WOULD BE MINIMAL 4

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ATTACHMENT

V-1 Septic Evaluation Report

V.1 INTRODUCTION

OAR 345-021-0010(1)(v) *Information about the Applicant's plans to minimize the generation of solid waste and wastewater and to recycle or reuse solid waste and wastewater, providing evidence to support a finding by the Council as required by OAR 345-022-0120. The Applicant shall include:*

Response: The Applicant meets the Council standards to minimize the generation of solid waste and wastewater and to reuse and recycle these wastes as much as possible. The applicant's solid waste and wastewater plans, as described in further detail below, outline specific measures to be taken to minimize waste and impacts to the environment.

V.2 TYPES OF WASTE

OAR 345-021-0010(1)(v)(A) *A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate, including an estimate of the amount of solid waste and wastewater.*

Response:

Construction-Related Waste Materials

During construction, various types of non-hazardous waste will be generated. Primary sources of waste will consist of concrete and wood from turbine pad construction and scrap steel from turbine construction. Other materials such as erosion control materials (straw bales, silt fencing, etc.) and leftover packaging materials from electrical equipment and turbine parts may also be generated during construction. All of the non-hazardous waste produced during construction will be accommodated by a local solid waste hauler, as described in more detail in Exhibit U.

The only sources of waste water generated during construction will result from vehicle wash down and portable toilets for construction workers. Vehicle wash down will occur at a local batch plant and portable toilets will be pumped regularly by the toilet contractor, and wastewater will be disposed of in accordance with state law.

Operation-Related Waste Materials

During operation, office waste will be the primary solid waste produced. Office waste will be composed of food scraps, food packaging materials, and paper and will be generated at the O&M building. Some materials used for maintenance, such as empty lubricant bottles, cleaning supplies, and oily rags will be generated and disposed of in accordance with all laws (see Exhibit G – Materials Analysis). In addition, other incidental solid waste will be generated from repair or replacement of turbine parts. On average, solid waste generated during operations of the Facility will be approximately one dumpster in volume and will be picked up by the local garbage hauler and transported to a regional landfill.

No industrial wastewater will be generated through the operations of the Facility. Wastewater generated from flushing toilets and sinks at the O&M building, will be treated

and disposed of through an on-site septic system and drain field and will not exceed 5000 gallons per day.

All other wastes generated by the Facility, such as used oils, and universal wastes such as light bulbs and batteries will be recycled or disposed of in accordance with local, state, and federal regulations.

Decommissioning-Related Waste Materials

Upon retirement or decommissioning of the Facility, all turbines and other above ground equipment will be removed and reused, sold for scrap, or disposed of at a local landfill. The potential volume of above ground equipment and turbines to be recycled is approximately 3,800 tons of steel. All inert underground electrical cables, concrete turbine pads, and access roads will be left in place. In order to allow for agricultural activities, concrete transformer and turbine pads will be removed up to three feet below the surface of the ground. If required by Wasco County, improvements to public roads will also be left in place.

V.3 PLANS FOR MANAGEMENT AND DISPOSAL

OAR 345-021-0010(1)(v)(B) *A description of any structures, systems and equipment for management and disposal of solid waste, wastewater and stormwater.*

Response: As described in further detail below, waste minimization and recycling measures will be implemented during construction and operation of the Facility.

Recycling During Construction

Construction waste will be minimized by estimating materials needs and implementing efficient construction practices. All construction and operations waste will be recycled as appropriate. Solid waste generated during construction will go through the following procedures in order to minimize waste: sorted and stored in dumpsters, transported by the local garbage hauler to the regional landfill, and sorted and recycled, as appropriate, by the regional landfill (see Exhibit U). All concrete waste will either be reused on-site as fill or transported to the regional landfill for disposal. All packaging wastes will be sorted and recycled and transported to the regional landfill. All non-recyclable materials will be collected in dumpsters and transported to the regional landfill for disposal.

As mentioned previously, wastewater generated during construction will come from two sources: toilets and vehicle wash down. Wastewater generated from portable toilets will be pumped regularly by the toilet contractor. Wastewater generated from vehicle wash down is expected to infiltrate because it will occur at a local batch plant on pervious surface.

Construction related stormwater measures consist of the following erosion control measures: straw bales and silt fencing, and are described in more detail in Exhibit I – Soils.

Recycling During Operation

Solid waste generated during operations will consist primarily of typical office waste including paper and food waste from the O&M building. All solid waste generated during

construction will be collected on site in garbage cans and transported by the local garbage hauler to the regional landfill. Recyclable materials and waste will be separated at the O&M facility through the implementation of a solid waste recycling program.

Wastewater generated during operations will result from on-site toilets and sinks; no industrial wastewater will be generated. All wastewater generated from the O&M building will be treated and disposed of through an on-site septic system and drain field, in accordance with local and state permits. The on-site well will provide less than 5,000 gallons per day; therefore, the amount of wastewater generated from operation of the Facility will be less than 5,000 gallons per day.

Recycling During Retirement

In the event of decommissioning or retirement, all waste will be removed, reused, or recycled as described above in Section V.2.

V.4 PLANS FOR CONSUMPTIVE WATER

OAR 345-021-0010(1)(v)(C) *A discussion of any actions or restrictions proposed by the Applicant to reduce consumptive water use during construction and operation of the facility.*

Response: During construction, approximately 12 to 15 million gallons of water will be needed for concrete mixing, road compacting, and dust suppression. All water used during construction of the Facility will be trucked from an offsite permitted source with adequate supply for the project needs.

During operations, the O&M facility will obtain water for domestic uses from a dedicated well. On-site wells will provide less than 5,000 gallons per day (see Exhibit O – Water Resources). On occasion, waster may be used to wash facility equipment such as turbine rotors.

V.5 PLANS FOR SOLID WASTE AND WASTEWATER

OAR 345-021-0010(1)(v)(D) *The Applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A).*

Response: As described in previous sections, the Applicant plans to implement waste minimization and materials recycling measures, construction efficiencies, and minimizing materials required for construction and operation in order to meet Council standards.

During construction and operation of the Facility, very little solid waste and wastewater will be generated. All waste will be sorted and recycled to the greatest extent practicable.

V.6 ADVERSE IMPACT FROM SOLID WASTE, WASTEWATER AND STORMWATER

OAR 345-021-0010(1)(v)(E) *A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of solid waste, wastewater and stormwater during construction and operation of the facility.*

Response: Very little solid waste, wastewater, and storm water will be accumulated, stored, disposed of, and transported as a result of this Facility. All solid waste generated during construction and operation of the Facility will be sorted for recycling and nonrecyclable material will be transported by the local garbage hauler to the regional landfill. It is anticipated that the Facility will generate approximately one dumpster per day of solid waste, mainly construction debris, and therefore would not adversely affect capacity at the regional landfill.

Construction and operation of the Facility will generate minimal amounts of wastewater. Wastewater will be generated from vehicle wash down and O&M facility plumbing. Vehicle washdowns will occur in designated pervious areas at local batch plants allowing wastewater to infiltrate. O&M facility wastewater will be collected in a county-approved on-site septic system.

Project features and construction practices would generate very little stormwater during construction and operation of the Facility. Stormwater from the widely scattered impervious surfaces, such as turbine and transformer pads and roadways, throughout the site will sheet flow to the adjacent ground and infiltrate. In addition, temporary impacts from construction stormwater will be controlled as required by National Pollutant Discharge Elimination System (NPDES) 1200-C permit issued by DEQ. No permanent stormwater facilities are proposed as part of this Facility.

V.7 EVIDENCE THAT ADVERSE IMPACTS WOULD BE MINIMAL

OAR 345-021-0010(1)(v)(F) *Evidence that adverse impacts described in (D) are likely to be minimal, taking into account any measures the Applicant proposes to avoid, reduce, or otherwise mitigate the impacts.*

Response: Through the implementation of the solid waste and wastewater reduction and recycling measures described above, the Applicant will reduce project impacts on-site and to the surrounding environment. These measures include materials and supplies to respond to accidental spills and potentially hazardous waste as well as daily practices to reduce solid waste and wastewater generated during construction and operation. For example, oily waste will be stored in sealable drums and removed for recycling or disposal by a licensed contractor. Additionally, spill kits with absorbent pads will be provided on equipment and in on-site temporary storage facilities in order to respond to accidental spills. Furthermore, equipment such as graders and dozers will be available to contain and clean up accidental spills.

All materials disposed of as fill on-site will be disposed of in accordance with OAR 340-093-0080 and other applicable regulations. OAR 340-093-0080 provides a permit exemption to the disposal permit requirement for disposal of inert wastes such as soil, rock, and concrete that does not contain contaminants that could adversely affect waters of the state or the United States. In order to meet the requirements for clean fill as defined in OAR 340-093-0080, all inert construction debris disposed of on-site will be separated from non-inert debris and disposed of properly.

Inert construction waste that could be disposed of on-site would primarily consist of excess waste concrete. If permitted by the landowner, the contractor may dispose of waste concrete

(excess cement mix from a concrete site; batches of concrete that do not meet specifications) on-site. Waste concrete would be placed in an excavated hole, covered with at least three feet of topsoil and regraded to match existing contours.

Packaging materials, paper, food scraps, and other office waste generated at the O&M facility will be sorted for recycling, collected in dumpsters and transported by a local licensed waste hauler to the regional landfill. During construction, sanitary wastes will be collected in portable toilets. All portable toilets will be pumped and cleaned regularly by the construction contractor.

V.8 PROPOSED MONITORING PROGRAM

OAR 345-021-0010(1)(v)(G) *The Applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts.*

Response: Given the waste minimization, reuse, and recycling measures proposed in previous sections, this Facility is not anticipated to produce significant adverse impacts on-site or to adjacent lands. Therefore, no monitoring program is proposed. All waste management activities will comply with applicable regulations and will be periodically inspected by the Applicant.

ATTACHMENT V-1
SEPTIC EVALUATION REPORT

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

REPORT OF EVALUATION FOR ONE LOT
ON-SITE SEWAGE SYSTEMS

(Technical Report – Not a Permit)

For Office Use Only
Lotus Works
Summit Ridge

Township 1S Range 15E Section 32 Tax Lot No. 3000 County: Wasco

Subdivision Name _____ Lot No. _____ Block No. _____ Lot Size _____

The entire property ☐ Has ☒ Has Not been evaluated.

PLOT PLAN OF APPROVABLE AREA:

RECEIVED SEP 10 2009

SEE ATTACHED

SKETCH

Any alteration of the natural conditions in the area approved for the on-site system or replacement area may void this approval. This approval is given on the basis that the lot or parcel described above will not be further partitioned or subdivided and that conditions on subject or adjacent properties have not been altered in any manner which would prohibit issuance of a permit in accordance with O.R.S. 454.605 through 454.755 and Administrative Rules of the Environmental Quality Commission. Any such subdivision, partitioning or alteration may void this report.

The site has been found suitable for installation of the following kinds of on-site sewage disposal systems, with the limitations and additional requirements indicated:

Suitable for standard serial drain field system. Minimum 1500 gallon septic tank, 300 feet of drain field required for an operations and maintenance building serving up to 26 employees daily and six employee showers daily. Soil consists of silt loam to 49 / 32 inches. Slope is 10-18% in drain field area. Special conditions: an effluent filter will be required in the sepic tank. 300' of drain line at site #2 and 460' of drain line at site #1.

Warning: This document is a technical report for on-site sewage disposal only. It may be converted to a permit **only** if, at the time of application, the parcel has been found to be compatible with applicable LCDC-acknowledged local comprehensive land use plans and implementing measures of the Statewide Planning Goals. The Statement of Compatibility may be made on the attached form or its equivalent. Authorized Agent approval is required before a construction permit can be issued.

This report is valid until an on-site sewage system is installed pursuant to a construction permit obtained from Wasco Sherman Health Department, or until earlier cancellation, pursuant to Commission rules, with written notice thereof by the Department of Environmental Quality to the owners according to Department records of the County tax records. Subject to the foregoing, this report runs with the land and will automatically benefit subsequent owners.

John Zalaznik	REHS	9/8/09	NCPHD
(Signature of Authorized Agent)	(Title)	(Date)	(Office)

Lotus Works
Summit Ridge Project
1S 15E 32 3000

8/20/09

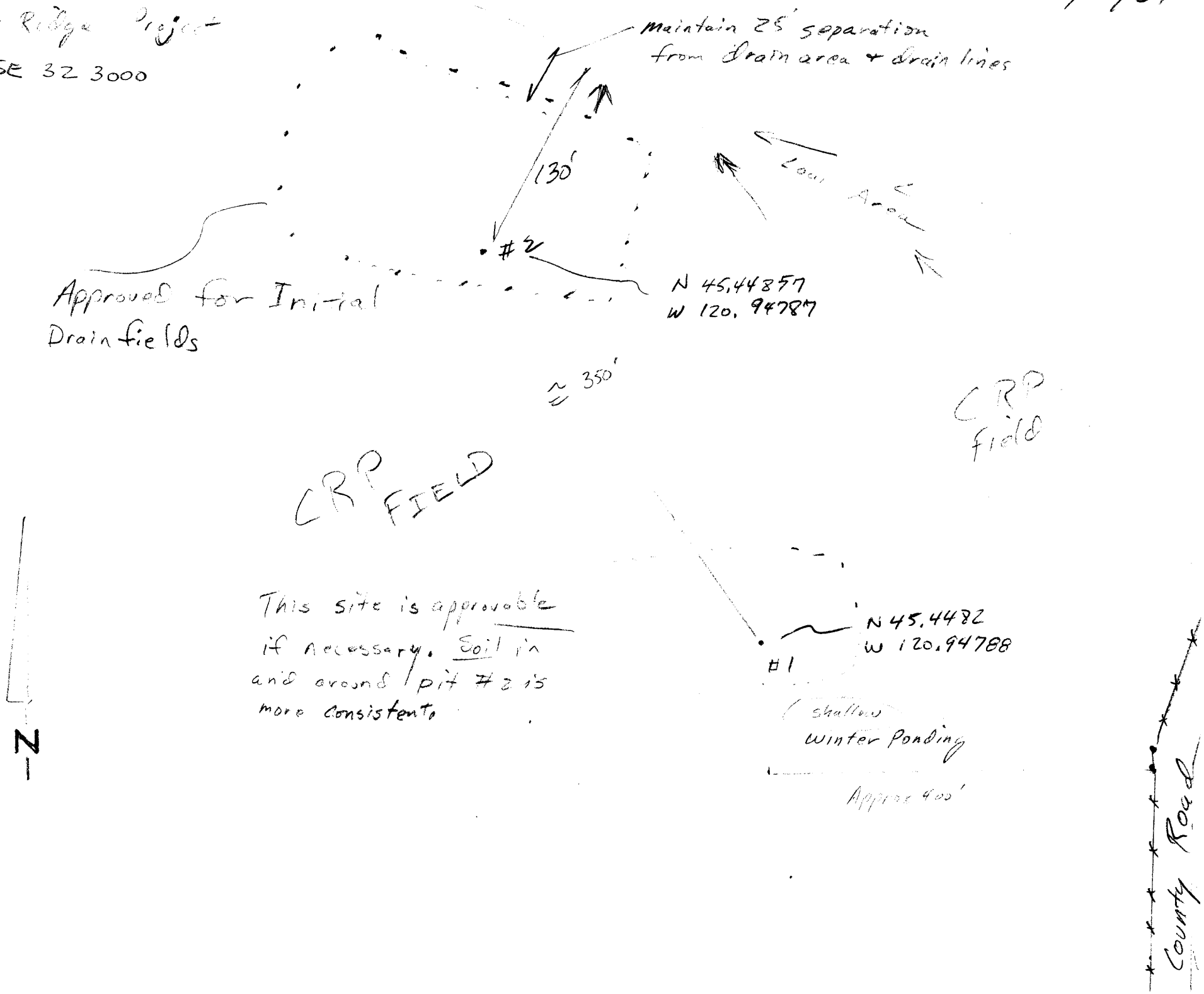

EXHIBIT W

FACILITY RETIREMENT AND SITE RESTORATION

OAR 345-021-0010(1)(w)

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W.6 MONITORING PLAN 4

W.1 INTRODUCTION

OAR 345-021(1)(w) *Information about site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1). The Applicant shall include:*

W.2 ESTIMATED USEFUL LIFE

OAR 345-021(1)(w)(A) *The estimated useful life of the proposed facility.*

Response: Design life for the Facility is 20 years; estimated useful life is 30 years.

W.3 ACTIONS FOR SITE RESTORATION

OAR 345-021(1)(w)(B) *Specific actions and tasks to restore the site to a useful, non-hazardous condition.*

Response: All 87 wind turbine generators (WTGs) will be dismantled and removed from the site. WTG foundations will be demolished to 3-feet below grade. The 34 kV collector power lines from all the WTGs to the plant substation will be removed to a point where the ends of the lines are 3-feet below grade, and then left in the ground. The O&M facility and substation will be dismantled, demolished and removed. The 230 kV transmission line and support structures will be removed. The Facility's access roads will be removed, except for the roads that existed prior to the Facility's construction (of the approximately 25 miles of access roads required for the Facility, approximately 6 miles of that total are existing roads). All areas initially disturbed by the installation of the Facility (and any areas disturbed during its restoration) will be backfilled with native soil, returned to their natural grades, and reseeded with native vegetation. Should existing landowners request alternative solutions, they will be given due consideration.

W.4 ESTIMATED COSTS OF SITE RESTORATION

OAR 345-021(1)(w)(C) *An estimate, in current dollars, of the total and unit costs of restoring the site to a useful, non-hazardous condition.*

Response: See Table W-1a: Cost Estimate for Site Restoration of 2.3 MW Wind Turbine Project Configuration and Table W-1b: Cost Estimate for Site Restoration of 1.8 MW Wind Turbine Project Configuration on the following pages. Costs for these estimates are based on 2nd quarter 2010 dollars.

Table W-1a: Cost Estimate for Site Restoration of 2.3 MW Wind Turbine Project Configuration

Cost Estimate Component	Quantity	Unit Cost	Extension
Disconnect electrical and ready for disassembly (per turbine)	87	$1,010	$87,870
Remove turbine blades, hubs and nacelles (per turbine)	87	$10,734	$933,858
Remove turbine towers (per net ton of steel)	16,748	$69.25	$1,159,764
Remove and load pad transformers (per turbine)	87	$1,700	$147,900
Foundation and transformer pad removal (per cubic yard of concrete)	2,897	$32.66	$94,619
Restore turbine pads (per turbine)	87	$1,280	$111,360
Met Towers			
Dismantle and dispose of met towers (per tower)	3	$7,540	$22,620
Substations and O&M Facility			
Dismantle and dispose of substations (each)	1	$57,096	$57,096
Dismantle and dispose of O&M Facility	1	$109,934	$109,934
Transmission Line			
Removal of 34.5 kV underground transmission line (per LF)	4,350	$1.61	$6,986
Removal of 230 kV transmission line (per mile)	8	$5,380	$43,040
Junction boxes - remove electrical to 4' below grade (each)	76	$1,362	$103,512
Access Roads			
Road removal, grading and seeding (per mile) (Pre-existing roads to remain in place -- approximately 6 miles of roads out of the project's 25 miles of access roads are pre-existing)	19	$47,363	$899,897
Temporary Areas			
Restore area disturbed during restoration work (per acre), including: laydown areas adjacent to each WTG tower; central laydown areas; areas adjacent to meterological towers; areas adjacent to access roads for crane paths; areas adjacent to and corridors disturbed in the course of dismantling 230 kV transmission line towers; and, areas of temporary disturbance aassociated with each roadway turnaround required for facility restoration.	100	$5,704	$570,400
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$222,221	$222,221
SUBTOTAL			**$4,571,078**
Performance Bond		1%	$45,711
GROSS COST			**$4,616,789**
Administration and Project Management		10%	$461,679
Future Developments Contingency		10%	$461,679
Total Site Restoration Cost			**$5,540,147**
Total Site Restoration Cost (rounded to nearest $1,000)			**$5,540,000**

Table W-1b: Cost Estimate for Site Restoration of 1.8 MW Wind Turbine Project Configuration

Cost Estimate Component	Quantity	Unit Cost	Extension
Disconnect electrical and ready for disassembly (per turbine)	87	$1,010	$87,870
Remove turbine blades, hubs and nacelles (per turbine)	87	$10,734	$933,858
Remove turbine towers (per net ton of steel)	15,347	$69.25	$1,062,766
Remove and load pad transformers (per turbine)	87	$1,700	$147,900
Foundation and transformer pad removal (per cubic yard of concrete)	1,931	$32.66	$63,080
Restore turbine pads (per turbine)	87	$1,280	$111,360
Met Towers			
Dismantle and dispose of met towers (per tower)	3	$7,540	$22,620
Substations and O&M Facility			
Dismantle and dispose of substations (each)	1	$57,096	$57,096
Dismantle and dispose of O&M Facility	1	$109,934	$109,934
Transmission Line			
Removal of 34.5 kV underground transmission line (per LF)	4,350	$1.61	$6,986
Removal of 230 kV transmission line (per mile)	8	$5,380	$43,040
Junction boxes - remove electrical to 4' below grade (each)	76	$1,362	$103,512
Access Roads			
Road removal, grading and seeding (per mile) (Pre-existing roads to remain in place – approximately 6 miles of roads out of the project's 25 miles of access roads are pre-existing)	19	$47,363	$899,897
Temporary Areas			
Restore area disturbed during restoration work (per acre), including: laydown areas adjacent to each WTG tower; central laydown areas; areas adjacent to meterological towers; areas adjacent to access roads for crane paths; areas adjacent to and corridors disturbed in the course of dismantling 230 kV transmission line towers; and, areas of temporary disturbance aassociated with each roadway turnaround required for facility restoration.	100	$5,704	$570,400
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$222,221	$222,221
SUBTOTAL			**$4,442,540**
Performance Bond		1%	$44,425
GROSS COST			**$4,486,965**
Administration and Project Management		10%	$448,697
Future Developments Contingency		10%	$448,697
Total Site Restoration Cost			**$5,384,358**
Total Site Restoration Cost (rounded to nearest $1,000)			**$5,384,000**

W.5 METHODS AND ASSUMPTIONS TO ESTIMATE SITE RESTORATION COSTS

OAR 345-021(1)(w)(D) *A discussion and justification of the methods and assumptions used to estimate site restoration costs.*

Response: The method used to estimate the site restoration costs was to use the Oregon Department of Energy's "Facility Retirement Cost Estimating Guide" (November 2, 2005) and associated spreadsheets. Certain unit cost factors shown on these spreadsheets were revised upwards to more adequately reflect the conditions of this Facility.

W.6 MONITORING PLAN

OAR 345-021(1)(w)(E) *For facilities that might produce site contamination by hazardous materials, a proposed monitoring plan, such as periodic environmental site assessment and reporting, or an explanation why a monitoring plan is unnecessary.*

Response: The hazardous materials associated with this Facility are limited to the petroleum-based lubricants used with the WTGs and antifreeze associated with the cooling water circuit of the frequency converter for each WTG. Prior to dismantling, all of these fluids will be drained and/or removed from the each unit, removed from the site and properly disposed. Monitoring will consist of completing a checklist for each WTG to ensure that these fluids have been removed from each unit and recycled, where possible.

EXHIBIT X

NOISE
OAR 345-021-0010(1)(x)

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X.1 INTRODUCTION

OAR 345-021-0010(1)(x) *Information about noise generated by construction and operation of the proposed facility, providing evidence to support a finding by the Council that the proposed facility complies with the Oregon Department of Environmental Quality's noise control standards in OAR 340-035-0035. The applicant shall include:*

Response:

X.1.1 Study Area and Facility Site

The study area for noise impacts includes all areas in Oregon that could be affected by construction or operational noise resulting from the Facility.

The Facility components will be located on private land for which the Applicant has negotiated long-term wind energy leases or easements with the landowners. The wind energy leases allow the Applicant to permit, construct, and operate wind energy facilities for a defined period. The area is sparsely populated; all identified homes are located on lands for which the Applicant has entered into wind energy leases or easements with the landowners. While several of the identified homes are not currently occupied, they have been assessed in this analysis as noise-sensitive receptors.

X.1.2 Existing Noise Conditions

For this Exhibit, the Facility is presumed to be located on "previously unused" land, as defined in Oregon Administrative Rule (OAR) Chapter 340, Division 35. In accordance with these rules, this Exhibit assumes an L_{50} ambient noise level of 26 decibels (A-weighted scale) (dBA).

X.2 PREDICTED NOISE LEVELS

OAR-345-021-0010(1)(x)(A) *Predicted noise levels resulting from construction and operation of the proposed facility.*

Response:

X.2.1 Construction

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control studied noise from individual pieces of construction equipment, as well as from construction sites of power plants and other types of facilities (see Table X-1). Because specific information about types, quantities, and operating schedules of construction equipment is not known at this stage, data from the EPA document for industrial projects of similar size (EPA, 1971) have been used. These data are conservative because the evolution of construction equipment has generally been toward quieter design. Use

of these data is reasonable for estimating noise levels, given that they are still widely used by acoustical professionals.

Table X-1. Average Noise Levels from Common Construction at a Reference Distance of 50 Feet (dBA)

Construction Equipment	Typical Average Noise Level at 50 Feet (dBA)
Air compressor	81
Backhoe	85
Concrete mixer	85
Concrete pump	82
Crane, mobile	83
Dozer	80
Generator	78
Grader	85
Loader	79
Paver	89
Pile driver	101
Pneumatic tool	85
Pump	76
Rock drill	98
Saw	78
Scraper	88
Shovel	82
Truck	91

Source: U.S. EPA, 1971.

Table X-2 shows the total composite noise levels at reference distances of 50 and 1,500 feet, based on the equipment operating for each phase of construction and the typical usage factor for each piece of equipment. The calculated level at 1,500 feet is probably conservative, because the only attenuating mechanism considered is geometric spreading, which results in an attenuation rate of 6 dBA per doubling of distance; attenuation related to the presence of structures, trees or vegetation, ground effects, or terrain is not considered.

Table X-2. Composite Construction Site Noise Levels

Construction Phase	Composite Equipment Noise Level at 50 Feet (dBA)	Composite Equipment Noise Level at 1,500 Feet (dBA)
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

X.2.2 Operation

Underlying data used to generate the operational noise analysis (i.e., the manufacturers' data regarding wind turbine sound power levels used in the preparation of this exhibit) were considered exempt from public disclosure pursuant to ORS 192.501(2) and submitted to the Oregon Department of Energy under separate cover. ORS 192.501(2) conditionally exempts trade secrets from public disclosure. The source noise data for the wind turbine generators are considered confidential by the manufacturers as each set of data reflects each manufacturer's specific equipment configuration. This equipment configuration is considered by each manufacturer to be a unique competitive advantage, and so they seek to prevent this information from public disclosure.

The Facility will use either 66 2.3-megawatt (MW) or 87 1.8 MW turbines. The total number of turbines will not exceed 87. Table X-3 presents the dimensions of the 2.3-MW turbine.

Table X-3. Potential Turbine Dimensions

Turbines	2.3-MW Turbine
Tower Type	Tubular
Hub Height	262 ft (80 m)
Blade (Rotor) Diameter	331 ft (101 m)
Total Turbine Height	428 ft (131 m)

Source: Exhibit B.9.
MW = megawatts.
m = meter(s).
ft = feet.

As described in Exhibit B, the Applicant seeks micrositing flexibility for the Facility with regard to the final layout for turbines and associated access roads and collector cables. The potential layout presented in Exhibit C was used to develop the noise model. The Applicant will submit for the Department's review an acoustical analysis of the final Facility design, along with evidence (including any noise waivers) that demonstrates compliance with OAR 340-035-0035. The Applicant will not start construction of major Facility components until the Department is satisfied that the Facility has fulfilled the requirements of OAR 340-035-0035.

As part of the noise modeling, each wind turbine was considered to be a point source of noise at the hub height identified in Table X-3. Table X-4 presents the anticipated warranted maximum overall and octave band sound power levels determined in accordance with International Electrotechnical Commission (IEC) 61400-11 (2002) for the 2.3-MW and the 1.8 MW turbine. This includes the operation of mechanical equipment such as the hydraulic cooling unit fans regardless of location (i.e., base of the tower or in the nacelle).

Table X-4. Anticipated Maximum Warranted Sound Power Levels									
	Overall (dBA)	**Octave Band Center Frequency, Hz (A-weighted)**							
		63	**125**	**250**	**500**	**1,000**	**2,000**	**4,000**	**8,000**
2.3 MW Turbine	107	84	94	98	102	102	98	91	87
1.8 MW Turbine	109	91	96	98	101	103	102	100	93

Hz = hertz.
dBA = decibels (A-weighted).
MW = megawatts.

Figures X-1 and X-2 presents the noise contours for the proposed turbine layout, including the substation. Transformers are expected to have a National Electrical Manufacturers Association (NEMA) sound rating of 87 dBA.

The model results are presented in Table X-5. The predicted levels do not exceed 50 dBA at any modeled receptor. The Applicant has conducted a thorough review of existing structures within 2,000 feet of the 36 dBA contour. The area is very sparsely populated and no additional residential structures (occupied, unoccupied or abandoned) were identified. All landowners within the 36 dBA contour are project participants, and while some structures are not currently occupied, they are included in this analysis.

Table X-5. Summary of Predicted Noise Levels (dBA)				
Receptor ID	**Predicted Noise Level (2.3 MW)**	**Waiver Required**	**Predicted Noise Level (1.8 MW)**	**Waiver Required**
R01	39	Yes	40	Yes
R02	43	Yes	43	Yes
R03	33	Unoccupied	34	Unoccupied
R04	49	Abandoned	49	Abandoned
R05	49	Yes	50	Yes
R06	44	Yes	45	Yes
R07	48	Abandoned	48	Abandoned
R08	47	Yes	47	Yes
R09	43	Yes	43	Yes
R10	47	Yes	47	Yes
R11	46	Unoccupied	46	Unoccupied
R12	44	Yes	44	Yes

After the precise turbine layout has been determined, and before construction of the Facility, the Applicant will submit for DEQ's administrative review (pursuant to a Council-approved methodology) the IEC 61400-11 or other appropriate acoustical test

reports for the turbines, along with an acoustical analysis of the Facility performed with the same methodology as this analysis. At that time, the Applicant will also submit to DEQ evidence that it has secured the noise easements necessary for sensitive receptors, included abandoned or unoccupied structures that may revert back to residential use, ensuring that Facility noise levels will not exceed allowable levels under the applicable OAR standards.

Corona typically becomes a design concern for transmission lines at 345 kV and above and is less noticeable from lines like these that are operated at lower voltages. Corona noise is also high frequency noise which attenuates rapidly with distance. During wet or foul weather conditions, the conductor will produce the greatest amount of corona noise. However, during heavy rain the noise generated by the falling rain drops hitting the ground will typically be greater than the noise generated by corona and thus will mask the audible noise from the transmission line. No residences are located within 1,000 feet of the proposed transmission line and the closest residence, a project participant, is located approximately 1,400 feet away. The Applicant is committed to designing and operating the project in full compliance with the applicable requirements and as stated above, prior to construction will submit an acoustical analysis of the final layout.

X.3 COMPLIANCE WITH APPLICABLE NOISE REGULATIONS

OAR 345-021-0010(1)(x)(B) *An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035, including a discussion and justification of the methods and assumptions used in the analysis.*

Response:

X.3.1 Summary of Regulations

OAR Chapter 340, Division 35, specifically addresses wind energy facilities, as follows:

- OAR 340-035-0035(1)(b)(B)(iii)(I) establishes the option for a proposed wind energy facility to assume a background L_{50} ambient noise level of 26 dBA.

- OAR 340-035-0035(1)(b)(B)(iii)(IV) requires a proposed wind energy facility to satisfy the ambient noise standard (where a landowner has not waived the standard) by predicting facility noise levels at the appropriate measurement point, assuming that all of the proposed wind facility's turbines are operating between cut-in speed and the wind speed corresponding to the maximum sound power level established by IEC 61400-11. These predictions are to be compared with the assumed ambient noise level of 26 dBA, or with the actual ambient background L_{10} and L_{50} noise levels, if measured. The Facility complies with the ambient background standard if this comparison shows that the increase in noise is not more than 10 dBA over this entire range of wind speeds.

- OAR 340-035-0035(1)(b)(B)(iii)(VI) requires that the Facility predict compliance with the "Table 8" limits set forth in the regulations, which are summarized in Table X-6.

Compliance must occur at the appropriate measurement point, with reference to the turbine's maximum sound power level, following procedures established by IEC 61400-11, and assuming that all of the Facility's turbines are operating at the maximum sound power level.

Table X-6. State of Oregon Statistical Noise Limits for Industrial and Commercial Sources (OAR 340-035-0035)

Statistical Descriptor	Maximum Permissible Statistical Noise Levels (dBA)	
	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
L_{50}	55	50
L_{10}	60	55
L_1	75	60

NOTE:
Based on "Table 8" of OAR 340-035-0035: New Industrial and Commercial Noise Source Standards and on OAR-340-035-0035(1)(b)(B)(i).

The noise limits apply at "appropriate measurement points" on "noise-sensitive property." The "appropriate measurement point" is defined in OAR 340-035-0035 as whichever of the following is farther from the noise source:

- 25 feet (7.6 meters) toward the noise source from that point on the noise-sensitive building nearest the noise source
- That point on the noise-sensitive property line nearest the noise source

"Noise-sensitive property" is defined as "real property normally used for sleeping, or normally used as schools, churches, hospitals, or public libraries. Property used in industrial or agricultural activities is not noise-sensitive property unless it meets the foregoing criteria in more than an incidental manner." Residences are the only noise-sensitive property identified in the Facility area.

In addition to the above limits, OAR 340-035-0035(1)(f) establishes standards that regulate octave band sound pressure levels and audible discrete tones. Such standards can be applied by the Oregon Department of Environmental Quality (DEQ) when it believes subsections (1)(a), (b), or (c) do not adequately protect the health, safety, or welfare of the public. Impulse sound is also regulated in OAR 340-035-0035(1)(d), but wind turbines do not generate impulse sound.

X.3.2 Construction

Because OAR 340-035-0035(5)(g) specifically exempts construction activity, by regulation, there will be no applicable construction noise standard. Section X.2.1 and Table X-2 present the expected construction noise levels.

Decommissioning activities will be similar to the activities anticipated during the construction phase, but shorter in duration. Therefore, decommissioning will not cause a significant noise impact.

X.3.3 Operation

The maximum operational noise levels for the proposed turbine and layout are presented in Table X-5 and Figures X-1 and X-2. As shown in Table X-5 and Figure X-1 and X-2, all receptors comply with the "Table 8 limit" of 50 dBA. After the precise turbine layout has been selected, and before construction of the Facility, the Applicant will submit for Department administrative review (pursuant to Council-approved methodology) an acoustical analysis of the Facility performed with the same methodology as this analysis. At that time, the Applicant will also submit to the Department evidence that it has secured the noise easements necessary for sensitive receptors.

X.3.3.1 Methods and Assumptions

Standard acoustical engineering methods were used in the noise analysis of the Facility. The noise model, CADNA/A by Datakustik GmbH of Munich, Germany (CADNA/A Version 3.72, 2009), is a sophisticated software program that enables complete noise modeling of complex industrial plants. The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613 (ISO, 1993) and VDI 2714 (VDI, 1988). Atmospheric absorption for conditions of 10 degrees Celsius (°C) and 70 percent relative humidity (conditions that favor propagation) was computed in accordance with ISO 9613-1 and the Simple Ground procedure per ISO 9613-2, as requested by the Department. This model and ethodology have been required previously by the Department. Potential reductions afforded by topographic shielding have not been included.

All turbines and substations were assumed to be operating at the sound power levels shown in Table X-7. The modeled turbine levels are based on the anticipated warranted sound power levels.

All turbines and substations were assumed to be operating at the sound power levels shown in Table X-7. The modeled turbine levels are based on the anticipated warranted sound power levels.

Table X-7. Modeled Octave Band Sound Power Levels

	Overall (dBA)	Octave Band Center Frequency, Hz (A-weighted)							
		63	125	250	500	1,000	2,000	4,000	8,000
2.3 MW Turbine	107	84	94	98	102	102	98	91	87
1.8 MW Turbine	109	91	96	98	101	103	102	100	93
Substation Transformers (87-dBA NEMA)*	106	83	95	97	103	100	96	91	82

* Transformers are expected to have a National Electrical Manufacturers Association (NEMA) sound rating of 87 dBA or less. A total of two transformers were modeled.

X.4 DESCRIPTION OF PROPOSED MITIGATION MEASURES

OAR 345-021-0010(1)(x)(C) *Any measures the applicant proposes to reduce noise levels or noise impacts or to address public complaints about noise from the facility.*

Response:

The Applicant proposes to secure the noise easements or waivers necessary to ensure that Oregon noise standards are met at all noise-sensitive receptors.

X.5 MONITORING PROGRAM

OAR 345-021-0010(1)(x)(D) *Any measures the applicant proposes to monitor noise generated by operation of the facility.*

Response:

A noise monitoring program is not proposed because of the absence of predicted impacts.

X.6 CONCLUSION

This noise analysis concludes that applicable DEQ noise regulations will be met for construction and operation of the Facility. The Applicant has provided information about the predicted noise levels during the Facility's construction and operation in accordance with OAR 345-021-0010(1)(x)(A), and has included an analysis of the Facility's compliance with applicable DEQ noise regulations per OAR 345-021-0010(1)(x)(B). In addition, pursuant to OAR 345-021-0010(1)(x)(C) and (D), the Applicant has provided information demonstrating that it will secure noise waivers where necessary. Accordingly, the Applicant has provided sufficient evidence to support the Council's finding that the Facility complies with applicable DEQ noise control standards in OAR 340-035-0035.

X.7 REFERENCES

CADNA/A Version 3.72. 2009. Datakustik, GmbH. Munich, Germany. August 2009. http://www.datakustik.de/frameset.php?lang=en

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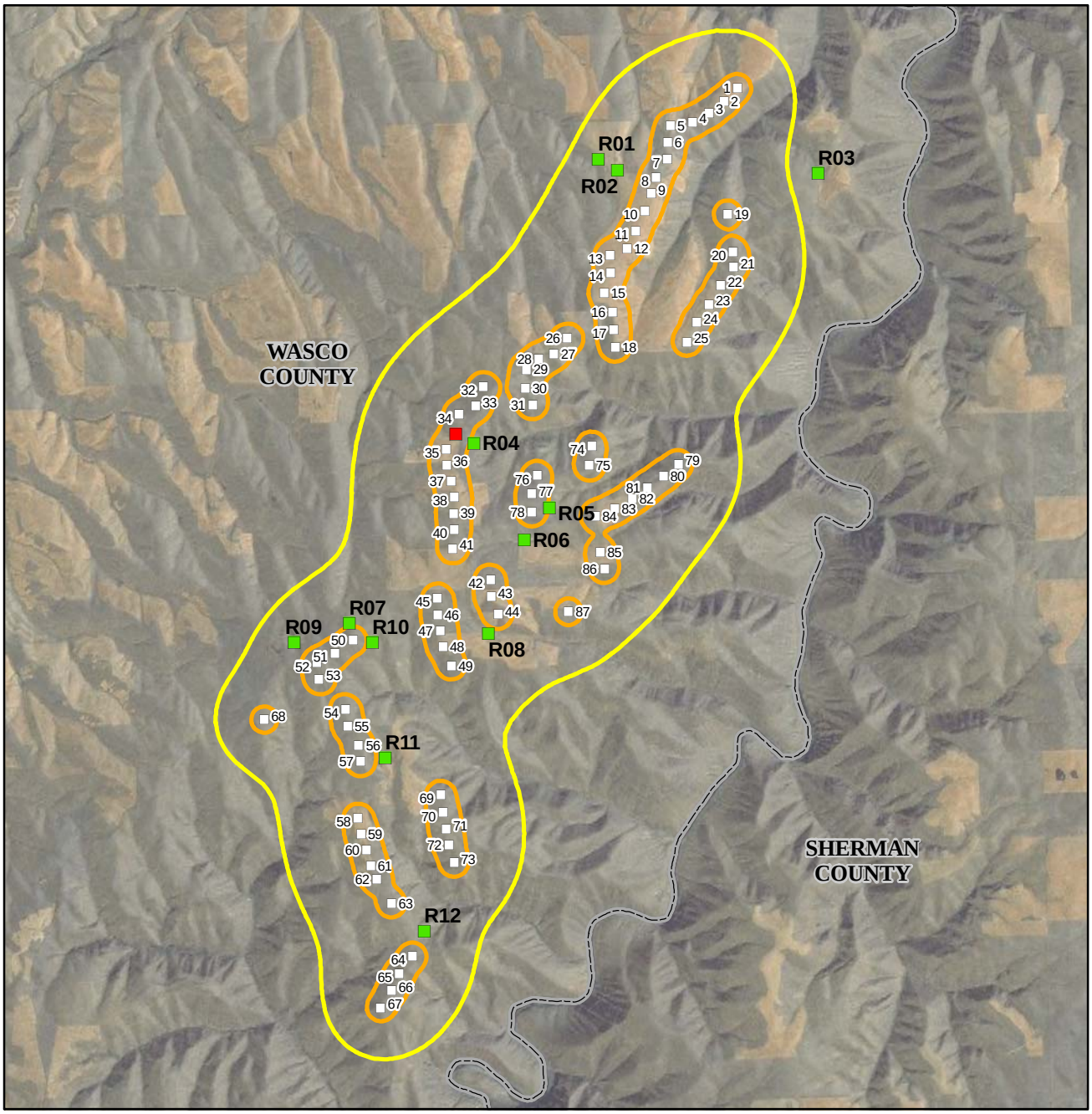
FIGURES



LEGEND

- Turbine
- Substation
- Receptor
- 36-dBA Noise Contour
- 50-dBA Noise Contour
- County Boundary

VICINITY MAP

N

0 5,000 10,000

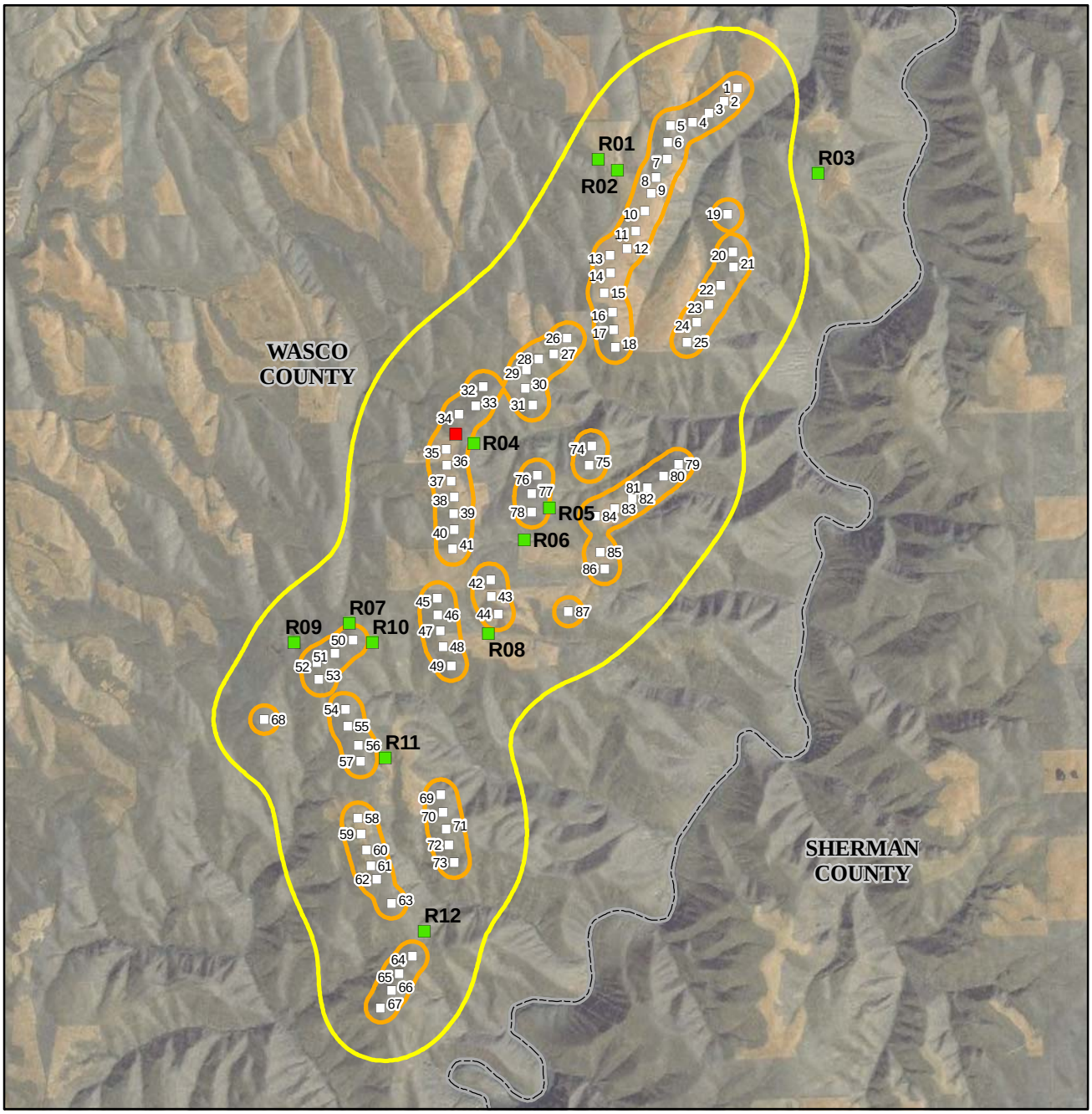
Feet

FIGURE X-1

Noise Contours (Siemens 2.3 MW Turbines)

Lotus Works Energy

Wasco County, Oregon



LEGEND

- Turbine
- Substation
- Receptor
- 36-dBA Noise Contour
- 50-dBA Noise Contour
- County Boundary

VICINITY MAP

N

0 5,000 10,000

Feet

FIGURE X-2
Noise Contours (Vestas V100)
Lotus Works Energy
Wasco County, Oregon

EXHIBIT AA

ELECTRIC TRANSMISSION LINE

OAR 345-021-0010(1)(aa)
OAR 345-024-0090(1)
OAR 345-024-0090(2)

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FIGURES *(located after text)*

ATTACHMENT

AA-1 Electric and Magnetic Field Analysis Program Results

AA.1 INTRODUCTION

OAR 345-021-0010(1)(aa) *If the proposed facility includes an electric transmission line:*

Response: The Facility will include a 230-kV single circuit overhead transmission line between the Facility collector substation and the existing network transmission line. The length of the new transmission line will be about eight miles.

The Facility will also include 34.5-kV collector circuits between the individual turbines and the Facility collector substation. Most, if not all, of those circuits will be placed underground for their entire length. Those circuits are also addressed below, where applicable.

AA.2 ELECTRIC AND MAGNETIC FIELDS

(A) Information about the expected electric and magnetic fields, including:

Distance from Transmission Line Center Line to Edge of Right-of-Way

(i) The distance in feet from the proposed center line of each proposed transmission line to the edge of the right-of-way;

Response: The Facility transmission line voltage will be 230-kV in order to match the voltage of the network transmission line. The length of the new transmission line will be about eight miles. The width of the right-of-way being procured for the transmission line is 150 feet. The transmission line will be located approximately in the center of the right-of-way; therefore the centerline of the transmission line will typically be 75 feet from the edge of the right-of-way.

The 34.5-kV underground and overhead collector circuits do not have a separate associated right-of-way because the entire wind farm is considered right-of-way for the collector circuits. In the responses below, the electric and magnetic field (EMF) characteristics associated with the collector circuits are described, but no values at the edge of a right-of-way can be given.

Types of Occupied Structures within 200 Feet of Center Line of Proposed Transmission Lines

(ii) The type of each occupied structure, including but not limited to residences, commercial establishments, industrial facilities, schools, daycare centers, and hospitals, within 200 feet on each side of the proposed center line of each proposed transmission line.

Response: There are no occupied structures, nor any structures meant for occupation, within 200 feet of the centerline of the proposed transmission line.

Distance from Proposed Center Lines to Structures

(iii) The approximate distance in feet from the proposed center line to each structure identified in (A);

Response: Not Applicable.

Graphs of Electric and Magnetic Field Levels

(iv) At representative locations along each proposed transmission line, a graph of the predicted electric and magnetic fields levels from the proposed center line to 200 feet on each side of the proposed center line;

Response: Refer to Figure AA-1 for a representation of the typical transmission line structure. Refer to Figures 1M and 1E and Table AA-1 below for predicted electric and magnetic fields at 1 meter above ground level due to the transmission line. The indicated electric and magnetic fields are representative of the locations of maximum anticipated fields, which occur at approximately the mid-span between pole structures where clearances above ground are near the minimum.

Table AA-1. Calculated Electric and Magnetic Fields for the 230-kV Transmission Line

	Left edge of R/W (75')	Max. on R/W	Right edge of R/W (75')
Electric Field (kV/m)	.5	3.6	.5
Magnetic Field (mGauss)	20	132	20

Refer to Figure AA-2 for a representation of the typical 34.5-kV overhead collector circuit structure. Refer to Figures 2M and 2E for predicted electric and magnetic fields at 1 meter above ground level due to the overhead collector. The indicated electric and magnetic fields are representative of the locations of maximum anticipated fields, which occur at approximately the mid-span between pole structures where clearances above ground are near the minimum. The maximum electric field for the 34.5-kV overhead collector line is about 0.5 kV/m and the maximum magnetic field is about 79 milli-Gauss (mGauss). The maximums occur on the center line of the line and drop off rapidly to either side.

Predicted magnetic fields at representative locations along the underground collector circuits are shown in Figures AA-3M and 4M for single and six parallel circuits respectively. Electric field data are not given. Due to the insulated and shielded underground cables, the electric fields at ground level are very low and not measurable. The maximum magnetic field strength at 1 meter above ground level is estimated to be 23 mGauss for a single circuit and 20 mGauss for six parallel circuits.

Mitigation Measures

(v) Any measures the applicant proposes to reduce electric or magnetic fields

Response: Electrical and magnetic fields are produced by any electrical device, including power transmission and distribution facilities, residential wiring, and household appliances. Many studies and much research has been made into whether those fields pose a risk to human health. To date, there is no consensus that there is a causal link between EMF exposure and adverse public health effects. Nevertheless, owners and operators of electric

utility facilities customarily will practice prudent avoidance, that is, implement low or no cost EMF mitigation measures in projects where practical.

Some characteristics of the Facility will unavoidably produce EMF. The applicant has incorporated the following techniques to reduce electric or magnetic field exposure to the public:

- Siting facilities remotely from the public – since both electric and magnetic field strengths fall off greatly with distance, the siting of EMF producing facilities so they are not located in close proximity to residences and continuously occupied buildings reduces the public's exposure to EMF.

- Adequate right-of-way widths – in order to prevent future residential use of land in close proximity to transmission lines, right-of-way easements are procured from land owners or land management agencies with the stipulations that no occupyable structures will be built within the right-of-way. The right-of-way width for the 230-kV transmission line is 150 feet, which ensures that any future development outside the right-of-way will experience only minimal EMF exposure.

- Current balance – Magnetic fields can be reduced by maintaining good current balance between the three phases of the transmission line. By their very nature, the wind turbines produce balanced current from phase to phase. Any single-phase station service power that is drawn from the substation will be small in relation to the total power in the transmission line and will not significantly affect current balance.

- Multiple circuits – two or more circuits may be carried on each 34.5-kV overhead collector circuit pole. Appropriate arrangement of the phases provides some cancellation effect that will reduce the electric field from that which would be experienced with a single circuit in a vertical or horizontal arrangement.

Other available methods to reduce ground-level EMF exposure include raising the conductors and/or changing to a different conductor arrangement such as vertical or delta style poles. Both of these measures increase the transmission pole height, which increases other considerations such as aesthetic impacts.

Assumptions and Methods

(vi) The assumptions and methods used in the electric and magnetic field analysis, including the current in amperes on each proposed transmission line; and

Response: The electric and magnetic field values are calculated using the Corona and Field Effects Program (Version 3), developed by the Bonneville Power Administration, U.S. Department of Energy. This program and similar programs have been in use for many years with results verified by actual measurements. Field strength values are calculated at 1 meter above ground.

For the 230-kV transmission line, the variables affecting the calculations and field strength estimates are:

- Line Load – the magnetic field is proportional to the current (amperage) in the conductors, which in turn is proportional to the power being generated by the Facility. For the purpose of estimating the maximum anticipated magnetic field strength, the calculations were made assuming 200MW net generation from the Facility, which equates to 502 amps in each of the 3 phases of the 230-kV transmission line.

- Line Voltage – the electric field is proportional to the voltage of the line, which in this case is the same as the BPA transmission line to which the Facility is connected, or 230,000 volts.

- Phase Spacing – the proposed configuration of the transmission line places the three conductors in a horizontal arrangement, spaced 20 feet apart.

- Line Clearance – the maximum anticipated electric and magnetic fields at ground level would occur at mid-span between transmission poles where the conductors are the closest to the ground. For the purposes of this study, the minimum clearance between the ground and the conductor was assumed to be near the minimum required by the National Electric Safety Code, or about 25 feet. Final design and construction of the line will result in actual clearances greater than the minimum under all weather and loading conditions.

- Conductor Size – the assumed conductor is 795 kcmil ACSR, one conductor per phase.

- Shield Wire – the presence of the shield wire at the top of one of the legs of the transmission line structures slightly affects the electro-magnetic field strength.

For the 34.5-kV overhead collector circuits, the variables affecting the calculations and field strength estimates are:

- Line Load – the magnetic field is proportional to the current (amperage) in the conductors, which in turn is proportional to the power being generated by the turbines connected to the circuit. For the purpose of estimating the maximum anticipated magnetic field strength, the calculations were made assuming circuits are limited to 600 amps in each of the 3 phases.

- Line Voltage – the electric field is proportional to the voltage of the line, which in this case is 34,500 volts.

- Phase Spacing – the proposed configuration of the overhead line places the three conductors in a staggered vertical arrangement, spaced four feet apart vertically and 3.5 feet apart horizontally.

- Line Clearance – the maximum anticipated electric and magnetic fields at ground level would occur at mid-span between transmission poles where the conductors are the closest to the ground. For the purposes of this study, the minimum clearance between the ground and the conductor was assumed to be about 20 feet.

- Conductor Size – the assumed conductor is 636 kcmil AAC, one conductor per phase.

For the 34.5-kV underground collector circuits, the electric field is contained within the insulation of the cable. Within the insulation layers are grounded conducting shield layers which means there is no measurable voltage at the cable surface and hence no measurable electric field at the surface of the ground above the cables. The insulation and shielding do not contain the magnetic field; therefore there is a measurable magnetic field at the surface of the ground above the cables.

For the 34.5-kV underground collector circuits, the variables affecting the calculations and field strength estimates are:

- Circuit Load – the maximum loading was assumed to be 600 amps per phase for the proposed 1,000 kcmil aluminum cable.

- Cable Location – the cables are assumed to be buried a minimum of 48 inches, with the three phases direct buried in a trefoil arrangement.

- Parallel Circuits – the existence of parallel circuits affects both the peak magnitude and the off-center magnitude of the magnetic field. Results are given for a single circuit, and for six parallel circuits with 10 feet of separation between circuits.

Monitoring

(vii) The applicant's proposed monitoring program, if any, for actual electric and magnetic field levels; and

Response: No program for monitoring actual electric and magnetic field levels is proposed at this time.

AA.3 ALTERNATE METHODS

(B) An evaluation of alternate methods and costs of reducing radio interference likely to be caused by the transmission line in the primary reception area near interstate, U.S., and state highways;

Refer to Figure AA-5 for a representation of the anticipated RFI levels in db microvolts/meter to a distance of 200 feet on either side of the centerline of the 230-kV transmission line. RFI levels for the 34.5-kV overhead and underground collector circuits are not shown because the RFI emissions from those lines are negligible.

Radio frequency interference (RFI) effects due to high-voltage transmission lines drop off rapidly with distance from the line, being inversely proportional to the square of the distance from the line. The nearest state highway is Highway 197 at a distance of over 2 miles and the nearest interstate highway is I-84 at 9.5 miles distance. RFI effects are negligible at distances of more than a couple hundred feet from the line.

Radio frequency interference is a consequence of corona discharges from the conductor and from energized line hardware on the transmission line. These discharges represent loss of energy from the transmission line, which is undesirable for many reasons. Modern hardware design and construction practices have been developed to minimize these losses, and hence also minimize RFI. Another factor that influences corona discharge is rain droplets on the conductor. This effect is proportional to voltage, and is mitigated by the fact that the transmission line voltage is 230-kV instead of 345-kV or 500-kV where corona discharge effects are more noticeable.

AA.4 CONCLUSION

Based on the above information, the Applicant has satisfied the required OAR 345-021-0010(1)(aa), and has demonstrated that the standard contained in OAR 345-024-0090 has been satisfied.

AA.5 REFERENCES

EPRI. 1987. Transmission Line Reference Book, 345-kV and Above. Second Edition revised. Publication No. EL-2500, Electric Power Research Institute, Palo Alto, California.

NIEHS. 1999. National Institute of Environmental Health Sciences Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. NIH Publication No. 99-4493.

FIGURES

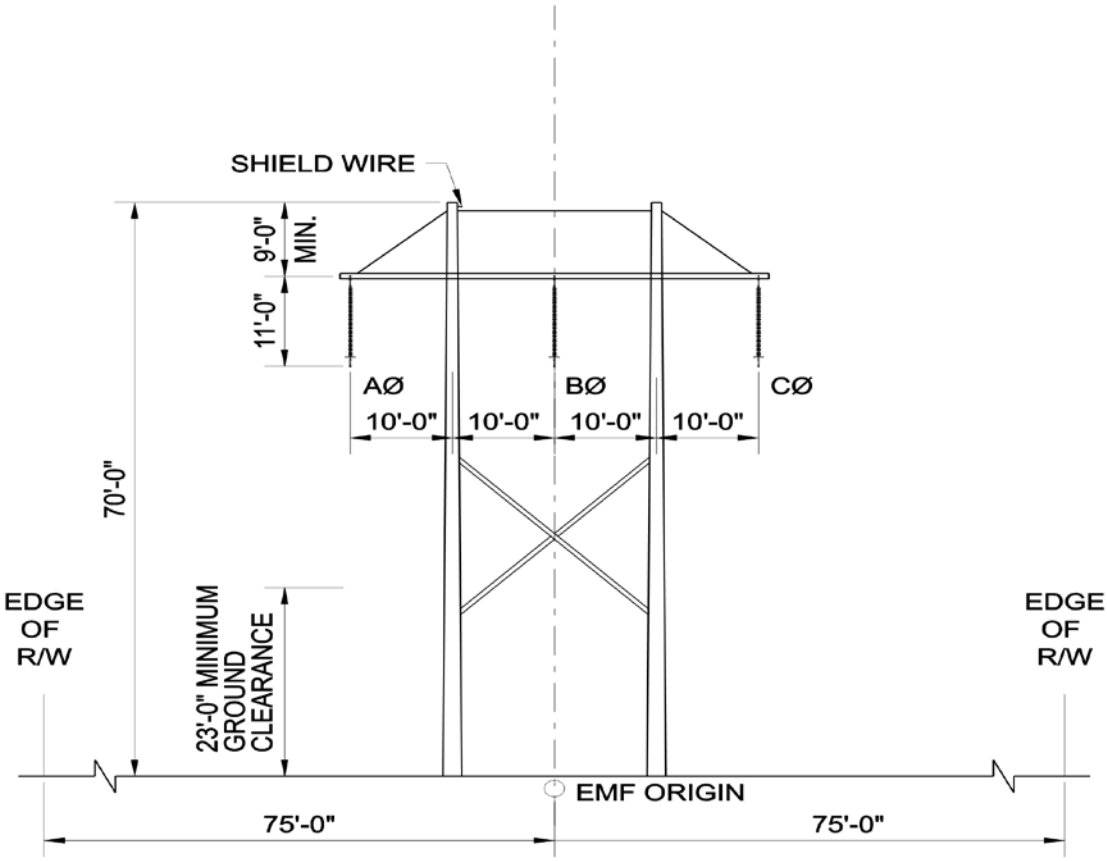

Figure AA-1
Proposed Typical 230-kV Transmission Line Configuration, with OPGW Shield Wire

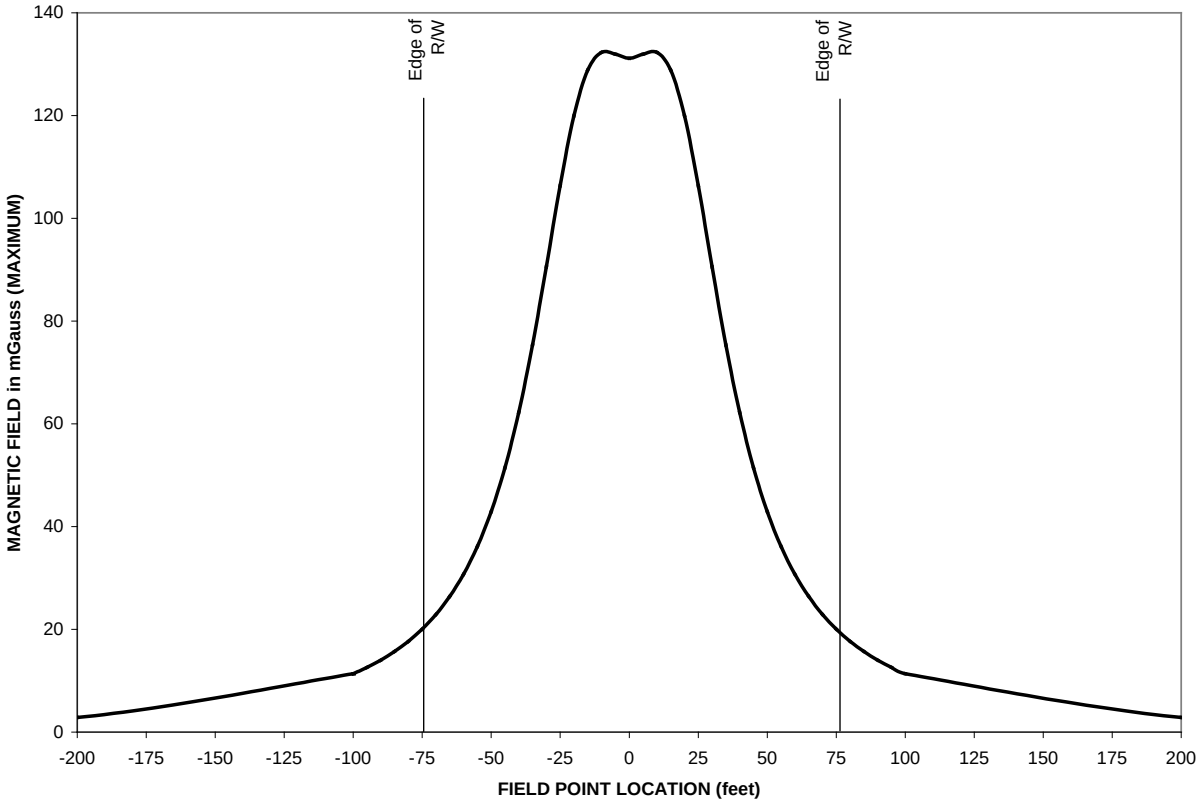

Figure AA-1M
Magnetic Field Profile for 230-kV Line

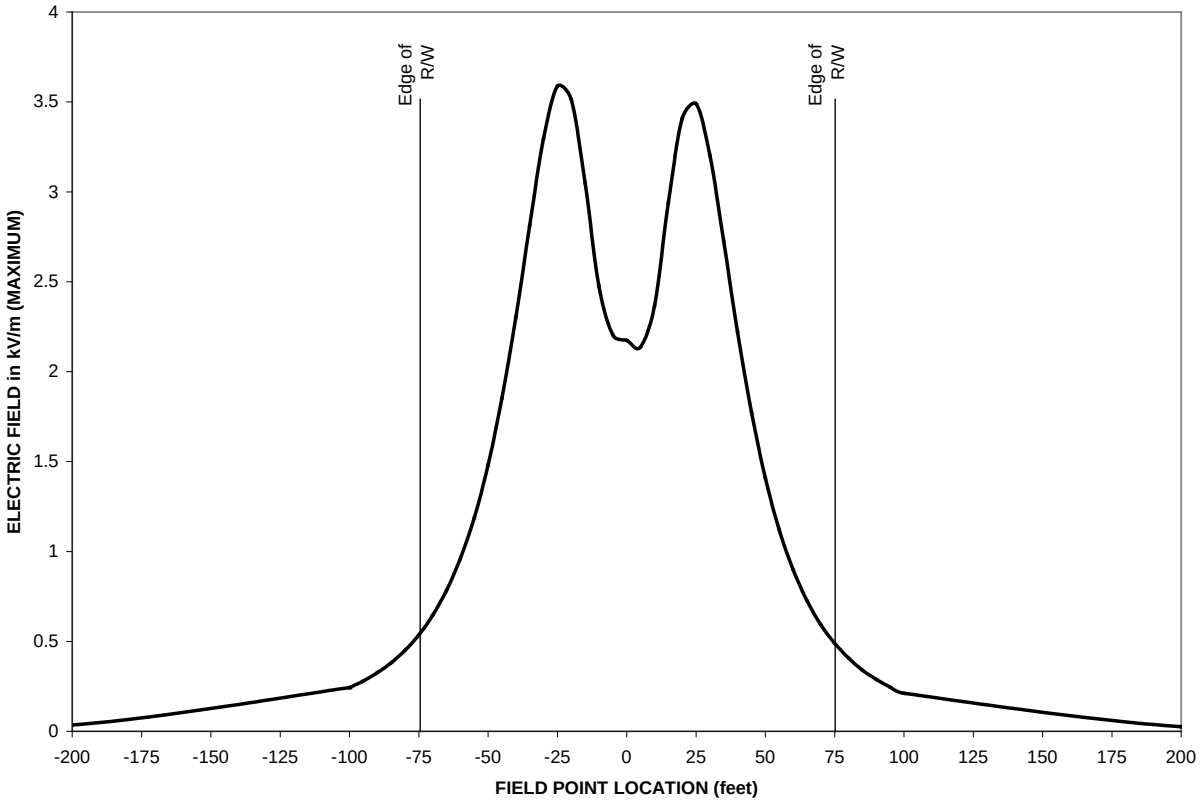

Figure AA-1E
Electric Field Profile for 230-kV Line

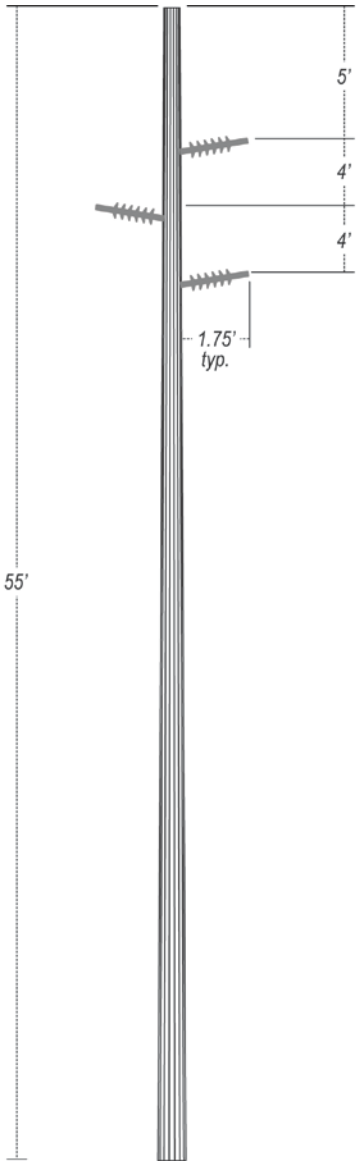

Figure AA-2
Proposed Typical Overhead 34.5kV Collector Circuit Configuration

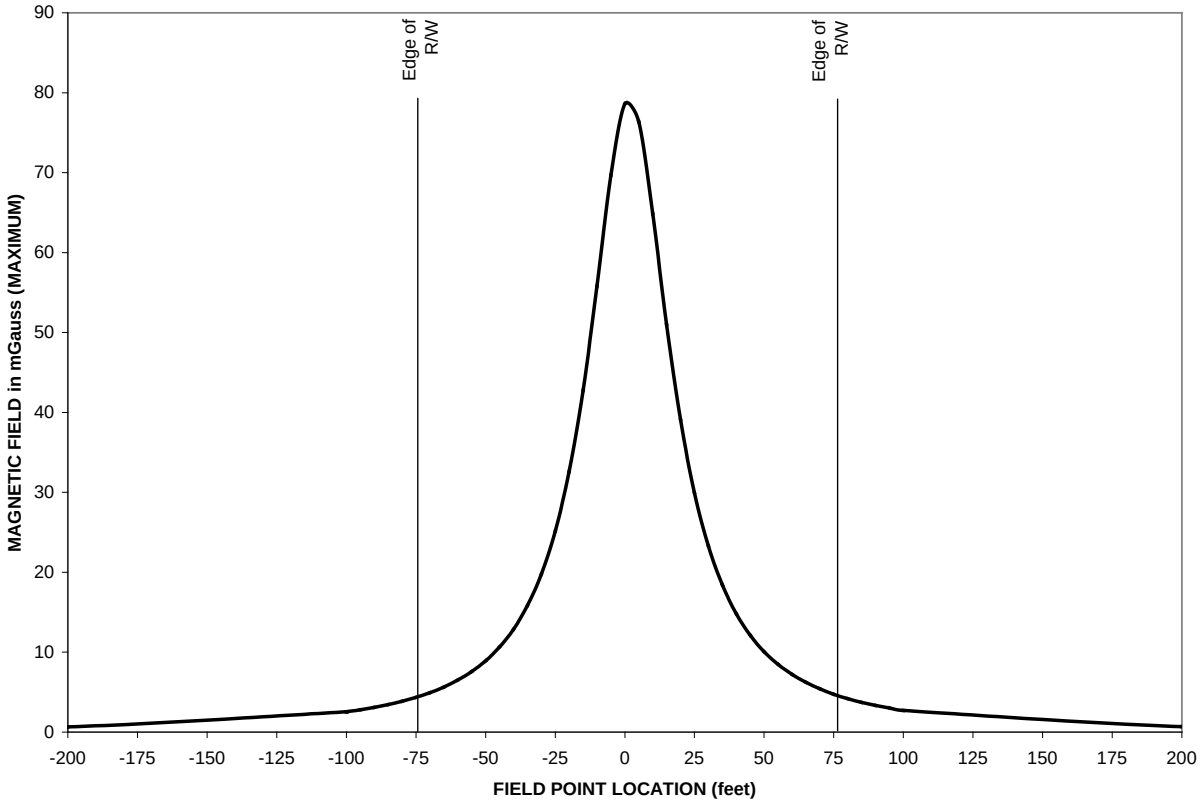

Figure AA-2M
Magnetic Field Profile for Overhead 34.5kV Collector Circuit

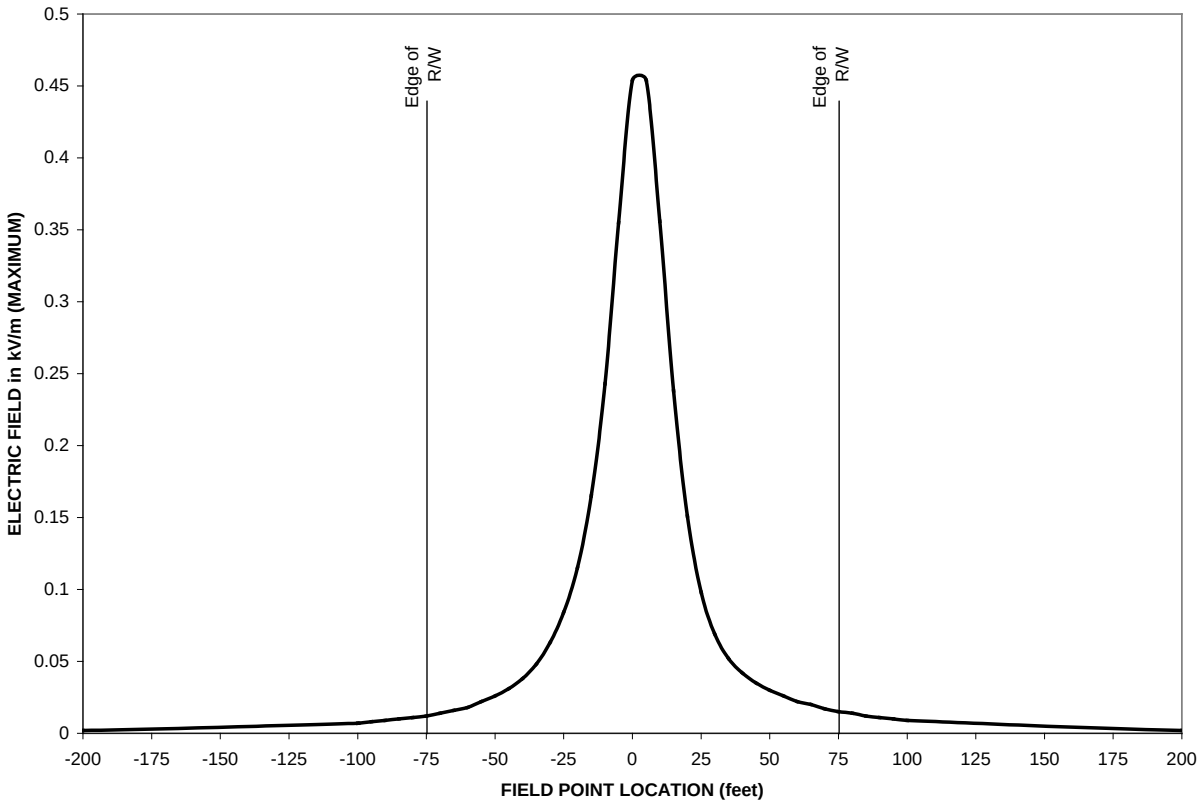

Figure AA-2E
Electric Field Profile for Overhead 34.5kV Collector Circuit

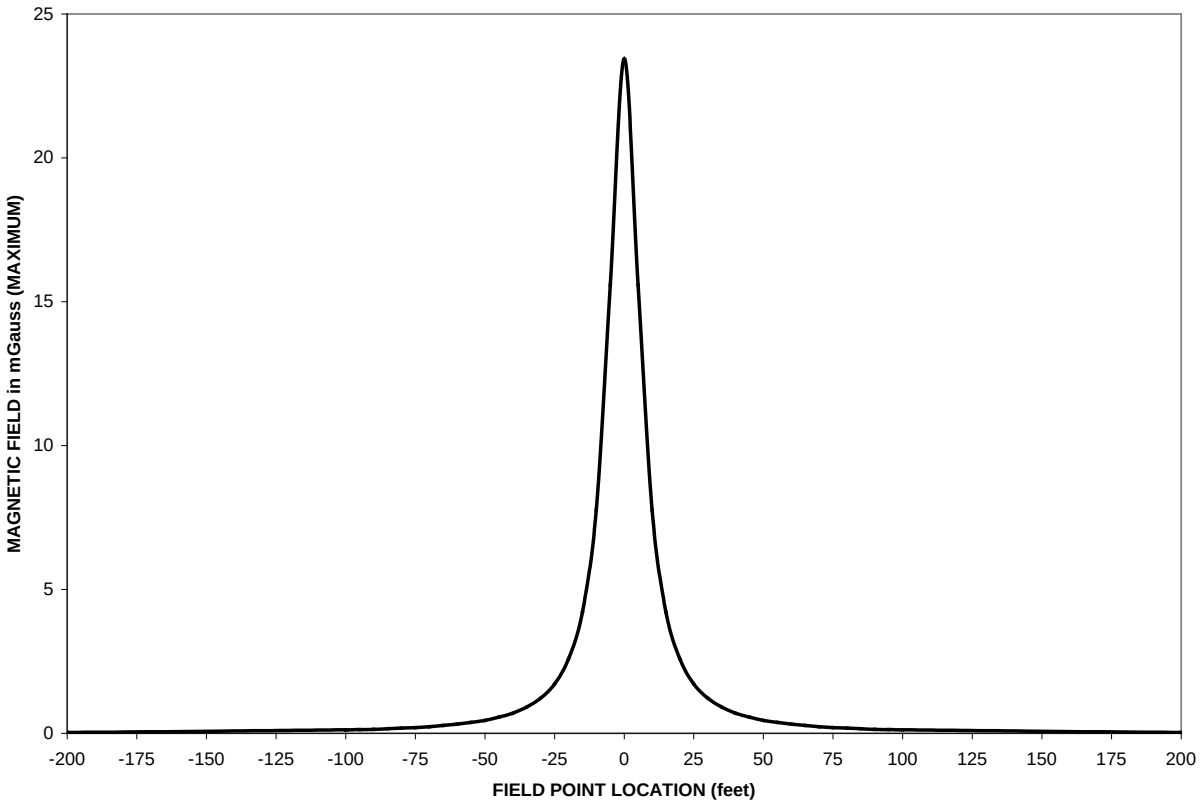

Figure AA-3M
Magnetic Field Profile for Single 34.5kV Underground Circuit

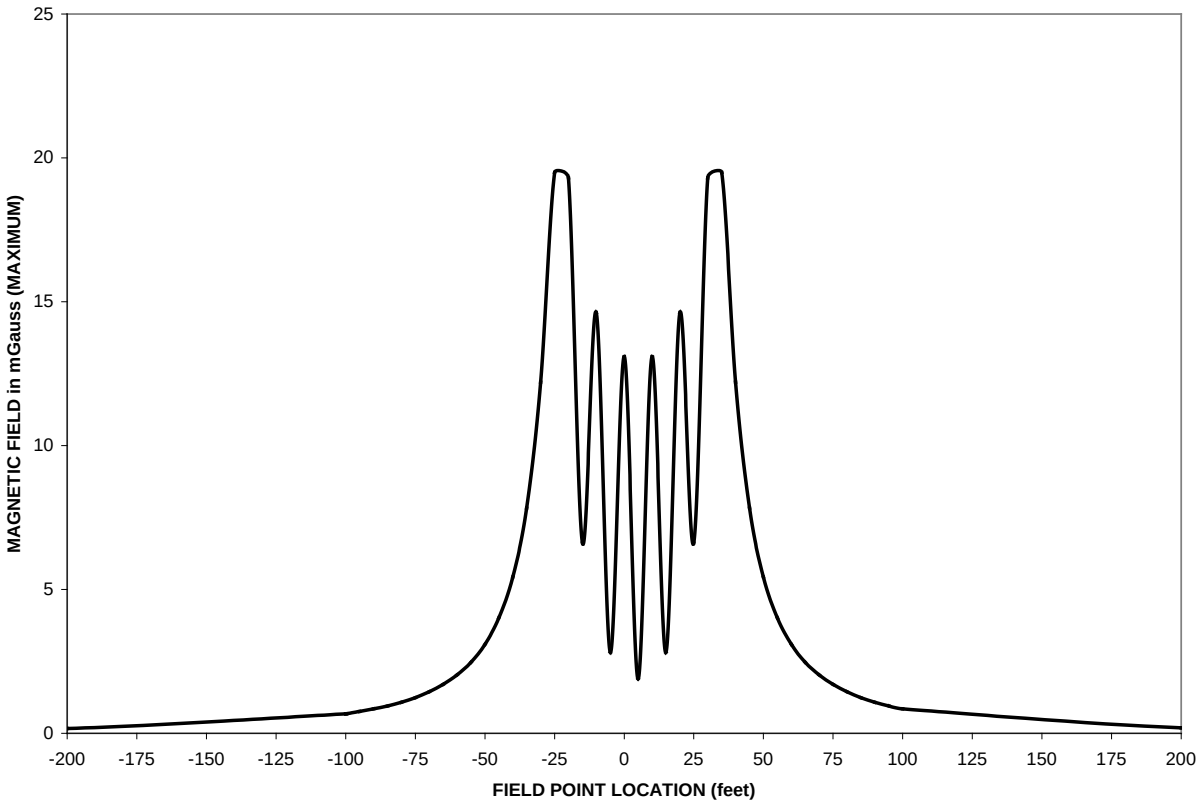

Figure AA-4M
Magnetic Field Profile for Six 34.5kV Underground Parallel Circuits

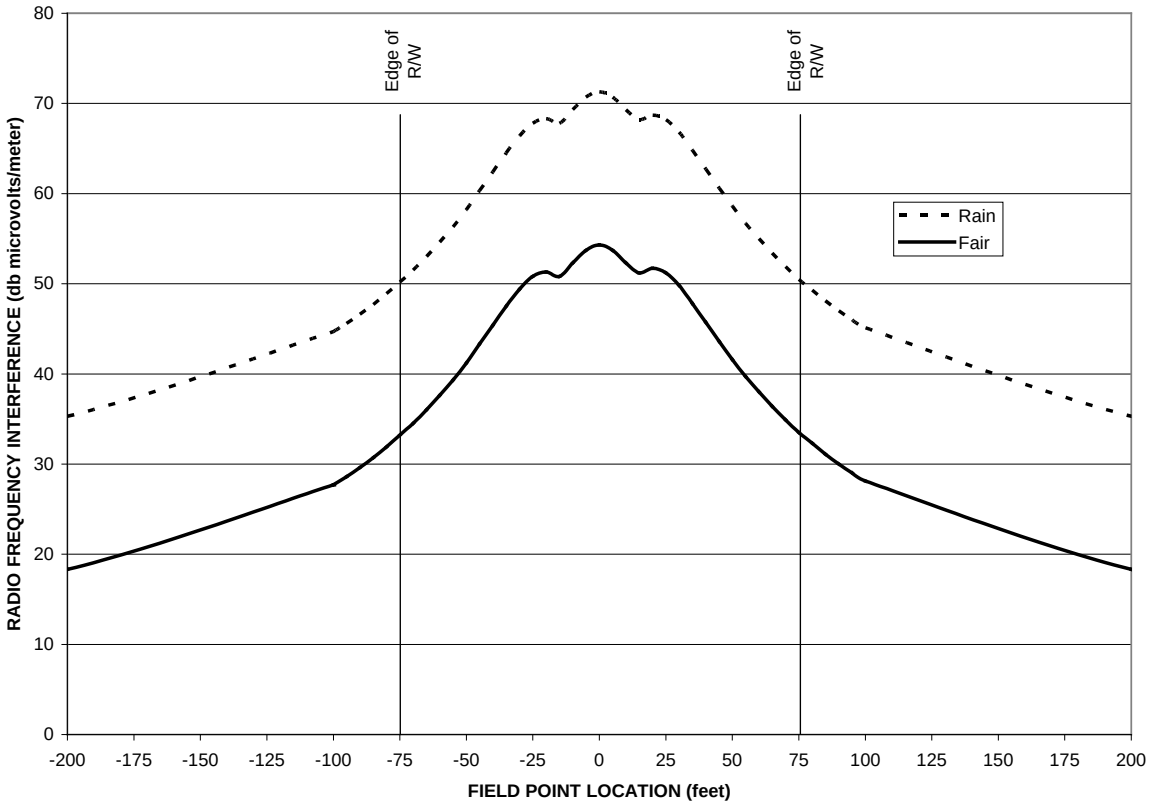

Figure AA-5
Radio Interference Profile at 1-kHz for the 230-kV Overhead Transmission Line

ATTACHMENT AA-1
ELECTRIC AND MAGNETIC FIELD ANALYSIS PROGRAM RESULTS

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ÛßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßßÛ
Û       C O R O N A   A N D   F I E L D       Û
Û E F F E C T S   P R O G R A M   V E R. 3   Û
Û   Source: Bonneville Power Administration   Û
ÛÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÛ
```

INPUT DATA LIST

```
                  9/ 2/2009         09:57:48
******************  CORONA AND FIELDS PROGRAM Version 3 ****************
******************  Summit Ridge Run 11 230kV H-frame   ****************
1,0, 3, 4,0.0,    .00,   2.00,    .00

(ENGLISH UNITS OPTION)

(GRADIENTS ARE COMPUTED BY PROGRAM)

PHYSICAL SYSTEM CONSISTS OF  4 CONDUCTORS, OF WHICH  3 ARE ENERGIZED PHASES

OPTIONS: 'EF','MF','RI'
  5.000,  5.000, 10.000,   .000,  1.000, 75.000,  3.280,  2.000,  3.280
'PH.A-1  ','A',   20.00,   25.00, 1,   1.108,    .000, 133.000,    .000,    .503,    .000
'PH.B-1  ','A',     .00,   25.00, 1,   1.108,    .000, 133.000,-120.000,    .503,    .000
'PH.C-1  ','A',  -20.00,   25.00, 1,   1.108,    .000, 133.000, 120.000,    .503,    .000
'GND1-1  ','A',   10.00,   45.00, 1,    .486,    .000,    .000,    .000,    .000,    .000
 10-1000.0  100.0
 20 -100.0    5.0
 20     .0    5.0
 10  100.0  100.0
  0     .0     .0
1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - RAIN
```

* * * * * L50 * * * * *
* * * * * FREQUENCY, MHZ * * * * *

DIST FROM REFERENCE (FEET)	.100 (DB)	.200 (DB)	.300 (DB)	.500 (DB)	.834 (DB)	1.000 (DB)	1.250 (DB)	1.500 (DB)	2.000 (DB)	3.000 (DB)	5.000 (DB)	10.000 (DB)	20.000 (DB)
-1000.0	16.1	17.9	18.9	19.8	19.6	19.2	18.2	17.1	14.6	8.9	-2.9	-26.4	-45.4
-900.0	17.7	19.2	20.0	20.8	20.6	20.1	19.2	18.1	15.6	10.2	-1.2	-24.4	-43.6
-800.0	19.5	20.7	21.3	22.0	21.7	21.2	20.3	19.2	16.8	11.6	.6	-22.1	-41.5
-700.0	21.6	22.4	22.9	23.3	22.9	22.5	21.5	20.5	18.1	13.1	2.7	-19.6	-39.1
-600.0	24.1	24.5	24.7	24.9	24.4	23.9	23.0	21.9	19.6	14.7	4.9	-16.7	-36.4
-500.0	27.1	27.2	27.1	26.9	26.2	25.6	24.7	23.6	21.3	16.6	7.4	-13.3	-33.2
-400.0	30.8	30.6	30.1	29.5	28.4	27.8	26.8	25.7	23.5	18.9	10.3	-9.2	-29.2
-300.0	35.7	35.2	34.3	33.1	31.5	30.7	29.6	28.5	26.2	21.8	13.7	-4.2	-24.1
-200.0	42.6	41.8	40.7	38.7	36.3	35.3	33.9	32.6	30.1	25.7	18.2	2.4	-16.9
-100.0	55.1	54.1	52.7	50.1	46.3	44.7	42.5	40.6	37.6	32.6	25.2	12.0	-4.1
-100.0	55.1	54.1	52.7	50.1	46.3	44.7	42.5	40.6	37.6	32.6	25.2	12.0	-4.1
-95.0	56.1	55.2	53.8	51.1	47.3	45.6	43.4	41.5	38.2	33.2	25.7	12.6	-3.0
-90.0	57.2	56.3	54.9	52.2	48.3	46.6	44.4	42.4	38.9	33.7	26.3	13.3	-1.9
-85.0	58.4	57.5	56.1	53.3	49.4	47.7	45.4	43.4	39.8	34.3	26.8	14.1	-.7
-80.0	59.7	58.7	57.3	54.6	50.6	48.9	46.6	44.5	40.8	35.2	27.5	15.0	.5
-75.0	61.0	60.1	58.6	55.9	51.9	50.2	47.8	45.6	41.9	36.2	28.2	15.9	1.8
-70.0	62.5	61.5	60.1	57.3	53.3	51.5	49.1	46.9	43.1	37.2	29.2	16.9	3.2
-65.0	64.0	63.1	61.6	58.8	54.8	53.0	50.5	48.3	44.5	38.4	30.2	18.0	4.7
-60.0	65.7	64.7	63.3	60.5	56.4	54.6	52.1	49.9	45.9	39.7	31.3	19.1	6.3
-55.0	67.5	66.5	65.1	62.3	58.2	56.3	53.8	51.5	47.5	41.2	32.6	20.4	8.0
-50.0	69.4	68.5	67.0	64.2	60.1	58.2	55.7	53.4	49.3	42.8	34.0	21.7	9.9
-45.0	71.5	70.5	69.1	66.3	62.1	60.3	57.7	55.3	51.2	44.6	35.6	23.2	11.8
-40.0	73.6	72.7	71.2	68.4	64.2	62.4	59.8	57.4	53.2	46.5	37.2	24.8	13.4

-35.0	75.8	74.8	73.4	70.5	66.3	64.5	61.9	59.5	55.2	48.4	39.0	26.4	14.7
-30.0	77.7	76.8	75.3	72.5	68.3	66.4	63.8	61.4	57.1	50.2	40.6	27.9	15.8
-25.0	79.1	78.2	76.7	73.9	69.7	67.8	65.2	62.8	58.5	51.5	41.8	29.0	16.7
-20.0	79.7	78.7	77.3	74.4	70.2	68.3	65.7	63.3	59.0	52.0	42.2	29.4	17.0
-15.0	79.1	78.2	76.7	73.9	69.7	67.8	65.2	62.8	58.5	51.5	41.9	29.3	17.6
-10.0	80.7	79.7	78.3	75.4	71.2	69.3	66.7	64.3	60.0	53.1	43.5	30.8	18.8
-5.0	82.1	81.1	79.7	76.8	72.6	70.7	68.1	65.7	61.4	54.4	44.7	31.9	19.6
.0	82.6	81.6	80.2	77.3	73.1	71.3	68.6	66.2	61.9	54.9	45.2	32.4	19.9
5.0	82.1	81.1	79.7	76.8	72.6	70.7	68.1	65.7	61.4	54.4	44.7	31.9	19.6
10.0	80.7	79.7	78.3	75.4	71.2	69.3	66.7	64.3	60.0	53.1	43.5	30.8	18.8
15.0	79.5	78.5	77.1	74.2	70.0	68.2	65.5	63.1	58.8	51.8	42.1	29.4	17.6
20.0	80.0	79.1	77.6	74.8	70.6	68.7	66.1	63.6	59.3	52.3	42.6	29.8	17.3
25.0	79.5	78.5	77.1	74.2	70.0	68.2	65.5	63.1	58.8	51.8	42.1	29.4	17.0
30.0	78.1	77.1	75.7	72.8	68.6	66.8	64.1	61.7	57.5	50.5	40.9	28.3	16.2
35.0	76.1	75.2	73.7	70.9	66.7	64.8	62.2	59.8	55.6	48.8	39.3	26.8	15.0
40.0	74.0	73.0	71.6	68.8	64.6	62.7	60.1	57.8	53.6	46.8	37.6	25.1	13.7
45.0	71.8	70.9	69.4	66.6	62.5	60.6	58.0	55.7	51.5	44.9	35.9	23.6	12.2
50.0	69.8	68.8	67.4	64.6	60.4	58.6	56.1	53.7	49.6	43.2	34.4	22.1	10.2
55.0	67.8	66.9	65.5	62.6	58.5	56.7	54.2	51.9	47.9	41.6	33.0	20.7	8.4
60.0	66.0	65.1	63.7	60.9	56.8	55.0	52.5	50.2	46.3	40.1	31.7	19.5	6.7
65.0	64.4	63.4	62.0	59.2	55.1	53.4	50.9	48.7	44.8	38.8	30.6	18.3	5.1
70.0	62.8	61.9	60.4	57.7	53.6	51.9	49.5	47.3	43.5	37.6	29.5	17.3	3.6
75.0	61.4	60.4	59.0	56.2	52.3	50.5	48.1	46.0	42.3	36.5	28.6	16.3	2.2
80.0	60.0	59.1	57.7	54.9	51.0	49.3	46.9	44.8	41.2	35.6	27.7	15.3	.9
85.0	58.8	57.8	56.4	53.7	49.8	48.1	45.8	43.7	40.2	34.7	26.9	14.5	-.4
90.0	57.6	56.7	55.2	52.5	48.7	47.0	44.8	42.7	39.3	33.9	26.3	13.6	-1.5
95.0	56.5	55.5	54.1	51.4	47.6	46.0	43.8	41.8	38.4	33.2	25.7	12.8	-2.6
100.0	55.4	54.5	53.1	50.4	46.7	45.1	42.9	41.0	37.6	32.6	25.2	12.1	-3.7
200.0	42.6	41.8	40.7	38.7	36.3	35.3	33.9	32.6	30.1	25.7	18.2	2.4	-16.9
300.0	35.7	35.2	34.3	33.1	31.5	30.7	29.6	28.5	26.2	21.8	13.7	-4.2	-24.1
400.0	30.8	30.6	30.1	29.5	28.4	27.8	26.8	25.7	23.5	18.9	10.3	-9.2	-29.2
500.0	27.1	27.2	27.1	26.9	26.2	25.6	24.7	23.6	21.3	16.6	7.4	-13.3	-33.2
600.0	24.1	24.5	24.7	24.9	24.4	23.9	23.0	21.9	19.6	14.7	4.9	-16.7	-36.4
700.0	21.6	22.4	22.9	23.3	22.9	22.5	21.5	20.5	18.1	13.1	2.7	-19.6	-39.1
800.0	19.5	20.7	21.3	22.0	21.7	21.2	20.3	19.2	16.8	11.6	.6	-22.1	-41.5
900.0	17.7	19.2	20.0	20.8	20.6	20.1	19.2	18.1	15.6	10.2	-1.2	-24.4	-43.6
1000.0	16.1	17.9	18.9	19.8	19.6	19.2	18.2	17.1	14.6	8.9	-2.9	-26.4	-45.4

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - FAIR

* * * * * L50 * * * * *
* * * * * FREQUENCY, MHZ * * * * *

DIST FROM REFERENCE (FEET)	.100 (DB)	.200 (DB)	.300 (DB)	.500 (DB)	.834 (DB)	1.000 (DB)	1.250 (DB)	1.500 (DB)	2.000 (DB)	3.000 (DB)	5.000 (DB)	10.000 (DB)	20.000 (DB)
-1000.0	-.9	.9	1.9	2.8	2.6	2.2	1.2	.1	-2.4	-8.1	-19.9	-43.4	-62.4
-900.0	.7	2.2	3.0	3.8	3.6	3.1	2.2	1.1	-1.4	-6.8	-18.2	-41.4	-60.6
-800.0	2.5	3.7	4.3	5.0	4.7	4.2	3.3	2.2	-.2	-5.4	-16.4	-39.1	-58.5
-700.0	4.6	5.4	5.9	6.3	5.9	5.5	4.5	3.5	1.1	-3.9	-14.3	-36.6	-56.1
-600.0	7.1	7.5	7.7	7.9	7.4	6.9	6.0	4.9	2.6	-2.3	-12.1	-33.7	-53.4
-500.0	10.1	10.2	10.1	9.9	9.2	8.6	7.7	6.6	4.3	-.4	-9.6	-30.3	-50.2
-400.0	13.8	13.6	13.1	12.5	11.4	10.8	9.8	8.7	6.5	1.9	-6.7	-26.2	-46.2
-300.0	18.7	18.2	17.3	16.1	14.5	13.7	12.6	11.5	9.2	4.8	-3.3	-21.2	-41.1
-200.0	25.6	24.8	23.7	21.7	19.3	18.3	16.9	15.6	13.1	8.7	1.2	-14.6	-33.9
-100.0	38.1	37.1	35.7	33.1	29.3	27.7	25.5	23.6	20.6	15.6	8.2	-5.0	-21.1
-100.0	38.1	37.1	35.7	33.1	29.3	27.7	25.5	23.6	20.6	15.6	8.2	-5.0	-21.1
-95.0	39.1	38.2	36.8	34.1	30.3	28.6	26.4	24.5	21.2	16.2	8.7	-4.4	-20.0
-90.0	40.2	39.3	37.9	35.2	31.3	29.6	27.4	25.4	21.9	16.7	9.3	-3.7	-18.9
-85.0	41.4	40.5	39.1	36.3	32.4	30.7	28.4	26.4	22.8	17.3	9.8	-2.9	-17.7
-80.0	42.7	41.7	40.3	37.6	33.6	31.9	29.6	27.5	23.8	18.2	10.5	-2.0	-16.5
-75.0	44.0	43.1	41.6	38.9	34.9	33.2	30.8	28.6	24.9	19.2	11.2	-1.1	-15.2
-70.0	45.5	44.5	43.1	40.3	36.3	34.5	32.1	29.9	26.1	20.2	12.2	-.1	-13.8
-65.0	47.0	46.1	44.6	41.8	37.8	36.0	33.5	31.3	27.5	21.4	13.2	1.0	-12.3

-60.0	48.7	47.7	46.3	43.5	39.4	37.6	35.1	32.9	28.9	22.7	14.3	2.1	-10.7
-55.0	50.5	49.5	48.1	45.3	41.2	39.3	36.8	34.5	30.5	24.2	15.6	3.4	-9.0
-50.0	52.4	51.5	50.0	47.2	43.1	41.2	38.7	36.4	32.3	25.8	17.0	4.7	-7.1
-45.0	54.5	53.5	52.1	49.3	45.1	43.3	40.7	38.3	34.2	27.6	18.6	6.2	-5.2
-40.0	56.6	55.7	54.2	51.4	47.2	45.4	42.8	40.4	36.2	29.5	20.2	7.8	-3.6
-35.0	58.8	57.8	56.4	53.5	49.3	47.5	44.9	42.5	38.2	31.4	22.0	9.4	-2.3
-30.0	60.7	59.8	58.3	55.5	51.3	49.4	46.8	44.4	40.1	33.2	23.6	10.9	-1.2
-25.0	62.1	61.2	59.7	56.9	52.7	50.8	48.2	45.8	41.5	34.5	24.8	12.0	-.3
-20.0	62.7	61.7	60.3	57.4	53.2	51.3	48.7	46.3	42.0	35.0	25.2	12.4	.0
-15.0	62.1	61.2	59.7	56.9	52.7	50.8	48.2	45.8	41.5	34.5	24.9	12.3	.6
-10.0	63.7	62.7	61.3	58.4	54.2	52.3	49.7	47.3	43.0	36.1	26.5	13.8	1.8
-5.0	65.1	64.1	62.7	59.8	55.6	53.7	51.1	48.7	44.4	37.4	27.7	14.9	2.6
.0	65.6	64.6	63.2	60.3	56.1	54.3	51.6	49.2	44.9	37.9	28.2	15.4	2.9
5.0	65.1	64.1	62.7	59.8	55.6	53.7	51.1	48.7	44.4	37.4	27.7	14.9	2.6
10.0	63.7	62.7	61.3	58.4	54.2	52.3	49.7	47.3	43.0	36.1	26.5	13.8	1.8
15.0	62.5	61.5	60.1	57.2	53.0	51.2	48.5	46.1	41.8	34.8	25.1	12.4	.6
20.0	63.0	62.1	60.6	57.8	53.6	51.7	49.1	46.6	42.3	35.3	25.6	12.8	.3
25.0	62.5	61.5	60.1	57.2	53.0	51.2	48.5	46.1	41.8	34.8	25.1	12.4	.0
30.0	61.1	60.1	58.7	55.8	51.6	49.8	47.1	44.7	40.5	33.5	23.9	11.3	-.8
35.0	59.1	58.2	56.7	53.9	49.7	47.8	45.2	42.8	38.6	31.8	22.3	9.8	-2.0
40.0	57.0	56.0	54.6	51.8	47.6	45.7	43.1	40.8	36.6	29.8	20.6	8.1	-3.3
45.0	54.8	53.9	52.4	49.6	45.5	43.6	41.0	38.7	34.5	27.9	18.9	6.6	-4.8
50.0	52.8	51.8	50.4	47.6	43.4	41.6	39.1	36.7	32.6	26.2	17.4	5.1	-6.8
55.0	50.8	49.9	48.5	45.6	41.5	39.7	37.2	34.9	30.9	24.6	16.0	3.7	-8.6
60.0	49.0	48.1	46.7	43.9	39.8	38.0	35.5	33.2	29.3	23.1	14.7	2.5	-10.3
65.0	47.4	46.4	45.0	42.2	38.1	36.4	33.9	31.7	27.8	21.8	13.6	1.3	-11.9
70.0	45.8	44.9	43.4	40.7	36.6	34.9	32.5	30.3	26.5	20.6	12.5	.3	-13.4
75.0	44.4	43.4	42.0	39.2	35.3	33.5	31.1	29.0	25.3	19.5	11.6	-.7	-14.8
80.0	43.0	42.1	40.7	37.9	34.0	32.3	29.9	27.8	24.2	18.6	10.7	-1.7	-16.1
85.0	41.8	40.8	39.4	36.7	32.8	31.1	28.8	26.7	23.2	17.7	9.9	-2.5	-17.4
90.0	40.6	39.7	38.2	35.5	31.7	30.0	27.8	25.7	22.3	16.9	9.3	-3.4	-18.5
95.0	39.5	38.5	37.1	34.4	30.6	29.0	26.8	24.8	21.4	16.2	8.7	-4.2	-19.6
100.0	38.4	37.5	36.1	33.4	29.7	28.1	25.9	24.0	20.6	15.6	8.2	-4.9	-20.7
200.0	25.6	24.8	23.7	21.7	19.3	18.3	16.9	15.6	13.1	8.7	1.2	-14.6	-33.9
300.0	18.7	18.2	17.3	16.1	14.5	13.7	12.6	11.5	9.2	4.8	-3.3	-21.2	-41.1
400.0	13.8	13.6	13.1	12.5	11.4	10.8	9.8	8.7	6.5	1.9	-6.7	-26.2	-46.2
500.0	10.1	10.2	10.1	9.9	9.2	8.6	7.7	6.6	4.3	-.4	-9.6	-30.3	-50.2
600.0	7.1	7.5	7.7	7.9	7.4	6.9	6.0	4.9	2.6	-2.3	-12.1	-33.7	-53.4
700.0	4.6	5.4	5.9	6.3	5.9	5.5	4.5	3.5	1.1	-3.9	-14.3	-36.6	-56.1
800.0	2.5	3.7	4.3	5.0	4.7	4.2	3.3	2.2	-.2	-5.4	-16.4	-39.1	-58.5
900.0	.7	2.2	3.0	3.8	3.6	3.1	2.2	1.1	-1.4	-6.8	-18.2	-41.4	-60.6
1000.0	-.9	.9	1.9	2.8	2.6	2.2	1.2	.1	-2.4	-8.1	-19.9	-43.4	-62.4

1ELECTRIC FIELD CALCULATIONS

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******************  CORONA AND FIELDS PROGRAM Version 3 ****************
******************  Summit Ridge Run 11 230kV H-frame   ****************
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	DIST. FROM REFERENCE FEET	HEIGHT FEET	MAXIMUM GRADIENT (KV/CM)	SUBCON. DIAM. (IN)	NO. OF SUBCON.	PHASE ANGLE (DEGREES)
PH.A-1	20.00	25.00	15.19	1.11	1	.0
PH.B-1	.00	25.00	15.96	1.11	1	-120.0
PH.C-1	-20.00	25.00	15.08	1.11	1	120.0
GND1-1	10.00	45.00	1.58	.49	1	.0

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	E-FIELD (KV/METER)	THETA (DEGREES)	EY-FIELD (KV/METER)	THETAY (DEGREES)	EX-FIELD (KV/METER)	THETAX (DEGREES)	SPACE POTENTIAL (VOLTS)
-1000.0	.001	89.6	.001	-66.5	.000	-60.8	.5
-900.0	.001	89.5	.001	-65.0	.000	-59.2	.7

-800.0	.001	89.4	.001	-63.4	.000	-57.5	.9
-700.0	.001	89.3	.001	-61.5	.000	-55.7	1.3
-600.0	.002	89.2	.002	-59.3	.000	-53.7	1.9
-500.0	.003	89.0	.003	-56.8	.000	-51.5	3.0
-400.0	.005	88.8	.005	-53.9	.000	-49.2	5.3
-300.0	.011	88.3	.011	-50.7	.000	-47.0	11.4
-200.0	.035	87.4	.035	-47.4	.002	-45.4	34.7
-100.0	.243	84.7	.242	-46.2	.022	-46.9	242.6
-100.0	.243	84.7	.242	-46.2	.022	-46.9	242.6
-95.0	.280	84.5	.279	-46.3	.027	-47.1	280.0
-90.0	.326	84.2	.324	-46.4	.033	-47.4	325.3
-85.0	.381	83.9	.379	-46.6	.040	-47.7	381.0
-80.0	.450	83.6	.447	-46.8	.050	-48.1	449.8
-75.0	.536	83.2	.533	-47.0	.063	-48.4	535.7
-70.0	.645	82.9	.640	-47.3	.080	-48.8	644.1
-65.0	.783	82.5	.777	-47.6	.102	-49.1	781.9
-60.0	.960	82.2	.951	-47.9	.131	-49.4	958.3
-55.0	1.188	81.9	1.176	-48.2	.168	-49.5	1185.2
-50.0	1.481	81.7	1.465	-48.5	.215	-49.5	1476.0
-45.0	1.852	81.7	1.832	-48.6	.268	-48.9	1843.3
-40.0	2.304	82.1	2.282	-48.6	.316	-47.4	2289.6
-35.0	2.813	83.3	2.794	-48.2	.332	-43.3	2788.8
-30.0	3.295	85.4	3.284	-47.0	.274	-30.9	3255.5
-25.0	3.588	88.8	3.587	-44.1	.185	22.5	3529.5
-20.0	3.513	93.3	3.508	-38.2	.387	82.9	3439.0
-15.0	3.051	97.5	3.026	-26.0	.679	98.5	2975.1
-10.0	2.477	97.6	2.457	-3.3	.823	107.9	2421.1
-5.0	2.204	92.0	2.202	28.1	.787	123.0	2141.7
.0	2.174	90.6	2.173	58.4	.725	150.1	2088.7
5.0	2.137	89.1	2.137	89.2	.788	177.1	2075.6
10.0	2.366	82.3	2.347	122.1	.826	-168.0	2312.0
15.0	2.938	82.1	2.911	146.0	.682	-158.7	2859.9
20.0	3.407	86.5	3.401	158.6	.389	-143.3	3331.8
25.0	3.489	91.1	3.488	164.8	.184	-83.3	3430.4
30.0	3.202	94.7	3.192	167.7	.272	-29.1	3162.6
35.0	2.726	96.9	2.706	169.1	.329	-16.5	2701.0
40.0	2.221	98.1	2.199	169.7	.312	-12.4	2206.8
45.0	1.774	98.6	1.755	169.9	.264	-10.7	1765.7
50.0	1.409	98.6	1.393	169.9	.211	-10.0	1403.8
55.0	1.122	98.4	1.109	169.8	.165	-9.8	1118.3
60.0	.899	98.2	.890	169.7	.128	-9.8	896.7
65.0	.727	97.8	.720	169.6	.099	-9.9	725.2
70.0	.593	97.5	.588	169.5	.077	-10.1	592.1
75.0	.489	97.1	.485	169.4	.060	-10.3	488.0
80.0	.407	96.8	.404	169.4	.048	-10.5	406.0
85.0	.341	96.4	.339	169.4	.038	-10.7	340.7
90.0	.289	96.1	.287	169.4	.031	-10.8	288.3
95.0	.246	95.9	.245	169.5	.025	-11.0	245.8
100.0	.211	95.6	.210	169.6	.021	-11.1	211.0
200.0	.026	92.9	.025	175.3	.001	-10.0	25.5
300.0	.007	91.9	.007	-175.5	.000	-5.3	7.4
400.0	.003	91.4	.003	-165.4	.000	.8	3.1
500.0	.002	91.0	.002	-155.5	.000	7.5	1.7
600.0	.001	90.8	.001	-146.5	.000	14.4	1.0
700.0	.001	90.6	.001	-138.9	.000	21.1	.7
800.0	.001	90.5	.001	-132.5	.000	27.5	.5
900.0	.000	90.4	.000	-127.2	.000	33.4	.4
1000.0	.000	90.4	.000	-122.9	.000	38.7	.3

1MAGNETIC FIELD CALCULATIONS

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	B-FIELD (GAUSS)	THETA	BY-FIELD (GAUSS)	THETAY	BX-FIELD (GAUSS)	THETAX
-1000.0	.00011433	92.5	.00011423	-30.7	.00000497	149.0
-900.0	.00014115	92.8	.00014099	-30.7	.00000681	148.9
-800.0	.00017865	93.1	.00017838	-30.8	.00000970	148.8
-700.0	.00023333	93.6	.00023288	-30.9	.00001448	148.6
-600.0	.00031759	94.2	.00031675	-31.1	.00002299	148.3
-500.0	.00045732	95.0	.00045559	-31.3	.00003973	148.0
-400.0	.00071455	96.2	.00071032	-31.6	.00007760	147.5
-300.0	.00127023	98.3	.00125685	-32.2	.00018394	146.7
-200.0	.00285719	102.5	.00278905	-33.2	.00062055	145.1
-100.0	.01137849	115.6	.01026227	-35.6	.00492224	140.9
-100.0	.01137849	115.6	.01026227	-35.6	.00492224	140.9
-95.0	.01259492	117.0	.01122125	-35.8	.00572917	140.5
-90.0	.01401486	118.6	.01230534	-36.0	.00671999	140.1
-85.0	.01568532	120.4	.01353134	-36.2	.00794890	139.6
-80.0	.01766717	122.4	.01491562	-36.4	.00948969	139.1
-75.0	.02004002	124.8	.01647097	-36.5	.01144389	138.6
-70.0	.02290889	127.4	.01819994	-36.6	.01395253	138.0
-65.0	.02641328	130.6	.02008164	-36.6	.01721279	137.4
-60.0	.03073905	134.3	.02204568	-36.4	.02150029	136.8
-55.0	.03613235	138.7	.02392196	-35.8	.02719520	136.2
-50.0	.04291178	144.1	.02534797	-34.7	.03480048	135.6
-45.0	.05146527	150.6	.02561508	-32.2	.04491185	135.0
-40.0	.06219611	158.8	.02350782	-26.2	.05802688	134.7
-35.0	.07534043	168.9	.01784146	-8.3	.07395045	134.8
-30.0	.09055364	-178.7	.01566860	53.0	.09053035	135.6
-25.0	.10633540	-163.8	.03676251	98.2	.10232040	138.1
-20.0	.11996540	-147.1	.07049247	111.5	.10223160	143.8
-15.0	.12883830	-129.8	.10282110	118.6	.08890782	156.2
-10.0	.13228490	-113.5	.12331670	125.8	.07312111	180.0
-5.0	.13196390	-100.0	.13045810	136.2	.06839828	211.6
.0	.13115280	-90.0	.13115280	150.0	.06972478	240.0
5.0	.13196390	-80.0	.13045810	163.8	.06839827	268.4
10.0	.13228490	-66.5	.12331670	174.2	.07312109	-60.0
15.0	.12883830	-50.2	.10282110	181.4	.08890779	-36.2
20.0	.11996530	-32.9	.07049248	188.5	.10223160	-23.8
25.0	.10633540	-16.2	.03676252	201.8	.10232040	-18.1
30.0	.09055363	-1.3	.01566860	247.0	.09053034	-15.6
35.0	.07534041	11.1	.01784145	-51.7	.07395043	-14.8
40.0	.06219610	21.2	.02350780	-33.8	.05802687	-14.7
45.0	.05146525	29.4	.02561506	-27.8	.04491185	-15.0
50.0	.04291176	35.9	.02534796	-25.3	.03480048	-15.6
55.0	.03613234	41.3	.02392194	-24.2	.02719519	-16.2
60.0	.03073904	45.7	.02204567	-23.6	.02150029	-16.8
65.0	.02641327	49.4	.02008164	-23.4	.01721279	-17.4
70.0	.02290888	52.6	.01819993	-23.4	.01395253	-18.0
75.0	.02004001	55.2	.01647096	-23.5	.01144388	-18.6
80.0	.01766716	57.6	.01491562	-23.6	.00948969	-19.1
85.0	.01568531	59.6	.01353133	-23.8	.00794890	-19.6
90.0	.01401485	61.4	.01230533	-24.0	.00671999	-20.1
95.0	.01259491	63.0	.01122124	-24.2	.00572917	-20.5
100.0	.01137848	64.4	.01026226	-24.4	.00492224	-20.9
200.0	.00285719	77.5	.00278904	-26.8	.00062055	-25.1
300.0	.00127023	81.7	.00125685	-27.8	.00018394	-26.7
400.0	.00071455	83.8	.00071032	-28.4	.00007760	-27.5
500.0	.00045732	85.0	.00045559	-28.7	.00003973	-28.0
600.0	.00031759	85.8	.00031675	-28.9	.00002299	-28.3
700.0	.00023333	86.4	.00023288	-29.1	.00001448	-28.6
800.0	.00017864	86.9	.00017838	-29.2	.00000970	-28.8
900.0	.00014115	87.2	.00014099	-29.3	.00000681	-28.9
1000.0	.00011433	87.5	.00011422	-29.3	.00000497	-29.0

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Û       C O R O N A   A N D   F I E L D       Û
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Û   Source: Bonneville Power Administration   Û
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INPUT DATA LIST

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                 9/ 2/2009         15:15:56
******************  CORONA AND FIELDS PROGRAM Version 3 ****************
******************  Summit Ridge Run 50 34.5kV single   ****************
1,0, 3, 4,0.0,    .00,   2.00,    .00

(ENGLISH UNITS OPTION)

(GRADIENTS ARE COMPUTED BY PROGRAM)

PHYSICAL SYSTEM CONSISTS OF  4 CONDUCTORS, OF WHICH  3 ARE ENERGIZED PHASES

OPTIONS: 'EF','MF','RI'
  5.000,  5.000, 10.000,    .000,  1.000, 75.000,  3.280,  2.000,  3.280
'PH.A-1  ','A',    1.75,   18.50, 1,    .900,    .000,  20.000,    .000,    .600,    .000
'PH.B-1  ','A',   -1.75,   22.50, 1,    .900,    .000,  20.000,-120.000,    .600,    .000
'PH.C-1  ','A',    1.75,   26.50, 1,    .900,    .000,  20.000, 120.000,    .600,    .000
'FOG-1   ','A',     .00,   31.00, 1,    .486,    .000,    .000,    .000,    .000,    .000
 10-1000.0  100.0
 20 -100.0    5.0
 20     .0    5.0
 10  100.0  100.0
  0     .0     .0
1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - RAIN
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* * * * * L50 * * * * *
* * * * * FREQUENCY, MHZ * * * * *

DIST FROM REFERENCE (FEET)	.100 (DB)	.200 (DB)	.300 (DB)	.500 (DB)	.834 (DB)	1.000 (DB)	1.250 (DB)	1.500 (DB)	2.000 (DB)	3.000 (DB)	5.000 (DB)	10.000 (DB)	20.000 (DB)
-1000.0	-66.3	-64.6	-63.5	-62.6	-62.8	-63.3	-64.2	-65.3	-67.9	-73.5	-85.3	-108.8	-127.8
-900.0	-64.7	-63.3	-62.4	-61.6	-61.8	-62.3	-63.2	-64.3	-66.8	-72.2	-83.6	-106.8	-125.9
-800.0	-62.9	-61.8	-61.1	-60.5	-60.8	-61.2	-62.1	-63.2	-65.6	-70.9	-81.8	-104.6	-123.9
-700.0	-60.8	-60.0	-59.5	-59.1	-59.5	-60.0	-60.9	-62.0	-64.3	-69.4	-79.8	-102.0	-121.5
-600.0	-58.3	-57.9	-57.7	-57.5	-58.0	-58.5	-59.5	-60.5	-62.8	-67.7	-77.5	-99.1	-118.8
-500.0	-55.3	-55.2	-55.3	-55.5	-56.3	-56.8	-57.7	-58.8	-61.1	-65.8	-75.0	-95.7	-115.6
-400.0	-51.6	-51.8	-52.3	-52.9	-54.0	-54.6	-55.6	-56.7	-59.0	-63.5	-72.1	-91.6	-111.7
-300.0	-46.7	-47.2	-48.0	-49.3	-50.9	-51.6	-52.8	-53.9	-56.2	-60.6	-68.7	-86.6	-106.6
-200.0	-39.7	-40.5	-41.6	-43.6	-46.0	-47.0	-48.4	-49.7	-52.2	-56.6	-64.2	-79.9	-99.5
-100.0	-27.8	-28.7	-30.0	-32.6	-36.2	-37.7	-39.7	-41.5	-44.6	-49.6	-57.0	-70.2	-87.4
-100.0	-27.8	-28.7	-30.0	-32.6	-36.2	-37.7	-39.7	-41.5	-44.6	-49.6	-57.0	-70.2	-87.4
-95.0	-26.9	-27.8	-29.2	-31.8	-35.4	-37.0	-39.0	-40.9	-44.0	-49.0	-56.5	-69.6	-86.5
-90.0	-26.0	-26.9	-28.3	-30.9	-34.6	-36.2	-38.3	-40.1	-43.4	-48.5	-55.9	-68.9	-85.6
-85.0	-25.0	-25.9	-27.3	-30.0	-33.7	-35.3	-37.4	-39.4	-42.6	-47.8	-55.3	-68.2	-84.6
-80.0	-24.0	-24.9	-26.3	-29.0	-32.8	-34.4	-36.6	-38.5	-41.9	-47.1	-54.7	-67.5	-83.6
-75.0	-22.9	-23.8	-25.2	-27.9	-31.8	-33.4	-35.6	-37.6	-41.1	-46.4	-54.0	-66.7	-82.5
-70.0	-21.7	-22.7	-24.1	-26.8	-30.7	-32.3	-34.6	-36.7	-40.2	-45.6	-53.3	-65.9	-81.4
-65.0	-20.5	-21.4	-22.8	-25.6	-29.5	-31.2	-33.5	-35.6	-39.2	-44.8	-52.6	-65.1	-80.2
-60.0	-19.2	-20.1	-21.5	-24.3	-28.3	-30.0	-32.3	-34.5	-38.1	-43.8	-51.7	-64.1	-78.9
-55.0	-17.8	-18.7	-20.1	-22.9	-26.9	-28.6	-31.0	-33.2	-37.0	-42.8	-50.8	-63.2	-77.5
-50.0	-16.2	-17.2	-18.6	-21.4	-25.4	-27.2	-29.6	-31.8	-35.7	-41.6	-49.8	-62.1	-76.0
-45.0	-14.6	-15.5	-16.9	-19.7	-23.8	-25.6	-28.1	-30.3	-34.2	-40.4	-48.7	-61.0	-74.4
-40.0	-12.8	-13.7	-15.2	-18.0	-22.1	-23.9	-26.4	-28.7	-32.6	-38.9	-47.4	-59.8	-72.7

-35.0	-10.8	-11.8	-13.2	-16.0	-20.1	-22.0	-24.5	-26.8	-30.9	-37.3	-46.0	-58.4	-70.9
-30.0	-8.7	-9.6	-11.1	-13.9	-18.1	-19.9	-22.5	-24.8	-28.9	-35.5	-44.5	-56.9	-68.9
-25.0	-6.4	-7.3	-8.8	-11.6	-15.8	-17.6	-20.2	-22.6	-26.8	-33.5	-42.7	-55.3	-66.8
-20.0	-3.9	-4.9	-6.3	-9.2	-13.4	-15.2	-17.8	-20.2	-24.5	-31.3	-40.7	-53.5	-65.0
-15.0	-1.5	-2.4	-3.9	-6.7	-10.9	-12.8	-15.4	-17.8	-22.1	-29.1	-38.7	-51.6	-63.5
-10.0	.7	-.2	-1.7	-4.5	-8.7	-10.6	-13.3	-15.7	-20.0	-27.0	-36.8	-49.9	-62.2
-5.0	2.2	1.2	-.2	-3.1	-7.3	-9.2	-11.8	-14.2	-18.6	-25.6	-35.5	-48.7	-61.3
.0	2.6	1.7	.2	-2.6	-6.9	-8.7	-11.4	-13.8	-18.2	-25.4	-35.3	-48.5	-61.2
5.0	2.3	1.3	-.1	-3.0	-7.2	-9.1	-11.7	-14.2	-18.5	-25.7	-35.9	-49.4	-61.9
10.0	.0	-.9	-2.4	-5.2	-9.5	-11.3	-14.0	-16.4	-20.8	-27.9	-37.9	-51.0	-63.1
15.0	-3.1	-4.0	-5.5	-8.3	-12.5	-14.4	-17.1	-19.5	-23.8	-30.6	-40.1	-52.9	-64.5
20.0	-5.6	-6.6	-8.0	-10.9	-15.1	-16.9	-19.5	-21.9	-26.1	-32.9	-42.1	-54.7	-66.1
25.0	-8.0	-9.0	-10.4	-13.2	-17.4	-19.2	-21.8	-24.2	-28.3	-34.9	-44.0	-56.4	-67.6
30.0	-10.1	-11.1	-12.5	-15.3	-19.5	-21.3	-23.8	-26.2	-30.3	-36.8	-45.6	-57.8	-69.3
35.0	-12.0	-13.0	-14.4	-17.2	-21.3	-23.1	-25.7	-28.0	-32.0	-38.3	-47.0	-59.1	-71.1
40.0	-13.8	-14.7	-16.2	-19.0	-23.1	-24.9	-27.4	-29.6	-33.6	-39.8	-48.2	-60.4	-72.8
45.0	-15.5	-16.4	-17.8	-20.6	-24.7	-26.5	-28.9	-31.2	-35.0	-41.1	-49.4	-61.5	-74.4
50.0	-17.0	-17.9	-19.4	-22.2	-26.2	-28.0	-30.4	-32.6	-36.4	-42.3	-50.4	-62.6	-75.9
55.0	-18.5	-19.4	-20.8	-23.6	-27.6	-29.3	-31.7	-33.9	-37.6	-43.4	-51.4	-63.6	-77.3
60.0	-19.8	-20.7	-22.2	-24.9	-28.9	-30.6	-32.9	-35.1	-38.7	-44.4	-52.2	-64.6	-78.7
65.0	-21.1	-22.0	-23.4	-26.2	-30.1	-31.8	-34.1	-36.1	-39.7	-45.3	-53.0	-65.4	-79.9
70.0	-22.3	-23.2	-24.6	-27.3	-31.2	-32.9	-35.1	-37.2	-40.7	-46.1	-53.8	-66.3	-81.1
75.0	-23.4	-24.3	-25.7	-28.4	-32.3	-33.9	-36.1	-38.1	-41.5	-46.9	-54.5	-67.1	-82.2
80.0	-24.5	-25.4	-26.8	-29.5	-33.2	-34.8	-37.0	-39.0	-42.3	-47.6	-55.1	-67.8	-83.3
85.0	-25.5	-26.4	-27.8	-30.4	-34.2	-35.7	-37.9	-39.8	-43.1	-48.2	-55.7	-68.5	-84.3
90.0	-26.4	-27.3	-28.7	-31.3	-35.0	-36.6	-38.7	-40.5	-43.8	-48.8	-56.3	-69.2	-85.2
95.0	-27.3	-28.2	-29.6	-32.2	-35.8	-37.4	-39.4	-41.3	-44.4	-49.4	-56.8	-69.9	-86.1
100.0	-28.2	-29.1	-30.4	-33.0	-36.6	-38.1	-40.1	-41.9	-45.0	-50.0	-57.3	-70.5	-87.0
200.0	-40.0	-40.8	-41.9	-43.8	-46.3	-47.2	-48.6	-49.9	-52.4	-56.8	-64.4	-80.2	-99.2
300.0	-46.9	-47.4	-48.2	-49.5	-51.0	-51.8	-52.9	-54.0	-56.3	-60.7	-68.8	-86.8	-106.4
400.0	-51.7	-51.9	-52.4	-53.1	-54.1	-54.7	-55.7	-56.8	-59.0	-63.6	-72.2	-91.8	-111.5
500.0	-55.4	-55.3	-55.4	-55.6	-56.3	-56.9	-57.8	-58.9	-61.1	-65.8	-75.1	-95.8	-115.5
600.0	-58.4	-57.9	-57.7	-57.6	-58.1	-58.6	-59.5	-60.6	-62.9	-67.8	-77.6	-99.2	-118.7
700.0	-60.9	-60.1	-59.6	-59.2	-59.6	-60.0	-60.9	-62.0	-64.4	-69.4	-79.8	-102.1	-121.5
800.0	-63.0	-61.8	-61.1	-60.5	-60.8	-61.3	-62.2	-63.3	-65.7	-70.9	-81.8	-104.7	-123.8
900.0	-64.8	-63.3	-62.4	-61.7	-61.9	-62.3	-63.3	-64.4	-66.8	-72.3	-83.7	-106.9	-125.9
1000.0	-66.4	-64.6	-63.6	-62.7	-62.9	-63.3	-64.2	-65.4	-67.9	-73.5	-85.4	-108.9	-127.7

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - FAIR

* * * * * L50 * * * * *
* * * * * FREQUENCY, MHZ * * * * *

DIST FROM REFERENCE (FEET)	.100 (DB)	.200 (DB)	.300 (DB)	.500 (DB)	.834 (DB)	1.000 (DB)	1.250 (DB)	1.500 (DB)	2.000 (DB)	3.000 (DB)	5.000 (DB)	10.000 (DB)	20.000 (DB)
-1000.0	-83.3	-81.6	-80.5	-79.6	-79.8	-80.3	-81.2	-82.3	-84.9	-90.5	-102.3	-125.8	-144.8
-900.0	-81.7	-80.3	-79.4	-78.6	-78.8	-79.3	-80.2	-81.3	-83.8	-89.2	-100.6	-123.8	-142.9
-800.0	-79.9	-78.8	-78.1	-77.5	-77.8	-78.2	-79.1	-80.2	-82.6	-87.9	-98.8	-121.6	-140.9
-700.0	-77.8	-77.0	-76.5	-76.1	-76.5	-77.0	-77.9	-79.0	-81.3	-86.4	-96.8	-119.0	-138.5
-600.0	-75.3	-74.9	-74.7	-74.5	-75.0	-75.5	-76.5	-77.5	-79.8	-84.7	-94.5	-116.1	-135.8
-500.0	-72.3	-72.2	-72.3	-72.5	-73.3	-73.8	-74.7	-75.8	-78.1	-82.8	-92.0	-112.7	-132.6
-400.0	-68.6	-68.8	-69.3	-69.9	-71.0	-71.6	-72.6	-73.7	-76.0	-80.5	-89.1	-108.6	-128.7
-300.0	-63.7	-64.2	-65.0	-66.3	-67.9	-68.6	-69.8	-70.9	-73.2	-77.6	-85.7	-103.6	-123.6
-200.0	-56.7	-57.5	-58.6	-60.6	-63.0	-64.0	-65.4	-66.7	-69.2	-73.6	-81.2	-96.9	-116.5
-100.0	-44.8	-45.7	-47.0	-49.6	-53.2	-54.7	-56.7	-58.5	-61.6	-66.6	-74.0	-87.2	-104.4
-100.0	-44.8	-45.7	-47.0	-49.6	-53.2	-54.7	-56.7	-58.5	-61.6	-66.6	-74.0	-87.2	-104.4
-95.0	-43.9	-44.8	-46.2	-48.8	-52.4	-54.0	-56.0	-57.9	-61.0	-66.0	-73.5	-86.6	-103.5
-90.0	-43.0	-43.9	-45.3	-47.9	-51.6	-53.2	-55.3	-57.1	-60.4	-65.5	-72.9	-85.9	-102.6
-85.0	-42.0	-42.9	-44.3	-47.0	-50.7	-52.3	-54.4	-56.4	-59.6	-64.8	-72.3	-85.2	-101.6
-80.0	-41.0	-41.9	-43.3	-46.0	-49.8	-51.4	-53.6	-55.5	-58.9	-64.1	-71.7	-84.5	-100.6
-75.0	-39.9	-40.8	-42.2	-44.9	-48.8	-50.4	-52.6	-54.6	-58.1	-63.4	-71.0	-83.7	-99.5
-70.0	-38.7	-39.7	-41.1	-43.8	-47.7	-49.3	-51.6	-53.7	-57.2	-62.6	-70.3	-82.9	-98.4
-65.0	-37.5	-38.4	-39.8	-42.6	-46.5	-48.2	-50.5	-52.6	-56.2	-61.8	-69.6	-82.1	-97.2

-60.0	-36.2	-37.1	-38.5	-41.3	-45.3	-47.0	-49.3	-51.5	-55.1	-60.8	-68.7	-81.1	-95.9
-55.0	-34.8	-35.7	-37.1	-39.9	-43.9	-45.6	-48.0	-50.2	-54.0	-59.8	-67.8	-80.2	-94.5
-50.0	-33.2	-34.2	-35.6	-38.4	-42.4	-44.2	-46.6	-48.8	-52.7	-58.6	-66.8	-79.1	-93.0
-45.0	-31.6	-32.5	-33.9	-36.7	-40.8	-42.6	-45.1	-47.3	-51.2	-57.4	-65.7	-78.0	-91.4
-40.0	-29.8	-30.7	-32.2	-35.0	-39.1	-40.9	-43.4	-45.7	-49.6	-55.9	-64.4	-76.8	-89.7
-35.0	-27.8	-28.8	-30.2	-33.0	-37.1	-39.0	-41.5	-43.8	-47.9	-54.3	-63.0	-75.4	-87.9
-30.0	-25.7	-26.6	-28.1	-30.9	-35.1	-36.9	-39.5	-41.8	-45.9	-52.5	-61.5	-73.9	-85.9
-25.0	-23.4	-24.3	-25.8	-28.6	-32.8	-34.6	-37.2	-39.6	-43.8	-50.5	-59.7	-72.3	-83.8
-20.0	-20.9	-21.9	-23.3	-26.2	-30.4	-32.2	-34.8	-37.2	-41.5	-48.3	-57.7	-70.5	-82.0
-15.0	-18.5	-19.4	-20.9	-23.7	-27.9	-29.8	-32.4	-34.8	-39.1	-46.1	-55.7	-68.6	-80.5
-10.0	-16.3	-17.2	-18.7	-21.5	-25.7	-27.6	-30.3	-32.7	-37.0	-44.0	-53.8	-66.9	-79.2
-5.0	-14.8	-15.8	-17.2	-20.1	-24.3	-26.2	-28.8	-31.2	-35.6	-42.6	-52.5	-65.7	-78.3
.0	-14.4	-15.3	-16.8	-19.6	-23.9	-25.7	-28.4	-30.8	-35.2	-42.4	-52.3	-65.5	-78.2
5.0	-14.7	-15.7	-17.1	-20.0	-24.2	-26.1	-28.7	-31.2	-35.5	-42.7	-52.9	-66.4	-78.9
10.0	-17.0	-17.9	-19.4	-22.2	-26.5	-28.3	-31.0	-33.4	-37.8	-44.9	-54.9	-68.0	-80.1
15.0	-20.1	-21.0	-22.5	-25.3	-29.5	-31.4	-34.1	-36.5	-40.8	-47.6	-57.1	-69.9	-81.5
20.0	-22.6	-23.6	-25.0	-27.9	-32.1	-33.9	-36.5	-38.9	-43.1	-49.9	-59.1	-71.7	-83.1
25.0	-25.0	-26.0	-27.4	-30.2	-34.4	-36.2	-38.8	-41.2	-45.3	-51.9	-61.0	-73.4	-84.6
30.0	-27.1	-28.1	-29.5	-32.3	-36.5	-38.3	-40.8	-43.2	-47.3	-53.8	-62.6	-74.8	-86.3
35.0	-29.0	-30.0	-31.4	-34.2	-38.3	-40.1	-42.7	-45.0	-49.0	-55.3	-64.0	-76.1	-88.1
40.0	-30.8	-31.7	-33.2	-36.0	-40.1	-41.9	-44.4	-46.6	-50.6	-56.8	-65.2	-77.4	-89.8
45.0	-32.5	-33.4	-34.8	-37.6	-41.7	-43.5	-45.9	-48.2	-52.0	-58.1	-66.4	-78.5	-91.4
50.0	-34.0	-34.9	-36.4	-39.2	-43.2	-45.0	-47.4	-49.6	-53.4	-59.3	-67.4	-79.6	-92.9
55.0	-35.5	-36.4	-37.8	-40.6	-44.6	-46.3	-48.7	-50.9	-54.6	-60.4	-68.4	-80.6	-94.3
60.0	-36.8	-37.7	-39.2	-41.9	-45.9	-47.6	-49.9	-52.1	-55.7	-61.4	-69.2	-81.6	-95.7
65.0	-38.1	-39.0	-40.4	-43.2	-47.1	-48.8	-51.1	-53.1	-56.7	-62.3	-70.0	-82.4	-96.9
70.0	-39.3	-40.2	-41.6	-44.3	-48.2	-49.9	-52.1	-54.2	-57.7	-63.1	-70.8	-83.3	-98.1
75.0	-40.4	-41.3	-42.7	-45.4	-49.3	-50.9	-53.1	-55.1	-58.5	-63.9	-71.5	-84.1	-99.2
80.0	-41.5	-42.4	-43.8	-46.5	-50.2	-51.8	-54.0	-56.0	-59.3	-64.6	-72.1	-84.8	-100.3
85.0	-42.5	-43.4	-44.8	-47.4	-51.2	-52.7	-54.9	-56.8	-60.1	-65.2	-72.7	-85.5	-101.3
90.0	-43.4	-44.3	-45.7	-48.3	-52.0	-53.6	-55.7	-57.5	-60.8	-65.8	-73.3	-86.2	-102.2
95.0	-44.3	-45.2	-46.6	-49.2	-52.8	-54.4	-56.4	-58.3	-61.4	-66.4	-73.8	-86.9	-103.1
100.0	-45.2	-46.1	-47.4	-50.0	-53.6	-55.1	-57.1	-58.9	-62.0	-67.0	-74.3	-87.5	-104.0
200.0	-57.0	-57.8	-58.9	-60.8	-63.3	-64.2	-65.6	-66.9	-69.4	-73.8	-81.4	-97.2	-116.2
300.0	-63.9	-64.4	-65.2	-66.5	-68.0	-68.8	-69.9	-71.0	-73.3	-77.7	-85.8	-103.8	-123.4
400.0	-68.7	-68.9	-69.4	-70.1	-71.1	-71.7	-72.7	-73.8	-76.0	-80.6	-89.2	-108.8	-128.5
500.0	-72.4	-72.3	-72.4	-72.6	-73.3	-73.9	-74.8	-75.9	-78.1	-82.8	-92.1	-112.8	-132.5
600.0	-75.4	-74.9	-74.7	-74.6	-75.1	-75.6	-76.5	-77.6	-79.9	-84.8	-94.6	-116.2	-135.7
700.0	-77.9	-77.1	-76.6	-76.2	-76.6	-77.0	-77.9	-79.0	-81.4	-86.4	-96.8	-119.1	-138.5
800.0	-80.0	-78.8	-78.1	-77.5	-77.8	-78.3	-79.2	-80.3	-82.7	-87.9	-98.8	-121.7	-140.8
900.0	-81.8	-80.3	-79.4	-78.7	-78.9	-79.3	-80.3	-81.4	-83.8	-89.3	-100.7	-123.9	-142.9
1000.0	-83.4	-81.6	-80.6	-79.7	-79.9	-80.3	-81.2	-82.4	-84.9	-90.5	-102.4	-125.9	-144.7

1ELECTRIC FIELD CALCULATIONS

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******************  CORONA AND FIELDS PROGRAM Version 3 ****************
******************  Summit Ridge Run 50 34.5kV single   ****************
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	DIST. FROM REFERENCE FEET	HEIGHT FEET	MAXIMUM GRADIENT (KV/CM)	SUBCON. DIAM. (IN)	NO. OF SUBCON.	PHASE ANGLE (DEGREES)
PH.A-1	1.75	18.50	3.41	.90	1	.0
PH.B-1	-1.75	22.50	3.58	.90	1	-120.0
PH.C-1	1.75	26.50	3.46	.90	1	120.0
FOG-1	.00	31.00	.79	.49	1	.0

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	E-FIELD (KV/METER)	THETA (DEGREES)	EY-FIELD (KV/METER)	THETAY (DEGREES)	EX-FIELD (KV/METER)	THETAX (DEGREES)	SPACE POTENTIAL (VOLTS)
-1000.0	.000	89.6	.000	-34.0	.000	-32.6	.1
-900.0	.000	89.6	.000	-33.7	.000	-32.1	.1

-800.0	.000	89.5	.000	-33.3	.000	-31.5	.1
-700.0	.000	89.5	.000	-32.8	.000	-30.8	.2
-600.0	.000	89.4	.000	-32.1	.000	-29.7	.2
-500.0	.000	89.3	.000	-31.1	.000	-28.2	.3
-400.0	.001	89.1	.001	-29.7	.000	-25.9	.5
-300.0	.001	88.8	.001	-27.2	.000	-22.1	.9
-200.0	.002	88.2	.002	-22.1	.000	-13.9	2.0
-100.0	.007	86.6	.007	-5.5	.000	13.3	7.4
-100.0	.007	86.6	.007	-5.5	.000	13.3	7.4
-95.0	.008	86.4	.008	-3.6	.001	16.2	8.1
-90.0	.009	86.3	.009	-1.6	.001	19.4	9.0
-85.0	.010	86.0	.010	.7	.001	23.0	9.9
-80.0	.011	85.8	.011	3.3	.001	26.9	11.1
-75.0	.012	85.5	.012	6.2	.001	31.3	12.4
-70.0	.014	85.2	.014	9.6	.001	36.1	14.0
-65.0	.016	84.9	.016	13.4	.002	41.4	16.0
-60.0	.018	84.4	.018	17.7	.002	47.3	18.4
-55.0	.022	83.9	.021	22.8	.003	53.8	21.5
-50.0	.026	83.3	.025	28.6	.004	61.0	25.5
-45.0	.031	82.6	.031	35.4	.005	69.0	30.8
-40.0	.038	81.7	.038	43.2	.007	78.0	37.9
-35.0	.048	80.7	.048	52.2	.009	88.2	47.9
-30.0	.063	79.7	.062	62.6	.014	100.2	62.1
-25.0	.084	78.7	.082	74.8	.021	114.7	82.8
-20.0	.115	77.5	.113	89.3	.033	131.9	113.7
-15.0	.165	76.2	.160	106.7	.052	151.0	161.2
-10.0	.243	75.3	.235	126.6	.080	169.7	236.2
-5.0	.355	77.7	.347	145.9	.098	-172.5	342.3
.0	.454	85.1	.453	160.8	.069	-143.0	436.0
5.0	.454	94.6	.453	170.9	.057	-59.4	437.1
10.0	.356	102.3	.348	179.6	.083	-25.7	344.1
15.0	.238	106.3	.229	-170.2	.073	-14.9	232.1
20.0	.151	106.9	.145	-157.5	.049	-7.0	148.3
25.0	.098	104.8	.095	-142.6	.030	1.3	97.3
30.0	.069	101.7	.068	-127.5	.018	11.1	68.7
35.0	.052	99.0	.052	-114.1	.011	22.4	52.3
40.0	.042	97.4	.042	-103.2	.007	34.5	42.1
45.0	.035	96.4	.035	-94.7	.005	46.6	35.1
50.0	.030	95.8	.030	-88.0	.004	57.5	29.8
55.0	.026	95.4	.026	-82.8	.003	67.0	25.7
60.0	.022	95.1	.022	-78.6	.002	74.9	22.3
65.0	.020	94.9	.019	-75.2	.002	81.5	19.5
70.0	.017	94.6	.017	-72.3	.001	86.8	17.2
75.0	.015	94.4	.015	-69.9	.001	91.3	15.2
80.0	.014	94.2	.014	-67.8	.001	95.1	13.6
85.0	.012	94.0	.012	-65.9	.001	98.3	12.2
90.0	.011	93.9	.011	-64.3	.001	101.1	11.0
95.0	.010	93.7	.010	-62.9	.001	103.5	9.9
100.0	.009	93.6	.009	-61.6	.001	105.6	9.0
200.0	.002	91.9	.002	-49.6	.000	124.3	2.3
300.0	.001	91.3	.001	-45.5	.000	130.4	1.0
400.0	.001	90.9	.001	-43.3	.000	133.5	.6
500.0	.000	90.8	.000	-42.1	.000	135.4	.4
600.0	.000	90.6	.000	-41.2	.000	136.6	.3
700.0	.000	90.5	.000	-40.6	.000	137.6	.2
800.0	.000	90.5	.000	-40.1	.000	138.3	.1
900.0	.000	90.4	.000	-39.7	.000	138.9	.1
1000.0	.000	90.4	.000	-39.4	.000	139.2	.1

1MAGNETIC FIELD CALCULATIONS

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	B-FIELD (GAUSS)	THETA	BY-FIELD (GAUSS)	THETAY	BX-FIELD (GAUSS)	THETAX
-1000.0	.00002717	-177.8	.00001387	64.3	.00002716	151.1
-900.0	.00003353	-177.6	.00001713	64.8	.00003351	151.3
-800.0	.00004241	-177.3	.00002171	65.4	.00004237	151.4
-700.0	.00005535	-176.9	.00002840	66.1	.00005528	151.6
-600.0	.00007525	-176.4	.00003875	67.1	.00007514	151.9
-500.0	.00010818	-175.6	.00005598	68.5	.00010795	152.3
-400.0	.00016859	-174.5	.00008797	70.5	.00016803	152.9
-300.0	.00029830	-172.7	.00015807	73.8	.00029656	153.8
-200.0	.00066385	-169.2	.00036458	80.1	.00065537	155.9
-100.0	.00254043	-159.0	.00158147	95.8	.00242290	162.5
-100.0	.00254043	-159.0	.00158147	95.8	.00242290	162.5
-95.0	.00279923	-158.0	.00176603	97.2	.00265743	163.2
-90.0	.00309904	-156.8	.00198415	98.7	.00292647	164.0
-85.0	.00344886	-155.6	.00224421	100.4	.00323683	165.0
-80.0	.00386020	-154.2	.00255725	102.2	.00359700	166.0
-75.0	.00434805	-152.6	.00293804	104.1	.00401762	167.3
-70.0	.00493212	-150.8	.00340654	106.2	.00451210	168.7
-65.0	.00563866	-148.8	.00399023	108.5	.00509744	170.3
-60.0	.00650319	-146.5	.00472735	111.1	.00579528	172.3
-55.0	.00757448	-143.9	.00567206	113.9	.00663321	174.7
-50.0	.00892063	-140.9	.00690219	117.1	.00764635	177.6
-45.0	.01063825	-137.3	.00853110	120.7	.00887899	181.3
-40.0	.01286658	-133.1	.01072582	124.9	.01038597	185.9
-35.0	.01580895	-128.0	.01373377	129.8	.01223259	192.0
-30.0	.01976413	-121.8	.01791856	135.6	.01449095	200.0
-25.0	.02516622	-114.1	.02379318	142.7	.01723313	211.2
-20.0	.03261106	-104.2	.03197901	151.4	.02056310	227.1
-15.0	.04276299	-91.0	.04275895	162.0	.02504793	250.9
-10.0	.05578934	-72.9	.05409288	174.5	.03387623	-76.2
-5.0	.06970972	-48.4	.05721956	190.3	.05338385	-44.0
.0	.07860820	-18.0	.04207502	220.0	.07560018	-23.3
5.0	.07636786	14.5	.03647450	-75.4	.07438222	-10.8
10.0	.06484360	43.8	.04861780	-42.1	.05011641	1.4
15.0	.05099416	67.5	.04774233	-31.1	.02689516	21.7
20.0	.03906421	85.8	.03897717	-25.3	.01568136	55.9
25.0	.02996471	99.8	.02959560	-21.1	.01293017	88.3
30.0	.02329000	110.7	.02205035	-17.3	.01213304	106.5
35.0	.01841555	119.2	.01651147	-13.7	.01120168	116.4
40.0	.01481992	125.9	.01255203	-10.3	.01007666	122.3
45.0	.01212593	131.5	.00972183	-7.0	.00892866	126.2
50.0	.01007250	136.0	.00767565	-3.9	.00786060	129.0
55.0	.00848054	139.8	.00617231	-.9	.00691196	131.1
60.0	.00722646	143.0	.00504813	1.9	.00608846	132.8
65.0	.00622386	145.8	.00419252	4.6	.00538102	134.2
70.0	.00541146	148.2	.00353020	7.1	.00477551	135.4
75.0	.00474508	150.3	.00300931	9.4	.00425713	136.3
80.0	.00419240	152.1	.00259360	11.7	.00381232	137.2
85.0	.00372939	153.7	.00225732	13.7	.00342928	137.9
90.0	.00333794	155.2	.00198191	15.6	.00309804	138.6
95.0	.00300424	156.5	.00175380	17.4	.00281030	139.2
100.0	.00271760	157.6	.00156289	19.1	.00255922	139.7
200.0	.00068727	168.9	.00035307	38.1	.00067739	144.7
300.0	.00030532	172.6	.00015399	45.3	.00030339	146.4
400.0	.00017156	174.5	.00008614	48.9	.00017096	147.3
500.0	.00010970	175.6	.00005502	51.2	.00010946	147.8
600.0	.00007613	176.3	.00003818	52.6	.00007601	148.2
700.0	.00005590	176.8	.00002804	53.7	.00005584	148.4
800.0	.00004278	177.2	.00002147	54.5	.00004274	148.6
900.0	.00003379	177.5	.00001696	55.1	.00003377	148.8
1000.0	.00002736	177.8	.00001374	55.6	.00002735	148.9

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Û       C O R O N A   A N D   F I E L D       Û
Û E F F E C T S   P R O G R A M   V E R.  3   Û
Û   Source: Bonneville Power Administration    Û
ÛÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÛ


                           INPUT DATA LIST


           8/25/2009         07:32:33
 ******************  CORONA AND FIELDS PROGRAM Version 3 ****************
 ******************  Summit Ridge Run 2  34.5kV U/G trefoil *************
1,0, 3, 3,0.0,   1.00,   1.00,    .00

(ENGLISH UNITS OPTION)

(GRADIENTS ARE COMPUTED BY PROGRAM)

PHYSICAL SYSTEM CONSISTS OF  3 CONDUCTORS, OF WHICH  3 ARE ENERGIZED PHASES

OPTIONS: 'COMB'
  5.000,  5.000, 10.000,   .000,  1.000, 75.000,  7.280,  2.000,  7.280
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'COLB-1  ','A',     .00,     .10, 1,   1.170,    .000,  20.000,-120.000,    .600,    .000
'COLC-1  ','A',    -.17,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
 10-1000.0  100.0
 20 -100.0    5.0
 20     .0    5.0
 10  100.0  100.0
  0     .0     .0
1COMBINED OUTPUT OF AUDIBLE NOISE, RADIO NOISE, TVI, OZONE CONCENTRATION, GROUND GRADIENT AND MAGNETIC FIELD
 ******************  CORONA AND FIELDS PROGRAM Version 3 ****************
 ******************  Summit Ridge Run 2  34.5kV U/G trefoil *************
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	DIST. FROM CENTER OF TOWER (FEET)	HEIGHT (FEET)	MAXIMUM GRADIENT (KV/CM)	SUBCON DIAM. (IN)	NO. OF SUBCON	SUBCON SPACING (IN)	VOLTAGE L-N (KV)	PHASE ANGLE (DEGREES)	CURRENT (kAmps)	CORONA LOSSES (KW/MI)
COLA-1	.17	.25	8.19	1.17	1	.00	20.00	.00	.60	.068
COLB-1	.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.515
COLC-1	-.17	.25	8.19	1.17	1	.00	20.00	120.00	.60	.068

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AN MICROPHONE HT.=  5.0 FT, RI ANT. HT.=  5.0 FT, TV ANT. HT.= 10.0 FT, ALTITUDE=      .0 FT
RI FREQ=  1.000 MHZ, TV FREQ=  75.000 MHZ, WIND VEL.(OZ)= 1.000 MPH, GROUND CONDUCTIVITY =   2.0 MMHOS/M
E-FIELD TRANSDUCER HT.=  7.3FT, B-FIELD TRANSDUCER HT.=  7.3FT
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LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-1000.0	16.7	-8.3	-37.8	-54.8	-29.4	.000000	.000	.00000
-900.0	17.3	-7.7	-36.8	-53.8	-27.6	.000000	.000	.00000
-800.0	17.8	-7.2	-35.7	-52.7	-25.5	.000000	.000	.00000
-700.0	18.5	-6.5	-34.5	-51.5	-23.2	.000000	.000	.00000
-600.0	19.3	-5.7	-33.1	-50.1	-20.5	.000000	.000	.00000
-500.0	20.2	-4.8	-31.3	-48.3	-17.4	.000000	.000	.00000
-400.0	21.3	-3.7	-29.2	-46.2	-13.5	.000000	.000	.00001
-300.0	22.7	-2.3	-26.2	-43.2	-8.5	.000000	.000	.00001
-200.0	24.7	-.3	-21.6	-38.6	-1.5	.000000	.000	.00003
-100.0	28.1	3.1	-12.3	-29.3	10.5	.000000	.001	.00012
-100.0	28.1	3.1	-12.3	-29.3	10.5	.000000	.001	.00012
-95.0	28.4	3.4	-11.5	-28.5	11.4	.000000	.001	.00013

-90.0	28.7	3.7	-10.7	-27.7	12.3	.000000	.001	.00014
-85.0	28.9	3.9	-9.8	-26.8	13.3	.000000	.001	.00016
-80.0	29.2	4.2	-8.9	-25.9	14.4	.000000	.002	.00018
-75.0	29.6	4.6	-7.9	-24.9	15.5	.000000	.002	.00020
-70.0	29.9	4.9	-6.8	-23.8	16.6	.000000	.002	.00023
-65.0	30.3	5.3	-5.6	-22.6	17.9	.000000	.002	.00027
-60.0	30.7	5.7	-4.3	-21.3	19.3	.000000	.003	.00032
-55.0	31.1	6.1	-2.9	-19.9	20.7	.000000	.003	.00038
-50.0	31.5	6.5	-1.4	-18.4	22.3	.000000	.004	.00045
-45.0	32.1	7.1	.4	-16.6	24.1	.000000	.005	.00056
-40.0	32.6	7.6	2.3	-14.7	26.0	.000000	.006	.00070
-35.0	33.3	8.3	4.5	-12.5	28.2	.000000	.008	.00091
-30.0	34.0	9.0	7.1	-9.9	30.6	.000000	.011	.00122
-25.0	34.9	9.9	10.1	-6.9	33.4	.000000	.015	.00172
-20.0	36.0	11.0	13.8	-3.2	36.7	.000000	.023	.00258
-15.0	37.3	12.3	18.4	1.4	40.4	.000000	.037	.00422
-10.0	39.0	14.0	24.4	7.4	44.7	.000000	.068	.00776
-5.0	41.3	16.3	32.5	15.5	48.8	.000000	.134	.01558
.0	43.1	18.1	38.7	21.7	50.8	.000000	.196	.02344
5.0	41.3	16.3	32.5	15.5	48.8	11.280360	.134	.01558
10.0	39.0	14.0	24.4	7.4	44.7	6.214944	.068	.00776
15.0	37.3	12.3	18.4	1.4	40.4	4.385298	.037	.00422
20.0	36.0	11.0	13.8	-3.2	36.7	3.424144	.023	.00258
25.0	34.9	9.9	10.1	-6.9	33.4	2.826244	.015	.00172
30.0	34.0	9.0	7.1	-9.9	30.6	2.416094	.011	.00122
35.0	33.3	8.3	4.5	-12.5	28.2	2.116117	.008	.00091
40.0	32.6	7.6	2.3	-14.7	26.0	1.886542	.006	.00070
45.0	32.1	7.1	.4	-16.6	24.1	1.704808	.005	.00056
50.0	31.5	6.5	-1.4	-18.4	22.3	1.557127	.004	.00045
55.0	31.1	6.1	-2.9	-19.9	20.7	1.434585	.003	.00038
60.0	30.7	5.7	-4.3	-21.3	19.3	1.331154	.003	.00032
65.0	30.3	5.3	-5.6	-22.6	17.9	1.242604	.002	.00027
70.0	29.9	4.9	-6.8	-23.8	16.6	1.165880	.002	.00023
75.0	29.6	4.6	-7.9	-24.9	15.5	1.098716	.002	.00020
80.0	29.2	4.2	-8.9	-25.9	14.4	1.039396	.002	.00018
85.0	28.9	3.9	-9.8	-26.8	13.3	.986593	.001	.00016
90.0	28.7	3.7	-10.7	-27.7	12.3	.939268	.001	.00014
95.0	28.4	3.4	-11.5	-28.5	11.4	.896594	.001	.00013
100.0	28.1	3.1	-12.3	-29.3	10.5	.857903	.001	.00012
200.0	24.7	-.3	-21.6	-38.6	-1.5	.472664	.000	.00003
300.0	22.7	-2.3	-26.2	-43.2	-8.5	.333514	.000	.00001
400.0	21.3	-3.7	-29.2	-46.2	-13.5	.260415	.000	.00001
500.0	20.2	-4.8	-31.3	-48.3	-17.4	.214943	.000	.00000
600.0	19.3	-5.7	-33.1	-50.1	-20.5	.183750	.000	.00000
700.0	18.5	-6.5	-34.5	-51.5	-23.2	.160936	.000	.00000
800.0	17.8	-7.2	-35.7	-52.7	-25.5	.143477	.000	.00000
900.0	17.3	-7.7	-36.8	-53.8	-27.6	.129655	.000	.00000
1000.0	16.7	-8.3	-37.8	-54.8	-29.4	.118424	.000	.00000

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Û       C O R O N A   A N D   F I E L D      Û
Û E F F E C T S   P R O G R A M   V E R.  3   Û
Û   Source: Bonneville Power Administration   Û
ÛÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÛ
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INPUT DATA LIST

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                 8/25/2009         13:22:44
******************  CORONA AND FIELDS PROGRAM Version 3 ****************
******************  Summit Ridge Run 7  34.5kV U/G trefoil *************
1,0,18,18,0.0,   1.00,   1.00,    .00

(ENGLISH UNITS OPTION)

(GRADIENTS ARE COMPUTED BY PROGRAM)

PHYSICAL SYSTEM CONSISTS OF 18 CONDUCTORS, OF WHICH 18 ARE ENERGIZED PHASES

OPTIONS: 'COMB'
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'COLC-1  ','A',    -.17,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
'COLA-2  ','A',   10.17,     .25, 1,   1.170,    .000,  20.000,    .000,    .600,    .000
'COLB-2  ','A',   10.00,     .10, 1,   1.170,    .000,  20.000,-120.000,    .600,    .000
'COLC-2  ','A',    9.83,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
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'COLB-3  ','A',  -10.00,     .10, 1,   1.170,    .000,  20.000,-120.000,    .600,    .000
'COLC-3  ','A',  -10.17,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
'COLA-4  ','A',   20.17,     .25, 1,   1.170,    .000,  20.000,    .000,    .600,    .000
'COLB-4  ','A',   20.00,     .10, 1,   1.170,    .000,  20.000,-120.000,    .600,    .000
'COLC-4  ','A',   19.83,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
'COLA-5  ','A',  -19.83,     .25, 1,   1.170,    .000,  20.000,    .000,    .600,    .000
'COLB-5  ','A',  -20.00,     .10, 1,   1.170,    .000,  20.000,-120.000,    .600,    .000
'COLC-5  ','A',  -20.17,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
'COLA-6  ','A',   30.17,     .25, 1,   1.170,    .000,  20.000,    .000,    .600,    .000
'COLB-6  ','A',   30.00,     .10, 1,   1.170,    .000,  20.000,-120.000,    .600,    .000
'COLC-6  ','A',   29.83,     .25, 1,   1.170,    .000,  20.000, 120.000,    .600,    .000
 10-1000.0  100.0
 20 -100.0    5.0
 20     .0    5.0
 10  100.0  100.0
  0     .0     .0
1COMBINED OUTPUT OF AUDIBLE NOISE, RADIO NOISE, TVI, OZONE CONCENTRATION, GROUND GRADIENT AND MAGNETIC FIELD
******************  CORONA AND FIELDS PROGRAM Version 3 ****************
******************  Summit Ridge Run 6  34.5kV U/G trefoil *************
```

	DIST. FROM CENTER OF TOWER (FEET)	HEIGHT (FEET)	MAXIMUM GRADIENT (KV/CM)	SUBCON DIAM. (IN)	NO. OF SUBCON	SUBCON SPACING (IN)	VOLTAGE L-N (KV)	PHASE ANGLE (DEGREES)	CURRENT (kAmps)	CORONA LOSSES (KW/MI)
COLA-1	.17	.25	8.18	1.17	1	.00	20.00	.00	.60	.068
COLB-1	.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.516
COLC-1	-.17	.25	8.18	1.17	1	.00	20.00	120.00	.60	.068
COLA-2	10.17	.25	8.18	1.17	1	.00	20.00	.00	.60	.068
COLB-2	10.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.516
COLC-2	9.83	.25	8.18	1.17	1	.00	20.00	120.00	.60	.068
COLA-3	-9.83	.25	8.18	1.17	1	.00	20.00	.00	.60	.068
COLB-3	-10.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.516

COLC-3	-10.17	.25	8.18	1.17	1	.00	20.00	120.00	.60	.068
COLA-4	20.17	.25	8.18	1.17	1	.00	20.00	.00	.60	.068
COLB-4	20.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.516
COLC-4	19.83	.25	8.18	1.17	1	.00	20.00	120.00	.60	.068
COLA-5	-19.83	.25	8.18	1.17	1	.00	20.00	.00	.60	.068
COLB-5	-20.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.516
COLC-5	-20.17	.25	8.18	1.17	1	.00	20.00	120.00	.60	.068
COLA-6	30.17	.25	8.18	1.17	1	.00	20.00	.00	.60	.068
COLB-6	30.00	.10	13.19	1.17	1	.00	20.00	-120.00	.60	1.516
COLC-6	29.83	.25	8.18	1.17	1	.00	20.00	120.00	.60	.068

AN MICROPHONE HT.= 5.0 FT, RI ANT. HT.= 5.0 FT, TV ANT. HT.= 10.0 FT, ALTITUDE= .0 FT
RI FREQ= 1.000 MHZ, TV FREQ= 75.000 MHZ, WIND VEL.(OZ)= 1.000 MPH, GROUND CONDUCTIVITY = 2.0 MMHOS/M
E-FIELD TRANSDUCER HT.= 7.3FT, B-FIELD TRANSDUCER HT.= 7.3FT

LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-1000.0	24.5	-.5	-37.6	-54.6	-29.0	.000000	.000	.00001
-900.0	25.0	.0	-36.6	-53.6	-27.2	.000000	.000	.00001
-800.0	25.6	.6	-35.5	-52.5	-25.1	.000000	.000	.00001
-700.0	26.3	1.3	-34.2	-51.2	-22.7	.000000	.000	.00001
-600.0	27.0	2.0	-32.7	-49.7	-19.9	.000000	.000	.00002
-500.0	27.9	2.9	-30.9	-47.9	-16.6	.000000	.000	.00003
-400.0	29.0	4.0	-28.6	-45.6	-12.6	.000000	.000	.00004
-300.0	30.4	5.4	-25.5	-42.5	-7.3	.000000	.001	.00008
-200.0	32.4	7.4	-20.3	-37.3	.4	.000000	.002	.00017
-100.0	35.8	10.8	-8.9	-25.9	14.4	.000000	.006	.00068
-100.0	35.8	10.8	-8.9	-25.9	14.4	.000000	.006	.00068
-95.0	36.1	11.1	-7.9	-24.9	15.5	.000000	.007	.00076
-90.0	36.3	11.3	-6.8	-23.8	16.6	.000000	.008	.00085
-85.0	36.6	11.6	-5.6	-22.6	17.9	.000000	.009	.00095
-80.0	36.9	11.9	-4.3	-21.3	19.3	.000000	.010	.00108
-75.0	37.3	12.3	-2.9	-19.9	20.7	.000000	.011	.00124
-70.0	37.6	12.6	-1.4	-18.4	22.3	.000000	.013	.00144
-65.0	38.0	13.0	.4	-16.6	24.1	.000000	.015	.00170
-60.0	38.4	13.4	2.3	-14.7	26.0	.000000	.018	.00203
-55.0	38.9	13.9	4.5	-12.5	28.2	.000000	.022	.00247
-50.0	39.4	14.4	7.1	-9.9	30.6	.000000	.028	.00309
-45.0	40.0	15.0	10.1	-6.9	33.4	.000000	.036	.00401
-40.0	40.8	15.8	13.8	-3.2	36.7	.000000	.048	.00543
-35.0	41.6	16.6	18.4	1.4	40.4	.000000	.069	.00783
-30.0	42.8	17.8	24.4	7.4	44.7	.000000	.107	.01220
-25.0	44.3	19.3	32.5	15.5	48.8	.000000	.168	.01949
-20.0	45.8	20.8	38.7	21.7	50.8	.000000	.164	.01930
-15.0	45.9	20.9	32.5	15.5	48.8	11.280970	.064	.00662
-10.0	46.5	21.5	38.7	21.7	50.8	6.215283	.123	.01462
-5.0	46.3	21.3	32.5	15.5	48.8	15.666900	.032	.00282
.0	46.7	21.7	38.7	21.7	50.8	9.639826	.109	.01309
5.0	46.4	21.4	32.5	15.5	48.8	18.493500	.024	.00189
10.0	46.7	21.7	38.7	21.7	50.8	12.056200	.109	.01309
15.0	46.3	21.3	32.5	15.5	48.8	20.609880	.032	.00282
20.0	46.5	21.5	38.7	21.7	50.8	13.942960	.123	.01462
25.0	45.9	20.9	32.5	15.5	48.8	22.314800	.064	.00662
30.0	45.8	20.8	38.7	21.7	50.8	15.500210	.164	.01930
35.0	44.3	19.3	32.5	15.5	48.8	23.749110	.168	.01949
40.0	42.8	17.8	24.4	7.4	44.7	16.831260	.107	.01220
45.0	41.6	16.6	18.4	1.4	40.4	13.710700	.069	.00783
50.0	40.8	15.8	13.8	-3.2	36.7	11.781850	.048	.00543
55.0	40.0	15.0	10.1	-6.9	33.4	10.423880	.036	.00401
60.0	39.4	14.4	7.1	-9.9	30.6	9.396926	.028	.00309
65.0	38.9	13.9	4.5	-12.5	28.2	8.584094	.022	.00247
70.0	38.4	13.4	2.3	-14.7	26.0	7.919989	.018	.00203
75.0	38.0	13.0	.4	-16.6	24.1	7.364480	.015	.00170

80.0	37.6	12.6	-1.4	-18.4	22.3	6.891271	.013	.00144
85.0	37.3	12.3	-2.9	-19.9	20.7	6.482255	.011	.00124
90.0	36.9	11.9	-4.3	-21.3	19.3	6.124473	.010	.00108
95.0	36.6	11.6	-5.6	-22.6	17.9	5.808360	.009	.00095
100.0	36.3	11.3	-6.8	-23.8	16.6	5.526676	.008	.00085
200.0	32.7	7.7	-19.6	-36.6	1.4	2.916643	.002	.00019
300.0	30.6	5.6	-25.1	-42.1	-6.7	2.035851	.001	.00008
400.0	29.1	4.1	-28.4	-45.4	-12.1	1.581981	.000	.00004
500.0	28.0	3.0	-30.7	-47.7	-16.3	1.302200	.000	.00003
600.0	27.1	2.1	-32.6	-49.6	-19.6	1.111286	.000	.00002
700.0	26.3	1.3	-34.1	-51.1	-22.4	.972136	.000	.00001
800.0	25.7	.7	-35.4	-52.4	-24.9	.865902	.000	.00001
900.0	25.1	.1	-36.5	-53.5	-27.0	.781957	.000	.00001
1000.0	24.5	-.5	-37.5	-54.5	-28.9	.713836	.000	.00001

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EXHIBIT BB

OTHER INFORMATION

OAR 345-021-0010(1)(bb)

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BB.1 OTHER INFORMATION

OAR 345-021-0010(1)(bb) *Any other information that the Department requests in the Project order or in a notification regarding expedited review;*

Response: The Department did not request any information in the Project Order that is not otherwise addressed within this Application.

EXHIBIT CC

OTHER LEGAL CITATIONS

OAR 345-021-0010(1)(cc)

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CC.1 ADDITIONAL STATUTES, RULES, AND ORDINANCES..... 1

CC.1 ADDITIONAL STATUTES, RULES, AND ORDINANCES

OAR 345-021-0010(1)(cc) *Identification, by legal citation, of all state statutes and administrative rules and local government ordinances containing standards or criteria that the proposed facility must meet for the Council to issue a site certificate, other than statutes, rules and ordinances identified in Exhibit E, and identification of the agencies administering those statutes, administrative rules and ordinances. The applicant shall identify all statutes, administrative rules and ordinances that the applicant knows to be applicable to the proposed facility, whether or not identified in the project order. To the extent not addressed by other materials in the application, the applicant shall include a discussion of how the proposed facility meets the requirements of the applicable statutes, administrative rules and ordinances.*

Response: There are no other statutes, administrative rules, or ordinances that the Applicant must meet for the Council to issue a site certificate that were not addressed in Exhibit E.

EXHIBIT DD

SPECIFIC STANDARDS

OAR 345-021-0010(1)(dd)

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DD.1 INTRODUCTION 1

DD.2 WIND ENERGY FACILITIES 1

DD.1 INTRODUCTION

OAR 345-021-0010(1)(dd) *If the proposed facility is a facility for which the Council has adopted specific standards, information about the facility providing evidence to support findings by the Council as required by the following rules:*

DD.2 WIND ENERGY FACILITIES

OAR 345-021-0010(1)(dd)(A) *For wind energy facilities, OAR 345-024-0010 [To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant*:

(1) Can design, construct and operate the facility to exclude members of the public from close proximity to the turbine blades and electrical equipment.

Response: The Facility's substation site will be surrounded by a graveled, fenced area with transformer, control building with protective relaying, switching equipment and an area to park utility vehicles. Transformers will be non-polychlorinated biphenyl (PCB) oil-filled types, such as mineral oil.

During construction, access by the general public will not be permitted; only authorized personnel will be able to access the facility site. Authorized visitors will be required to check in with security. Construction personnel and security will monitor the project site to ensure only authorized personnel and visitors are present.

During operation of the Facility, all access to towers and electrical components including substations and turbines will be locked. Operation and access of these components will be restricted to authorized personnel only.

(2) Can design, construct and operate the facility to preclude structural failure of the tower or blades that could endanger the public safety and to have adequate safety devices and testing procedures designed to warn of impending failure and to minimize the consequences of such failure.]

Response: All towers and blades will be designed by a reputable wind turbine manufacturer and installation will follow manufacturer's requirements. All turbines have automated cut off devices to shut the equipment down when the turbine reaches the cut-out speed in order to prevent failure during a strong wind event. Routine monitoring and inspections of all turbine equipment will be conducted per the manufacturer's specifications.

In addition to cut-out speed shut offs, each turbine has vibration sensing equipment to shut down the turbine if vibration in excess of manufacturer's recommendations is detected. In the unlikely event of a blade manufacturing defect, the resulting vibration caused by aerodynamic or structural failure will trigger a shut down and prevent the type of failure that may otherwise result in a safety hazard.

and -0015 [To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant can design and construct the facility to reduce cumulative adverse environmental effects in the vicinity by practicable measures including, but not limited to, the following:

(1) Using existing roads to provide access to the facility site, or if new roads are needed, minimizing the amount of land used for new roads and locating them to reduce adverse environmental impacts.

Response: The Summit Ridge Wind Farm Facility will consist of approximately 25 miles of new access roads and renovation or improvement of approximately six miles of existing roads. Both new and existing roads will be improved to the following general configurations: 20-foot-wide graveled surfaces and 10-foot compacted shoulders that will allow crane access during construction. To minimize environmental impacts, erosion control and drainage best management practices will be included in the design of all roads. After the completion of construction, the roads will be restored to 20-foot width for general use during operations. Restoration will include ripping or tilling compacted soil and re-vegetating with species native to the site.

To the extent possible, new access roads will be constructed to avoid sensitive areas such as wetlands, significant communities of rare plants, archeological/cultural resources, and known raptor nests.

(2) Using underground transmission lines and combining transmission routes.

Response: As described in Exhibit B (B.8.4), the Facility's electrical system will consist of the following: an underground 34.5 kV power collection system, a facility substation, eight miles of 230 kV overhead transmission and an interconnection facility consisting of a three ring breaker bus to tie into the 230 kV BPA Big Eddy to Maupin-Redmond transmission line.

Cables will be buried to the greatest extent practicable to avoid impacts to sensitive resources and comply with safety requirements. Cables will be buried approximately three or more feet below the ground surface, in a trench up to three feet wide and generally following alongside access roads. To minimize environmental impacts, these cables will generally be combined in the same ditch with the fiber optic cables interconnecting the SCADA system.

While not the preferred method, the collector cables might be constructed above ground in some locations, likely on wood poles. Examples of specific conditions that will make it environmentally advantageous to run portions of the collection system above ground are as follows:

- Steep terrain where the use of backhoes and trenching machines would be infeasible or unsafe;
- Stream and wetland crossings where an aboveground line avoids or minimizes environmental impacts;
- Avoidance of significant communities of rare plants or archeological/cultural resources;
- Soil with low thermal conductivity preventing adequate heat dissipation from the conductor; and/or
- Rocky conditions that would significantly increase ground impacts or fail to achieve the required heat dissipation.

Until the final layout, including substation location through micrositing, is established, and site-specific geotechnical borings have been studied, the Applicant will not know if any additional above ground collector cables, beyond the projected eight miles of overhead transmission lines, will be required, but it is anticipated that no more than 10 percent of the collector system would be above ground.

(3) Connecting the facility to existing substations, or if new substations are needed, minimizing the number of new substations.

Response: The facility substation will step up the power from 34.5 kV to 230 kV. There will also be a substation at the point of interconnection with the BPA transmission system. As described in Exhibit B, the Facility is expected to be interconnected to the 230 kV Bonneville Power Administration Big Eddy to Maupin-Redmond transmission line via approximately eight miles of 230 kV overhead transmission lines.

The additional interconnect substation equipment may include circuit breakers, bus and insulators, disconnect switches, relaying, battery and charger, surge arrestors, AC and DC supplies, control house, metering equipment, SCADA provision, grounding, and associated control wiring. The facilities will conform to all applicable BPA regulations and electrical codes, as required.

(4) Designing the facility to reduce the risk of injury to raptors or other vulnerable wildlife in areas near turbines or electrical equipment.

Response: As described in Exhibit P, the Facility will be designed to reduce the risk to raptors through adherence of the 1996 Avian Powerline Interaction Committee (APLIC) recommended practices for raptor protection on power lines. The Facility will reduce the risk of adverse impacts to wildlife by minimizing disturbance areas to the greatest extent practicable and mitigating for any unavoidable impacts to wildlife per ODFW's mitigation guidelines.

(5) Designing the components of the facility to minimize adverse visual features.

Response: All visual features such as large logos, signs, and other similar components will be minimized as appropriate, without jeopardizing personnel or public safety. Unnecessary and unusual visual features will not be added to project components. Further information on visual resource impacts from larger project components is provided in Exhibit R.

(6) Using the minimum lighting necessary for safety and security purposes and using techniques to prevent casting glare from the site, except as otherwise required by the Federal Aviation Administration or the Oregon Department of Aviation.

Response: Some of the turbines will include the minimum aviation warning lights required by the Federal Aviation Administration (FAA). The applicant will suggest that FAA lighting only be placed on the highest turbines within each string and at the ends of each string to minimize light impacts from the project site. However, the exact number of turbines with lights and the lighting pattern of the turbines will be determined in consultation with the FAA.

The O&M facility area will be secured and will have outside lighting directed downward to limit night glare.

OAR 345-021-0010(1)(dd)(B) *For surface facilities related to underground gas storage reservoirs, OAR 345-024-0030, including information required by OAR 345-021-0020.*

Response: Not Applicable.

OAR 345-021-0010(1)(dd)(C) *For any transmission line under Council jurisdiction, OAR 345-024-0090. [To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:*

(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;

Response: Please refer to Figure AA-1E in Exhibit AA. The figure shows that the electric field at the edge of the right-of-way for the 230-kV transmission line is estimated to be a maximum of 0.5 kV per meter, which is well under the 9 kV per meter standard.

Electric field strength for the overhead 34.5-kV collector circuit is shown on Figure AA-2E. The maximum electric field strength at any location in the circuit corridor is about 0.5 kV per meter, which is well under the 9 kV per meter standard.

Electric field strength for the underground 34.5-kV collector circuits is not computed. For the insulated and shielded underground cables, the electric field is contained within the insulation and any resulting electric field at ground level is not measurable.

(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.]

Response: The electric fields produced by alternating current transmission lines can induce current or voltage in nearby conductive objects. Induced currents are not hazardous to people but can be a concern for communication lines and pipelines that parallel transmission lines. There are no communication lines or metal pipelines that parallel the transmission line for any distance that would cause concern.

The transmission line is proposed to be routed in remote areas with little development; therefore there are few structures or objects that might be affected by induced currents or voltage. Structures that might be affected, including metal fences that run parallel to the transmission line or structures with metal siding or roofing in close proximity to the line, will be grounded by LotusWorks – Summit Ridge I, LLC to minimize the occurrence of induced voltages, if requested by the structure owner.